

HOMO SAPIENS?

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Introduction¹

Can humans really claim to be wise?

Humans, in their arrogance, call themselves not just “Homo sapiens”, but “Homo sapiens sapiens”, the “wisest of the wise”! Admittedly, our species has enormous technical and scientific progress to its credit, as well as great cultural achievements. But wisdom? Wisdom is another matter entirely. Our suicidal wars against nature and against each other can hardly be called wise.

The insanity of nuclear war

War was always madness, always immoral, always the cause of unspeakable suffering, economic waste and widespread destruction, and always a source of poverty, hate, barbarism and endless cycles of revenge and counter-revenge. It has always been a crime for soldiers to kill people, just as it is a crime for murderers in civil society to kill people. No flag has ever been wide enough to cover up atrocities.

But today, the development of all-destroying thermonuclear weapons has put war completely beyond the bounds of sanity and elementary humanity

Just as the leaders who started World War I had no imaginative idea of what it would be like, so our current leaders seem not to understand what a war with thermonuclear weapons would be like. During the Cold War, driven by collective paranoia, enough nuclear weapons were produced to destroy human civilization entirely, together with much of the biosphere. The collective explosive power of these warheads was equivalent to 20,000,000,000 tons of TNT, i.e., 4 tons for every man, woman and child on the planet. Expressed differently, the explosive power of these weapons was roughly a million times greater than the power of the bombs that produced the horrors of Hiroshima and Nagasaki. Today, the existing nuclear weapons have “only” half a million times the power of the bombs that devastated the two Japanese cities. But this does not change the fact that a thermonuclear war would destroy human civilization, together with most of the plants and animals with which we share the gift of life.

¹This book draws heavily on chapters that I have previously published in various books, but a considerable amount of new material has been added

Research has shown that fire-storms produced by a nuclear war would send vast quantities of smoke into the atmosphere, blocking sunlight, and blocking the hydrological cycle. The climate would become very cold for a period of about ten years. Human agriculture would fail. Plants and animals would also be killed by the nuclear winter.

Ukraine and the threat of nuclear war

Besides illegally and brutally invading Ukraine, Russia's Vladimir Putin has put Russian nuclear forces on high alert, thus threatening the world with nuclear war.

Our failure to address the climate emergency

An equally serious lack of wisdom can be seen in the world's collective failure to adequately address the climate emergency. Recent reports by the International Panel on Climate Change (IPCC) tell us that the situation is very grave indeed. We are close to tipping points, beyond which human efforts to avoid catastrophe may become useless, as feedback loops take over and drive us towards disaster.

The Keeling curve measures the concentration of atmospheric CO₂. Despite conferences, speeches, and promises, the Keeling curve keeps steadily rising, and its rate of rising is also increasing.

Sacrificing the earth for the sake of the economy

Humans tend to see what is near to them more clearly than what is far away. The basic problem in mobilizing political will to address the climate emergency is that immediate action is urgently needed, but the worst effects of catastrophic climate change lie in the distant future. What every nation seems to do is to give its economy higher priority than the urgent need to save the earth. If we fail to prevent catastrophic climate change, most of the earth's surface will become uninhabitable, and the global population of humans will be correspondingly reduced, no doubt with much conflict. Is this wisdom?

We need wisdom before it is too late

Our species urgently needs wisdom to save us from the danger that our arrogance and folly have created. Can we not try to save ourselves by actually becoming Homo sapiens?

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Chapter 1

THE CHEMISTRY OF EMOTIONS

1.1 Darwin's book on emotions

In *The Origin of Species*, Charles Darwin devoted a chapter to the evolution of instincts, and he later published a separate book on *The Expression of the Emotions in Man and Animals*. Because of these pioneering studies, Darwin is considered to be the founder of ethology.

Behind Darwin's work in this field is the observation that instinctive behavior patterns are just as reliably inherited as morphological characteristics. Darwin was also impressed by the fact that within a given species, behavior patterns have some degree of uniformity, and the fact that the different species within a family are related by similarities of instinctive behavior, just as they are related by similarities of bodily form. For example, certain elements of cat-like behavior can be found among all members of the cat family; and certain elements of dog-like or wolf-like behavior can be found among all members of the dog family. On the other hand, there are small variations in instinct among the members of a given species. For example, not all domestic dogs behave in the same way.

"Let us look at the familiar case of breeds of dogs", Darwin wrote in *The Origin of Species*, "It cannot be doubted that young pointers will sometimes point and even back other dogs the very first time they are taken out; retrieving is certainly in some degree inherited by retrievers; and a tendency to run round, instead of at, a flock of sheep by shepherd dogs. I cannot see that these actions, performed without experience by the young, and in nearly the same manner by each individual, and without the end being known - for the young pointer can no more know that he points to aid his master than the white butterfly knows why she lays her eggs on the leaf of the cabbage - I cannot see that these actions differ essentially from true instincts..."

"How strongly these domestic instincts habits and dispositions are inherited, and how curiously they become mingled, is well shown when different breeds of dogs are crossed. Thus it is known that a cross with a bulldog has affected for many generations the courage and obstinacy of greyhounds; and a cross with a greyhound has given to a whole family of shepherd dogs a tendency to hunt hares..."

Darwin believed that in nature, desirable variations of instinct are propagated by natural selection, just as in the domestication of animals, favorable variations of instinct are selected and propagated by kennelmen and stock breeders. In this way, according to Darwin, complex and highly developed instincts, such as the comb-making instinct of honey-bees, have evolved by natural selection from simpler instincts, such as the instinct by which bumble bees use their old cocoons to hold honey and sometimes add a short wax tube.

In the introduction of his book, *The Expression of the Emotions in Man and Animals*, Darwin says “I thought it very important to ascertain whether the same expressions and gestures prevail, as has often been asserted without much evidence, with all the races of mankind, especially with those who have associated but little with Europeans. Whenever the same movements of the features or body express the same emotions in several distinct races of man, we may infer with much probability, that such expressions are true ones, - that is, are innate or instinctive.”

To gather evidence on this point, Darwin sent a printed questionnaire on the expression of human emotions and sent it to missionaries and colonial administrators in many parts of the world. There were 16 questions to be answered:

1. *Is astonishment expressed by the eyes and mouth being opened wide, and by the eyebrows being raised?*
2. *Does shame excite a blush when the colour of the skin allows it to be visible? and especially how low down on the body does the blush extend?*
3. *When a man is indignant or defiant does he frown, hold his body and head erect, square his shoulders and clench his fists?*
4. *When considering deeply on any subject, or trying to understand any puzzle, does he frown, or wrinkle the skin beneath the lower eyelids?*

and so on.

Darwin received 36 replies to his questionnaire, many coming from people who were in contact with extremely distinct and isolated groups of humans. The results convinced him that our emotions and the means by which they are expressed are to a very large extent innate, rather than culturally determined, since the answers to his questionnaire were so uniform and so independent of both culture and race. In preparation for his book, he also closely observed the emotions and their expression in very young babies and children, hoping to see inherited characteristics in subjects too young to have been greatly influenced by culture. Darwin’s observations convinced him that in humans, just as in other mammals, the emotions and their expression are to a very large extent inherited universal characteristics of the species.

The study of inherited behavior patterns in animals (and humans) was continued in the 20th century by such researchers as Karl von Frisch (1886-1982), Nikolaas Tinbergen (1907-1988), and Konrad Lorenz (1903-1989), three scientists who shared a Nobel Prize in Medicine and Physiology in 1973.

Karl von Frisch, the first of the three ethologists who shared the 1973 prize, is famous for his studies of the waggle-dance of honeybees. Bees guide each other to sources of food by a genetically programmed signaling method - the famous waggle dance, deciphered in 1945 by von Frisch. When a worker bee has found a promising food source, she returns to the hive and performs a complex dance, the pattern of which indicates both the direction and distance of the food. The dancer moves repeatedly in a pattern resembling the Greek letter Θ . If the food-discoverer is able to perform her dance on a horizontal flat surface in view of the sun, the line in the center of the pattern points in the direction of the food. However, if the dance is performed in the interior of the hive on a vertical surface, gravity takes the place of the sun, and the angle between the central line and the vertical represents the angle between the food source and the sun.

The central part of the dance is, in a way, a re-enactment of the excited forager's flight to the food. As she traverses the central portion of the pattern, she buzzes her wings and waggles her abdomen rapidly, the number of waggles indicating the approximate distance to the food ¹. After this central portion of the dance, she turns alternately to the left or to the right, following one or the other of the semicircles, and repeats the performance. Studies of the accuracy with which her hive-mates follow these instructions show that the waggle dance is able to convey approximately 7 bits of information - 3 bits concerning distance and 4 bits concerning direction. After making his initial discovery of the meaning of the dance, von Frisch studied the waggle dance in many species of bees. He was able to distinguish species-specific dialects, and to establish a plausible explanation for the evolution of the dance.

Among the achievements for which Tinbergen is famous are his classic studies of instinct in herring gulls. He noticed that the newly-hatched chick of a herring gull pecks at the beak of its parent, and this signal causes the parent gull to regurgitate food into the gaping beak of the chick. Tinbergen wondered what signal causes the chick to initiate this response by pecking at the beak of the parent gull. Therefore he constructed a series of models of the parent in which certain features of the adult gull were realistically represented while other features were crudely represented or left out entirely. He found by trial and error that the essential signal to which the chick responds is the red spot on the tip of its parent's beak. Models which lacked the red spot produced almost no response from the young chick, although in other respects they were realistic models; and the red spot on an otherwise crude model would make the chick peck with great regularity.

In other experiments, Tinbergen explored the response of newly-hatched chicks of the common domestic hen to models representing a hawk. Since the chicks were able to recognize a hawk immediately after hatching, he knew that the response must be genetically programmed. Just as he had done in his experiments with herring gulls, Tinbergen experimented with various models, trying to determine the crucial characteristic that was recognized by the chicks, causing them to run for cover. He discovered that a crude model in the shape of the letter T invariable caused the response if pulled across the sky with the

¹The number of waggles is largest when the source of food is near, and for extremely nearby food, the bees use another dance, the "round dance".

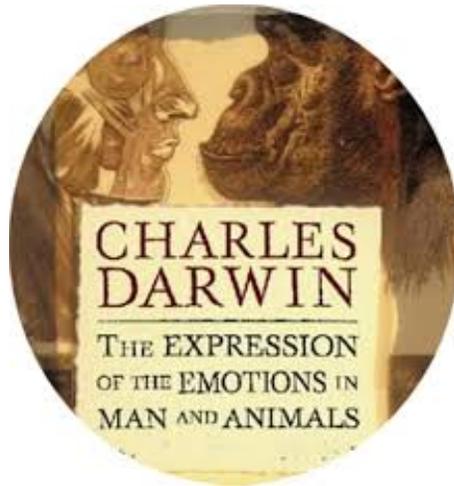


Figure 1.1: Charles Darwin discussed inherited behaviour patterns in *The Origin of Species*. He later published a separate book on this subject entitled *The Expression of Emotions in Man and Animals*.

wings first and tail last. (Pulled backwards, the T shape caused no response.)

In the case of a newly-hatched herring gull chick pecking at the red spot on the beak of its parent, the program in the chick's brain must be entirely genetically determined, without any environmental component at all. Learning cannot play a part in this behavioral pattern, since the pattern is present in the young chick from the very moment when it breaks out of the egg. On the other hand (Tinbergen pointed out) many behavioral patterns in animals and in man have both an hereditary component and an environmental component. Learning is often very important, but learning seems to be built on a foundation of genetic predisposition.

To illustrate this point, Tinbergen called attention to the case of sheep-dogs, whose remote ancestors were wolves. These dogs, Tinbergen tells us, can easily be trained to drive a flock of sheep towards the shepherd. However, it is difficult to train them to drive the sheep away from their master. Tinbergen explained this by saying that the sheep-dogs regard the shepherd as their "pack leader"; and since driving the prey towards the pack leader is part of the hunting instinct of wolves, it is easy to teach the dogs this maneuver. However, driving the prey away from the pack leader would not make sense for wolves hunting in a pack; it is not part of the instinctive makeup of wolves, nor is it a natural pattern of behavior for their remote descendants, the sheep-dogs.

As a further example of the fact that learning is usually built on a foundation of genetic predisposition, Tinbergen mentions the ease with which human babies learn languages. The language learned is determined by the baby's environment; but the astonishing ease with which a human baby learns to speak and understand implies a large degree of genetic predisposition.



Figure 1.2: A baby crying, one of the illustrations in *The Expression of Emotions in Man and Animals*.



Figure 1.3: Another illustration in Darwin's book, *The Expression of Emotions in Man and Animals* shows an expression of horror on the face of a man. This expression was induced by an electrical shock, showing the human facial musculature is capable of forming the expression of horror automatically, if properly induced.



Figure 1.4: Another illustration in Darwin's book shows a dog's face expressing threat when confronting an enemy.

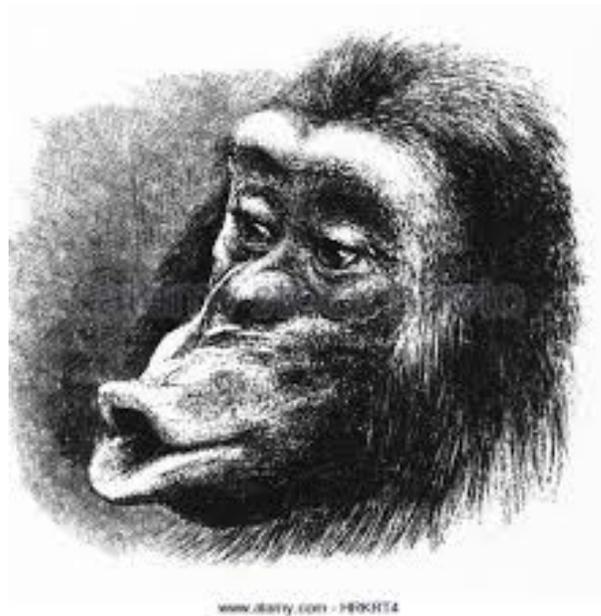


Figure 1.5: An ape expressing affection.

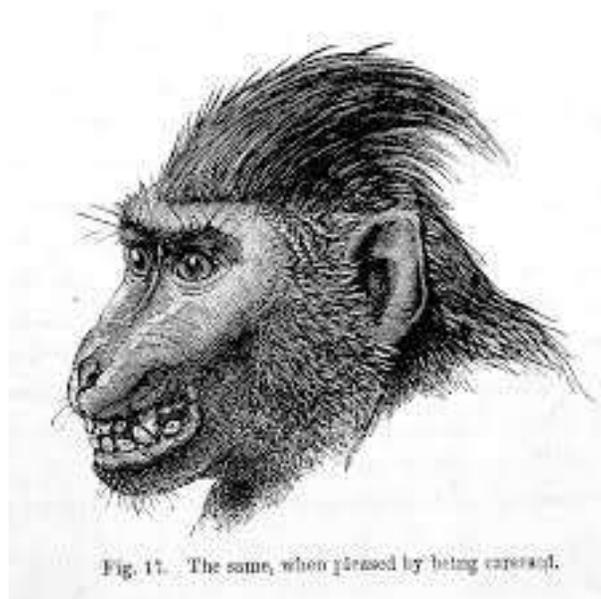


Figure 1.6: The same animal expressing threat. Both drawings are illustrations from Darwin's book.

1.2 Brain chemistry

Emotions in humans and in animals have an extremely long evolutionary history. Chemicals that affect behaviour are present in even the most primitive forms of multicellular organisms, even in slime molds, which are at the exact borderline between single-celled multicellular organisms. Cyclic AMP has been shown to be the molecule that expresses slime mold unhappiness!

Not only do cells communicate by touching each other and recognizing each other's cell surface antigens - they also communicate by secreting and absorbing transmitter molecules. For example, the group behavior of slime mold cells is coordinated by the cyclic adenosine monophosphate molecules, which the cells secrete when distressed.

Within most multicellular organisms, cooperative behavior of cells is coordinated by molecules such as hormones - chemical messengers. These are recognized by "receptors", the mechanism of recognition once again depending on complementarity of charge distributions and shape. Receptors on the surfaces of cells are often membrane-bound proteins which reach from the exterior of the membrane to the interior. When an external transmitter molecule is bound to a receptor site on the outside part of the protein, it causes a conformational change which releases a bound molecule of a different type from a site on the inside part of the protein, thus carrying the signal to the cell's interior. In other cases the messenger molecule passes through the cell membrane.

In this way the individual cell in a society of cells (a multicellular organism) is told when to divide and when to stop dividing, and what its special role will be in the economy of the cell society (differentiation). For example, in humans, follicle-stimulating hormone, luteinizing hormone, prolactin, estrogen and progesterone are among the chemical messengers which cause the cell differentiation needed to create the secondary sexual characteristics of females.

Another role of chemical messengers in multicellular organisms is to maintain a reasonably constant internal environment in spite of drastic changes in the external environment of individual cells or of the organism as a whole (homeostasis). An example of such a homeostatic chemical messenger is the hormone insulin, which is found in humans and other mammals. The rate of its release by secretory cells in the pancreas is increased by high concentrations of glucose in the blood. Insulin carries the news of high glucose levels to target cells in the liver, where the glucose is converted to glycogen, and to other target cells in the muscles, where the glucose is burned.

1.3 Nervous systems

Hormones require a considerable amount of time to diffuse from the cells where they originate to their target cells; but animals often need to act very quickly, in fractions of seconds, to avoid danger or to obtain food. Because of the need for quick responses, a second system of communication has evolved - the system of neurons.

Neurons have a cell bodies, nuclei, mitochondria and other usual features of eukaryotic

cells, but in addition they possess extremely long and thin tubelike extensions called axons and dendrites. The axons function as informational output channels, while the dendrites are inputs. These very long extensions of neurons connect them with other neurons which can be at distant sites, to which they are able to transmit electrical signals. The complex network of neurons within a multicellular organism, its nervous system, is divided into three parts. A sensory or input part brings in signals from the organism's interior or from its external environment. An effector or output part produces a response to the input signal, for example by initiating muscular contraction.

Between the sensory and effector parts of the nervous system is a message-processing (internuncial) part, whose complexity is not great in the jellyfish or the leech. However, the complexity of the internuncial part of the nervous system increases dramatically as one goes upward in the evolutionary order of animals, and in humans it is truly astonishing.

1.4 Chemical synapses

The small button-like connections between neurons are called synapses. When an electrical signal propagating along an axon reaches a synapse, it releases a chemical transmitter substance into the tiny volume between the synapse and the next neuron (the post-synaptic cleft). Depending on the nature of the synapse, this chemical messenger may either cause the next neuron to "fire" (i.e., to produce an electrical pulse along its axon) or it may inhibit the firing of the neuron. Furthermore, the question of whether a neuron will or will not fire depends on the past history of its synapses. Because of this feature, the internuncial part of an animal's nervous system is able to learn. There are many kinds of synapses and many kinds of neurotransmitters, and the response of synapses is sensitive to the concentration of various molecules in the blood, a fact which helps to give the nervous systems of higher animals extraordinary subtlety and complexity.

1.5 Neurotransmitters

The first known neurotransmitter molecule, acetylcholine, was discovered jointly by Sir Henry Dale in England and by Otto Loewi in Germany. In 1921 Loewi was able to show that nerve endings transmit information to muscles by means of this substance.

The idea for the critical experiment occurred to him in a dream at 3 am. Otto Loewi woke up and wrote down the idea; but in the morning he could not read what he had written. Luckily he had the same dream the following night. This time he took no chances. He got up, drank some coffee, and spent the whole night working in his laboratory. By morning he had shown that nerve cells separated from the muscle of a frog's heart secrete a chemical substance when stimulated, and that this substance is able to cause contractions of the heart of another frog.

Sir Henry Dale later showed that Otto Loewi's transmitter molecule was identical to acetylcholine, which Dale had isolated from the ergot fungus in 1910. The two men shared

a Nobel Prize in 1936. Since that time, a large variety of neurotransmitter molecules have been isolated. Among the excitatory neurotransmitters (in addition to acetylcholine) are noradrenalin, norepinephrine, serotonin, dopamine, and glutamate, while gamma-aminobutyric acid is an example of an inhibitory neurotransmitter.

Some important neurotransmitters

- **Glutamate:** This is the most abundant neurotransmitter in humans, used by about half of the neurons in the human brain. It is the primary excitatory transmitter in the central nervous system. One of its functions is to help form memories.
- **GABA:** The name GABA is an acronym for Gamma-aminobutyric acid. GABA is the primary inhibitory transmitter in the vertebrate brain. It helps to control anxiety, and it is sometimes used medically to treat anxiety and the associated sleeplessness.
- **Glycine:** This neurotransmitter is a single amino acid. It is the main inhibitory neurotransmitter in the vertebrate spinal cord. Glycine is important in the central nervous system, especially in the spinal cord, brainstem, and retina.
- **Acetylcholine:** An ester (the organic analogue of a salt) formed from the reaction between choline and acetic acid, acetylcholine stimulates muscles, functions in the autonomic nervous system and sensory neurons, and is associated with REM sleep. Alzheimer's disease is associated with a significant drop in acetylcholine levels.
- **Norepinephrine:** Also known as noradrenaline, norepinephrine increases heart rate and blood pressure. It is part of the body's "fight or flight" system. Norepinephrine is also needed to form memories. Stress depletes stores of this neurotransmitter.
- **Dopamine:** Dopamine is also synthesized in plants and most animals. It is an inhibitory transmitter associated with the reward center of the brain. Low dopamine levels are associated with social anxiety and Parkinson's disease, while excess dopamine is related to schizophrenia. The brain includes several distinct dopamine pathways, one of which plays a major role in reward-motivated behavior. Most types of rewards increase the level of dopamine in the brain, and many addictive drugs increase dopamine neuronal activity.
- **Serotonin:** Biochemically derived from the amino acid tryptophan, serotonin is an inhibitory neurotransmitter involved in mood, emotion, and perception. Low serotonin levels can lead to depression, suicidal tendencies, anger management issues, difficulty sleeping, migraines, and an increased craving for carbohydrates. Its functions include the regulation of mood, appetite, and sleep. Serotonin also has some cognitive functions, including memory and learning.

- **Endorphins:** The name of this class of neurotransmitters means “a class of a morphine-like substance originating from within the body”. are a class of molecules similar to opioids (e.g., morphine, heroin) in terms of structure and function. The word “endorphin” is short for “endogenous morphine.” Endorphins are inhibitory transmitters associated with pleasure and pain relief. In other animals, these chemicals slow metabolism and permit hibernation. The treatment of pain by means of acupuncture functions by releasing endorphines.

Pleasure versus happiness

Pleasure is fleeting. Happiness lasts. Pleasure is addictive, but happiness is not. Pleasure craves more and more of everything. Happiness can be content with very little. These characteristics make happiness a better goal than pleasure. Interestingly, the neurotransmitter dopamine is associated with pleasure, while serotonin is associated with happiness.²

1.6 Oxytocin, the “love hormone”

Besides discovering acetylcholine, Sir Henry Dale also discovered, in 1906. the peptide hormone Oxytocin, which has sometimes been called the “love hormone”. Oxytocin plays a role in social bonding and sexual reproduction in both sexes. During childbirth, Oxytocin is released into the bloodstream of women in response to stretching of the cervix and uterus during labour, and also in response to breastfeeding. The hormone then facilitates the bonding between mother and child. Oxytocin is also present in men and its concentration in their bloodstream increases in response to romantic attachments and social bonding.

A very similar hormone, with similar functions, is also present in other mammals besides humans.

²See, for example, <https://gobeyondlifestyle.com/happiness-vs-pleasure-root-addiction/>

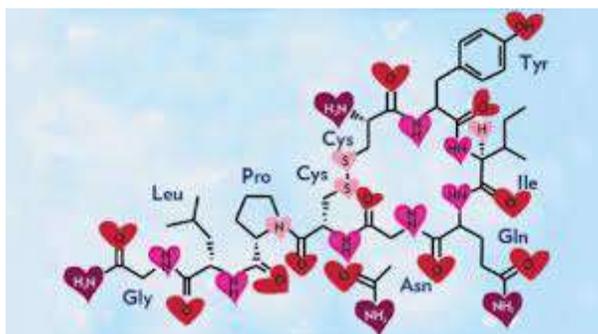


Figure 1.7: An artist’s impression of the structure of oxytocin

1.7 Mother love and rage

We can recognize many of our own emotions in other mammals. Among these are mother love and rage. Interestingly these two emotions are associated respectively with oxytocin and testosterone.

One of the most beautiful emotions is the love that women exhibit towards their children. We must all be grateful that women are willing to undergo the danger and pain of childbirth. We must be grateful for the devotion that they show to their children and families.

Both humans and most other animals compete for dominance and mating rights. In humans, mating displays and struggles for dominance lead to what the economist Thorstein Veblen called “conspicuous consumption”. Overconsumption in industrialized nations is one of the factors driving the world towards an ecological catastrophe.



Figure 1.8: Mother love: One of the most beautiful emotions.



Figure 1.9: Mother love.



Figure 1.10: Mother love



Figure 1.11: Mother love:



Figure 1.12: Mother love



Figure 1.13: Mother love



Figure 1.14: **Mother love**



Figure 1.15: **Mother love:** Although we recognize the emotions of mammals most clearly as being similar to our own, animals less closely related to ourselves also exhibit emotions that we can recognize. For example, birds are devoted to their young and make great sacrifices to help and protect them.



Figure 1.16: Male animals fighting for dominance and mating rights

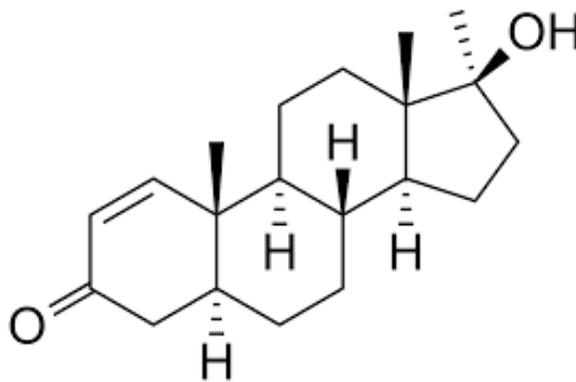


Figure 1.17: Testosterone is a hormone present in large quantities in males and much smaller amounts in females. It is involved in rank-determining fights and mating.



Figure 1.18: Male lions fighting for dominance and mating rights.



Figure 1.19: In Shakespeare's poetic tragedy, *Romeo and Juliet*, we see many human emotions on display: males fighting for dominance and mating rights (testosterone), romantic attachment (oxytocin), and tribalism (Montagues versus Capulets). The dangers of tribalism in an age of genocidal and potentially omniscient thermonuclear weapons will be discussed in another chapter.

1.8 Nervous systems

Hormones require a considerable amount of time to diffuse from the cells where they originate to their target cells; but animals often need to act very quickly, in fractions of seconds, to avoid danger or to obtain food. Because of the need for quick responses, a second system of communication has evolved - the system of neurons.

Neurons have a cell bodies, nuclei, mitochondria and other usual features of eukaryotic cells, but in addition they possess extremely long and thin tubelike extensions called axons and dendrites. The axons function as informational output channels, while the dendrites are inputs. These very long extensions of neurons connect them with other neurons which can be at distant sites, to which they are able to transmit electrical signals. The complex network of neurons within a multicellular organism, its nervous system, is divided into three parts. A sensory or input part brings in signals from the organism's interior or from its external environment. An effector or output part produces a response to the input signal, for example by initiating muscular contraction. Between the sensory and effector parts of the nervous system is a message-processing (internuncial) part, whose complexity is not great in the jellyfish or the leech. However, the complexity of the internuncial part of the nervous system increases dramatically as one goes upward in the evolutionary order of animals, and in humans it is truly astonishing.

The small button-like connections between neurons are called synapses. When an electrical signal propagating along an axon reaches a synapse, it releases a chemical transmitter substance into the tiny volume between the synapse and the next neuron (the post-synaptic cleft). Depending on the nature of the synapse, this chemical messenger may either cause the next neuron to "fire" (i.e., to produce an electrical pulse along its axon) or it may inhibit the firing of the neuron. Furthermore, the question of whether a neuron will or will not fire depends on the past history of its synapses. Because of this feature, the internuncial part of an animal's nervous system is able to learn. There many kinds of synapses and many kinds of neurotransmitters, and the response of synapses is sensitive to the concentration of various molecules in the blood, a fact which helps to give the nervous systems of higher animals extraordinary subtlety and complexity.

The first known neurotransmitter molecule, acetylcholine, was discovered jointly by Sir Henry Dale in England and by Otto Loewi in Germany. In 1921 Loewi was able to show that nerve endings transmit information to muscles by means of this substance. The idea for the critical experiment occurred to him in a dream at 3 am. Otto Loewi woke up and wrote down the idea; but in the morning he could not read what he had written. Luckily he had the same dream the following night. This time he took no chances. He got up, drank some coffee, and spent the whole night working in his laboratory. By morning he had shown that nerve cells separated from the muscle of a frog's heart secrete a chemical substance when stimulated, and that this substance is able to cause contractions of the heart of another frog. Sir Henry Dale later showed that Otto Loewi's transmitter molecule was identical to acetylcholine, which Dale had isolated from the ergot fungus in 1910. The two men shared a Nobel Prize in 1936. Since that time, a large variety of neurotransmitter molecules have been isolated. Among the excitatory neurotransmitters (in addition to

acetylcholine) are noradrenalin, norepinephrine, serotonin, dopamine, and glutamate, while gamma-amino-butyric acid is an example of an inhibitory neurotransmitter.

The mechanism by which electrical impulses propagate along nerve axons was clarified by the English physiologists Alan Lloyd Hodgkin and Andrew Fielding Huxley (a grandson of Darwin's defender, Thomas Henry Huxley). In 1952, working with the giant axon of the squid (which can be as large as a millimeter in diameter), they demonstrated that the electrical impulse propagating along a nerve is in no way similar to an electrical current in a conducting wire, but is more closely analogous to a row of dominoes knocking each other down. The nerve fiber, they showed, is like a long thin tube, within which there is a fluid containing K^+ , and Na^+ ions, as well as anions. Inside a resting nerve, the concentration of K^+ is higher than in the normal body fluids outside, and the concentration of Na^+ is lower. These abnormal concentrations are maintained by an "ion pump", which uses the Gibbs free energy of adenosine triphosphate (ATP) to bring potassium ions into the nerve and to expel sodium ions.

The membrane surrounding the neural axon is more permeable to potassium ions than to sodium, and the positively charged potassium ions tend to leak out of the resting nerve, producing a small difference in potential between the inside and outside. This "resting potential" helps to hold the molecules of the membrane in an orderly layer, so that the membrane's permeability to ions is low.

Hodgkin and Huxley showed that when a neuron fires, the whole situation changes dramatically. Triggered by the effects of excitatory neurotransmitter molecules, sodium ions begin to flow into the axon, destroying the electrical potential which maintained order in the membrane. A wave of depolarization passes along the axon. Like a row of dominoes falling, the disturbance propagates from one section to the next: Sodium ions flow in, the order-maintaining electrical potential disappears, the next small section of the nerve membrane becomes permeable, and so on. Thus, Hodgkin and Huxley showed that when a neuron fires, a quick pulse-like electrical and chemical disturbance is transmitted along the axon.

In 1953, Stephen W. Kuffler, working at Johns Hopkins University, made a series of discoveries which yielded much insight into the mechanisms by which the internuncial part of mammalian nervous systems processes information. Kuffler's studies showed that some degree of abstraction of patterns already takes place in the retina of the mammalian eye, before signals are passed on through the optic nerve to the visual cortex of the brain. In the mammalian retina, about 100 million light-sensitive primary light-receptor cells are connected through bipolar neurons to approximately a million retinal neurons of another type, called ganglions. Kuffler's first discovery (made using microelectrodes) was that even in total darkness, the retinal ganglions continue to fire steadily at the rate of about thirty pulses per second. He also found that diffuse light illuminating the entire retina does not change this steady rate of firing.

Kuffler's next discovery was that each ganglion is connected to an array of about 100 primary receptor cells, arranged in an inner circle surrounded by an outer ring. Kuffler found the arrays to be of two types, which he called "on center arrays" and "off center arrays". In the "on center arrays", a tiny spot of light, illuminating only the inner circle,

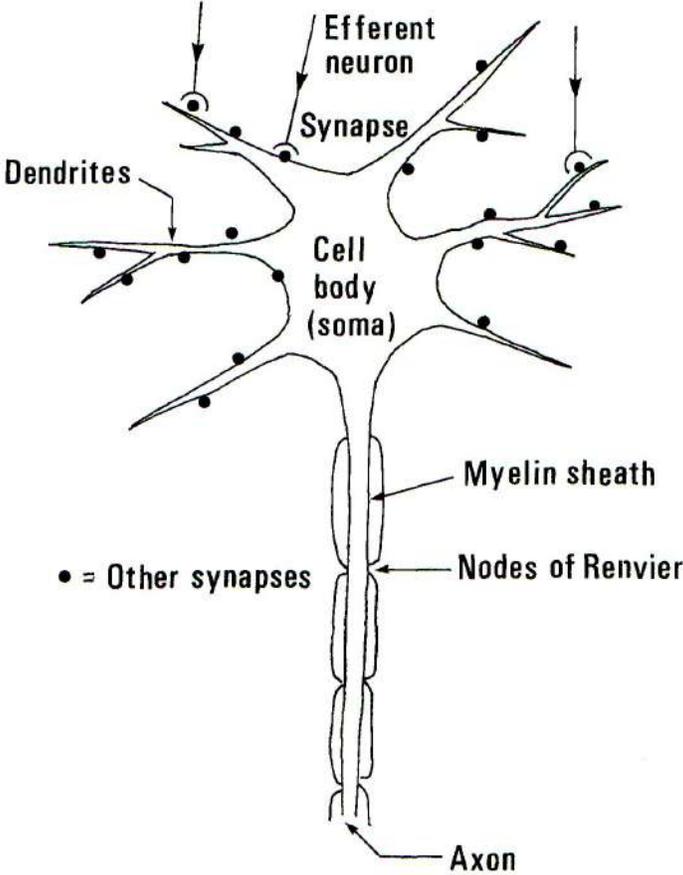


Figure 1.20: A schematic diagram of a neuron.

produces a burst of frequent firing of the associated ganglion, provided that cells in the outer ring of the array remain in darkness. However, if the cells in the outer ring are also illuminated, there is a cancellation, and there is no net effect. Exactly the opposite proved to be the case for the “off center arrays”. As before, uniform illumination of both the inner circle and outer ring of these arrays produces a cancellation and hence no net effect on the steady background rate of ganglion firing. However, if the central circle by itself is illuminated by a tiny spot of light, the ganglion firing is inhibited, whereas if the outer ring alone is illuminated, the firing is enhanced. Thus Kuffler found that both types of arrays give no response to uniform illumination, and that both types of arrays measure, in different ways, the degree of contrast in the light falling on closely neighboring regions of the retina.

Kuffler’s research was continued by his two associates, David H. Hubel and Torsten N. Wessel, at the Harvard Medical School, to which Kuffler had moved. In the late 1950’s, they found that when the signals sent through the optic nerves reach the visual cortex of the brain, a further abstraction of patterns takes place through the arrangement of connections between two successive layers of neurons. Hubel and Wessel called the cells in these two pattern-abstracting layers “simple” and “complex”. The retinal ganglions were found to be connected to the “simple” neurons in such a way that a “simple” cell responds to a line of contrasting illumination of the retina. For such a cell to respond, the line has to be at a particular position and has to have a particular direction. However, the “complex” cells in the next layer were found to be connected to the “simple” cells in such a way that they respond to a line in a particular direction, even when it is displaced parallel to itself³.

In analyzing their results, Kuffler, Hubel and Wessel concluded that pattern abstraction in the mammalian retina and visual cortex takes place through the selective destruction of information. This conclusion agrees with what we know in general about abstractions: They are always simpler than the thing which they represent.

³ Interestingly, at about the same time, the English physiologist J.Z. Young came to closely analogous conclusions regarding the mechanism of pattern abstraction in the visual cortex of the octopus brain. However, the similarity between the image-forming eye of the octopus and the image-forming vertebrate eye and the rough similarity between the mechanisms for pattern abstraction in the two cases must both be regarded as instances of convergent evolution, since the mollusc eye and the vertebrate eye have evolved independently.

Suggestions for further reading

1. S. Pinker, *The Language Instinct: How the Mind Creates Language*, Harper-Collins Publishers, New York, (1995).
2. S. Pinker, *Talk of genetics and visa versa*, *Nature*, **413**, 465-466, (2001).
3. S. Pinker, *Words and rules in the human brain*, *Nature*, **387**, 547-548, (1997).
4. R. Lee and I. DeVore, editors, *Kalahari Hunter-Gatherers*, Harvard University Press, (1975).
5. D.J. Futuyma, *Evolutionary Biology*, Sinauer Associates, Sunderland Mass., (1986).
6. B. Glass, O. Temkin, and W.L. Strauss, eds., *Forerunners of Darwin: 1745-1859*, Johns Hopkins Press, Baltimore, (1959).
7. R. Milner, *The Encyclopedia of Evolution*, an Owl Book, Henry Holt and Company, New York, (1990).
8. T.A. Appel, *The Cuvier-Geoffroy Debate: French Biology in the Decades before Darwin*, Oxford University Press, (1987).
9. P. Corsi, *The Age of Lamarck: Evolutionary Theories in France, 1790-1834*, University of California Press, Berkeley, (1988).
10. M. McNeil, *Under the Banner of Science: Erasmus Darwin and his Age*, Manchester University Press, Manchester, (1987).
11. L.G. Wilson, *Sir Charles Lyell's Scientific Journals on the Species Question*, Yale University Press, New Haven, (1970).
12. E.O. Wilson, *Sociobiology*, Harvard University Press (1975).
13. E.O. Wilson, *On Human Nature*, Bantam Books, New York, (1979).
14. A.B. Adams, *Eternal Quest: The Story of the Great Naturalists*, G.P. Putnam's Sons, New York, (1969).
15. A.S. Packard, *Lamarck, the Founder of Evolution: His Life and Work*, Longmans, Green, and Co., New York, (1901).
16. C. Darwin, *An historical sketch of the progress of opinion on the Origin of Species, previously to the publication of this work*, Appended to third and later editions of **On the Origin of Species**, (1861).
17. L. Eiseley, *Darwin's Century: Evolution and the Men who Discovered It*, Doubleday, New York, (1958).
18. Francis Darwin (editor), *The Autobiography of Charles Darwin and Selected Letters*, Dover, New York (1958).
19. Charles Darwin, *The Voyage of the Beagle*, J.M. Dent and Sons Ltd., London (1975).
20. Charles Darwin, *The Origin of Species*, Collier MacMillan, London (1974).
21. Charles Darwin, *The Expression of Emotions in Man and Animals*, The University of Chicago Press (1965).
22. H.F. Osborne, *From the Greeks to Darwin: The Development of the Evolution Idea Through Twenty-Four Centuries*, Charles Scribner and Sons, New York, (1929).
23. Sir Julian Huxley and H.B.D. Kettlewell, *Charles Darwin and his World*, Thames and Hudson, London (1965).
24. Allan Moorehead, *Darwin and the Beagle*, Penguin Books Ltd. (1971).

25. Ruth Moore, *Evolution*, Time-Life Books (1962).
26. L. Barber, *The Heyday of Natural History: 1820-1870*, Doubleday and Co., Garden City, New York, (1980).
27. A. Desmond, *Huxley*, Addison Wesley, Reading, Mass., (1994).
28. A. Desmond and J. Moore, *Darwin*, Penguin Books, (1992).
29. R. Owen, (P.R. Sloan editor), *The Hunterian Lectures in Comparative Anatomy, May-June, 1837*, University of Chicago Press, (1992).
30. C. Nichols, *Darwinism and the social sciences*, Phil. Soc. Scient. **4**, 255-277 (1974).
31. M. Ruse, *The Darwinian Revolution*, University of Chicago Press, (1979).
32. R. Dawkins, *The Extended Phenotype*, Oxford University Press, (1982).
33. R. Dawkins, *The Blind Watchmaker*, W.W. Norton, (1987).
34. R. Dawkins, *River out of Eden: A Darwinian View of Life*, Harper Collins, (1995).
35. R. Dawkins, *Climbing Mount Improbable*, W.W. Norton, (1996).
36. R. Dawkins, *The Selfish Gene*, Oxford University Press, (1989).
37. S.J. Gould, *Ever Since Darwin*, W.W. Norton, (1977).
38. R.G.B. Reid, *Evolutionary Theory: The Unfinished Synthesis*, Croom Helm, (1985).
39. M. Ho and P.T. Saunders, editors, *Beyond Neo-Darwinism: An Introduction to a New Evolutionary Paradigm*, Academic Press, London, (1984).
40. J. Maynard Smith, *Did Darwin Get it Right? Essays on Games, Sex and Evolution*, Chapman and Hall, (1989).
41. E. Sober, *The Nature of Selection: Evolutionary Theory in Philosophical Focus*, University of Chicago Press, (1984).
42. B.K. Hall, *Evolutionary Developmental Biology*, Chapman and Hall, London, (1992).
43. J. Thompson, *Interaction and Coevolution*, Wiley and Sons, (1982).
44. R.A. Fischer, *The Genetical Theory of Natural Selection*, Clarendon, Oxford, (1930).
45. J.B.S. Haldane, *Population genetics*, New Biology **18**, 34-51, (1955).
46. N. Tinbergen, *The Study of Instinct*, Oxford University Press, (1951).
47. N. Tinbergen, *The Herring Gull's World*, Collins, London, (1953).
48. N. Tinbergen, *Social Behavior in Animals*, Methuen, London, (1953).
49. N. Tinbergen, *Curious Naturalists*, Country Life, London, (1958).
50. N. Tinbergen, *The Animal in its World: Explorations of an Ethologist*, Allan and Unwin, London, (1973).
51. K. Lorenz, *On the evolution of behavior*, Scientific American, **December**, (1958).
52. K. Lorenz, *Evolution and Modification of Behavior* Harvard University Press, Cambridge, MA, (1961).
53. K. Lorenz, *Studies in Animal and Human Behavior. I and II.*, Harvard University Press, (1970) and (1971).
54. K. Lorenz, *On Aggression*, Bantem Books, (1977).
55. P.H. Klopfer and J.P. Hailman, *An Introduction to Animal Behavior: Ethology's First Century*, Prentice-Hall, New Jersey, (1969).
56. J. Jaynes, *The historical origins of "Ethology" and "Comparative Psychology"*, Anim. Behav. **17**, 601-606 (1969).

57. W.H. Thorpe, *The Origin and Rise of Ethology: The Science of the Natural Behavior of Animals*, Heinemann, London, (1979).
58. R.A. Hinde, *Animal Behavior: A Synthesis of Ethological and Comparative Psychology*, McGraw-Hill, New York, (1970).
59. R.A. Hinde, *Biological Bases of Human Social Behavior*, McGraw-Hill, New York (1977).
60. R.A. Hinde, *Individuals, Relationships and Culture: Links Between Ethology and the Social Sciences*, Cambridge University Press, (1987).
61. R.A. Hinde, *Non-Verbal Communication*, Cambridge University Press, (1972).
62. R.A. Hinde, A.-N. Perret-Clermont and J. Stevenson-Hinde, editors, *Social Relationships and Cognitive Development*, Clarendon, Oxford, (1985).
63. R.A. Hinde and J. Stevenson-Hinde, editors, *Relationships Within Families: Mutual Influences*, Clarendon Press, Oxford, (1988).
64. J.H. Crook, editor, *Social Behavior in Birds and Mammals*, Academic Press, London, (1970).
65. P. Ekman, editor, *Darwin and Facial Expression*, Academic Press, New York, (1973).
66. P. Ekman, W.V. Friesen and P. Ekworth, *Emotions in the Human Face*, Pergamon, New York, (1972).
67. N. Blurton Jones, editor, *Ethological Studies of Child Behavior*, Cambridge University Press, (1975).
68. M. von Cranach, editor, *Methods of Inference from Animals to Human Behavior*, Chicago/Mouton, Haag, (1976); Aldine, Paris, (1976).
69. I. Eibl-Eibesfeldt, *Ethology, The Biology of Behavior*, Holt, Rinehart and Winston, New York, (1975).
70. I. Eibl-Eibesfeldt and F.K. Salter, editors, *Indoctrinability, Ideology, and Warfare: Evolutionary Perspectives*, Berghahn Books, (1998).
71. I. Eibl-Eibesfeldt, *Human Ethology*, Walter De Gruyter Inc., (1989).
72. I. Eibl-Eibesfeldt, *Love and Hate*, Walter De Gruyter Inc., (1996).
73. I. Eibl-Eibesfeldt, *The Biology of Peace and War*, Thames and Hudson, New York (1979).
74. I. Eibl-Eibesfeldt, **Der Vorprogrammiert Mensch**, Molden, Vienna, (1973).
75. I. Eibl-Eibesfeldt, *Liebe und Hass*, Molden, Vienna, (1973).
76. J. Bowlby, *By ethology out of psychoanalysis: An experiment in interbreeding*, *Animal Behavior*, **28**, 649-656 (1980).
77. B.B. Beck, *Animal Tool Behavior*, Garland STPM Press, New York, (1980).
78. R. Axelrod, *The Evolution of Cooperation*, Basic Books, New York, (1984).
79. J.D. Carthy and F.L. Ebling, *The Natural History of Aggression*, Academic Press, New York, (1964)
80. D.L. Cheney and R.M. Seyfarth, *How Monkeys See the World: Inside the Mind of Another Species*, University of Chicago Press, (1990).
81. F. De Waal, *Chimpanzee Politics*, Cape, London, (1982).
82. M. Edmunds, *Defense in Animals*, Longman, London, (1974).

83. R.D. Estes, *The Behavior Guide to African Mammals*, University of California Press, Los Angeles, (1991).
84. R.F. Ewer, **Ethology of Mammals**, Logos Press, London, (1968).
85. E. Morgan, *The Scars of Evolution*, Oxford University Press, (1990).
86. W.D. Hamilton, *The genetical theory of social behavior. I and II*, J. Theor. Biol. **7**, 1-52 (1964).
87. R.W. Sussman, *The Biological Basis of Human Behavior*, Prentice Hall, Englewood Cliffs, (1997).
88. Albert Szent-Györgyi, *The Crazy Ape*, Philosophical Library, New York (1970).
C. Zhan-Waxler, *Altruism and Aggression: Biological and Social Origins*, Cambridge University Press (1986).
89. R. Dart, *The predatory transition from ape to man*, International Anthropological and Linguistic Review, **1**, (1953).
90. R. Fox, *In the beginning: Aspects of hominid behavioral evolution*, Man, **NS 2**, 415-433 (1967).
91. R.G. Klein, *Anatomy, behavior, and modern human origins*, Journal of World Prehistory, **9 (2)**, 167-198 (1995).
92. D.R. Begun, C.V. Ward and M.D. Rose, *Function, Phylogeny and Fossils: Miocene Hominid Evolution and Adaptations*, Plenum Press, New York, (1997).
93. P.J. Bowler, *Theories of Human Evolution: A Century of Debate, 1884-1944*, Basil Blackwell, Oxford, (1986).
94. G.C. Conroy, *Primate Evolution*, W.W. Norton, New York, (1990).
95. G. Klein, *The Human Career, Human Biological and Cultural Origins*, University of Chicago Press, (1989).
96. D.P. Barash *Sociobiology and Behavior*, Elsevier, New York, (1977).
97. N.A. Chagnon and W. Irons, eds., *Evolutionary Biology and Human Social Behavior, an Anthropological Perspective*, Duxbury Press, N. Scituate, MA, (1979).
98. E. Danielson, *Vold, en Ond Arv?*, Gyldendal, Copenhagen, (1929).
99. M.R. Davie, *The Evolution of War*, Yale University Press, New Haven, CT, (1929).
100. T. Dobzhanski, *Mankind Evolving*, Yale University Press, New Haven, CT, (1962).
101. R.L. Holloway, *Primate Aggression: Territoriality and Xenophobia*, Academic Press, New York, (1974).
102. P. Kitcher, *Vaulting Ambition: Sociobiology and the Quest for Human Nature*, MIT Press, Cambridge, MA, (1985).
103. S.L.W. Mellen, *The Evolution of Love*, Freeman, Oxford, (1981).
104. A. Roe and G.G. Simpson, *Behavior and Evolution*, Yale University Press, New Haven, CT, (1958).
105. N.J. Smelser, *The Theory of Collective Behavior*, Free Press, New York, (1963).
106. R. Trivers, *Social Evolution*, Benjamin/Cummings, Menlo Park, CA, (1985).
107. W. Weiser, *Konrad Lorenz und seine Kritiker*, Piper, Munich, (1976).
108. W. Wickler, *Biologie der 10 Gebote*, Piper, Munich, (1971).
109. J. Galtung, *A structural theory of aggression*, Journal of Peace Research, **1**, 95-119, (1964).

110. G.E. Kang, *Exogamy and peace relations of social units: A cross-cultural test*, *Ethology*, **18**, 85-99, (1979).
111. A. Montagu, *Man and Aggression*, Oxford University Press, New York, (1968).
112. W.A. Nesbitt, *Human Nature and War*, State Education Department of New York, Albany, (1973).
113. W. Suttles, *Subhuman and human fighting*, *Anthropologica*, **3**, 148-163, (1961).
114. V. Vale and Andrea Juno, editors, *Modern Primitives: An Investigation of Contemporary Adornment and Ritual*, San Francisco Research, (1990).
115. P.P.G. Bateson and R.A. Hinde, editors, *Growing Points in Ethology: Based on a Conference Sponsored by St. John's College and King's College, Cambridge*, Cambridge University Press, (1976).
116. P. Bateson, editor, *The Development and Integration of Behaviour: Essays in Honour of Robert Hinde*, Cambridge University Press, (1991).
117. C. Darwin, *The Expression of Emotions in Man and Animals*, The University of Chicago Press (1965).
118. P. Kropotkin, *Mutual Aid, A Factor in Evolution*, Walter Heinemann, London, (1902).
119. R.A. Fischer, *The Genetical Theory of Natural Selection*, Clarendon, Oxford, (1930).
120. J.B.S. Haldane, *Population genetics*, *New Biology* **18**, 34-51, (1955).
121. L. Margulis, *Symbiosis as a Source of Evolutionary Innovation: Speciation and Morphogenesis*, The MIT Press, (1991).
122. L. Margulis, *Symbiosis in Cell Evolution: Microbial Communities in the Archean and Proterozoic Eons*, W.H. Freeman, (1992).

Chapter 2

TRIBALISM: A DANGEROUS ANACHRONISM

2.1 The science of inherited behavior patterns

In the long run, because of the terrible weapons that have already been produced through the misuse of science, and because of the even more terrible weapons that are likely to be invented in the future, the only way in which we can ensure the survival of civilization is to abolish the institution of war. But is this possible? Or are the emotions that make war possible so much a part of human nature that we cannot stop humans from fighting any more than we can stop cats and dogs from fighting? Can biological science throw any light on the problem of why our supposedly rational species seems intent on choosing war, pain and death instead of peace, happiness and life? To answer this question, we need to turn to the science of ethology - the study of inherited emotional tendencies and behavior patterns in animals and humans.

In *The Origin of Species*, Charles Darwin devoted a chapter to the evolution of instincts, and he later published a separate book on *The Expression of the Emotions in Man and Animals*. Because of these pioneering studies, Darwin is considered to be the founder of ethology.

The study of inherited behavior patterns in animals (and humans) was continued in the 20th century by such researchers as Karl von Frisch (1886-1982), Nikolaas Tinbergen (1907-1988), and Konrad Lorenz (1903-1989), three scientists who shared a Nobel Prize in Medicine and Physiology in 1973.

The third of the 1973 prizewinners, Konrad Lorenz, is controversial, but at the same time very interesting in the context of studies of the causes of war and discussions of how war may be avoided. As a young boy, he was very fond of animals, and his tolerant parents allowed him to build up a large menagerie in their house in Altenberg, Austria. Even as a child, he became an expert on waterfowl behavior, and he discovered the phenomenon of imprinting. He was given a one day old duckling, and found, to his intense joy, that it transferred its following response to his person. As Lorenz discovered, young waterfowl

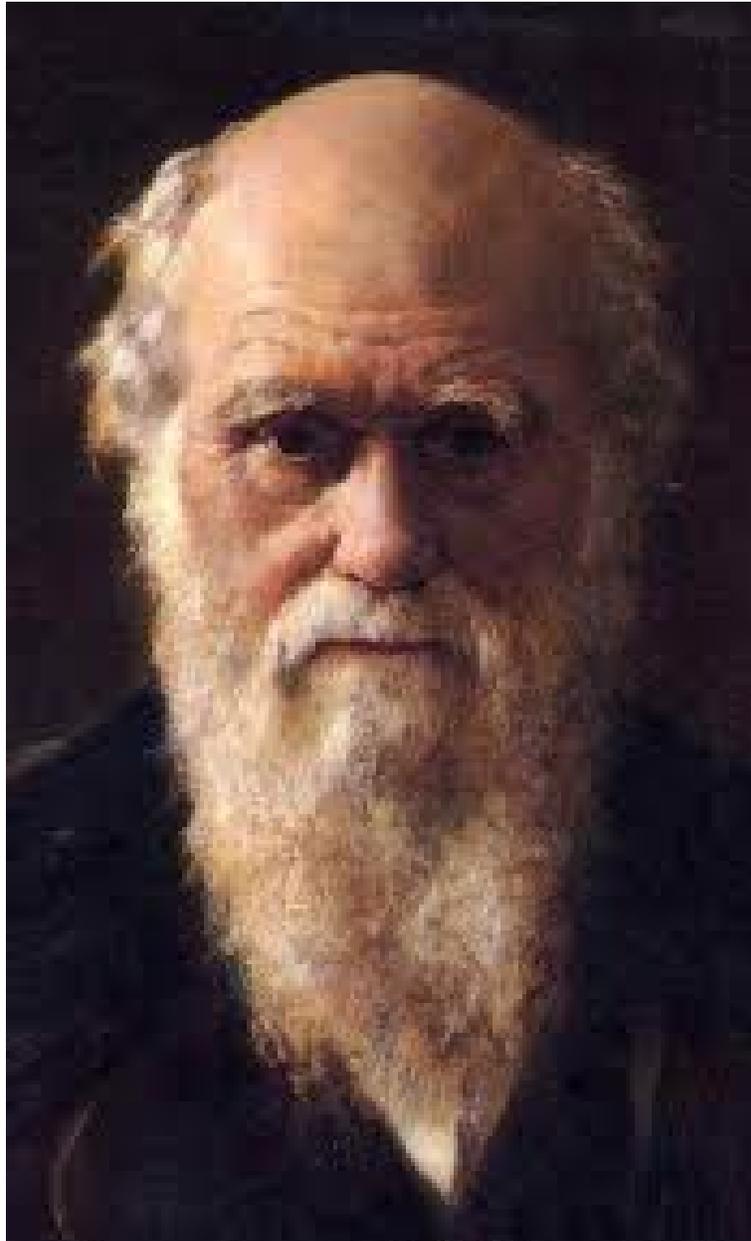


Figure 2.1: Because of Charles Darwin's book "The Expression of Emotions in Man and Animals", he is considered to be the founder of the field of Ethology, the study of inherited behavior patterns.



Figure 2.2: Nikolaas Tinbergen (1907-1988) on the left, with Konrad Lorenz (1903-1989). Together with Karl von Frisch (1886-1982) they shared the 1973 Nobel Prize in Physiology and Medicine for their pioneering work in Ethology.



Figure 2.3: Konrad Lorenz with geese who consider him to be their mother.

have a short period immediately after being hatched, when they identify as their “mother” whomever they see first. In later life, Lorenz continued his studies of imprinting, and there exists a touching photograph of him, with his white beard, standing waist-deep in a pond, surrounded by an adoring group of goslings who believe him to be their mother. Lorenz also studied bonding behavior in waterfowl.

It is, however, for his controversial book *On Aggression* that Konrad Lorenz is best known. In this book, Lorenz makes a distinction between intergroup aggression and intragroup aggression. Among animals, he points out, rank-determining fights are seldom fatal. Thus, for example, the fights that determine leadership within a wolf pack end when the loser makes a gesture of submission. By contrast, fights between groups of animals are often fights to the death, examples being wars between ant colonies, or of bees against intruders, or the defense of a rat pack against strange rats.

Many animals, humans included, seem willing to kill or be killed in defense of the communities to which they belong. Lorenz calls this behavioral tendency a “communal defense response”. He points out that the “holy shiver” - the tingling of the spine that humans experience when performing a heroic act in defense of their communities - is related to the prehuman reflex for raising the hair on the back of an animal as it confronts an enemy - a reflex that makes the animal seem larger than it really is.

In his book *On Aggression*, Konrad Lorenz gives the following description of the emotions of a hero preparing to risk his life for the sake of the group:

“In reality, militant enthusiasm is a specialized form of communal aggression, clearly distinct from and yet functionally related to the more primitive forms of individual aggression. Every man of normally strong emotions knows, from his own experience, the subjective phenomena that go hand in hand with the response of militant enthusiasm. A shiver runs down the back and, as more exact observation shows, along the outside of both arms. One soars elated, above all the ties of everyday life, one is ready to abandon all for the call of what, in the moment of this specific emotion, seems to be a sacred duty. All obstacles in its path become unimportant; the instinctive inhibitions against hurting or killing one’s fellows lose, unfortunately, much of their power. Rational considerations, criticisms, and all reasonable arguments against the behavior dictated by militant enthusiasm are silenced by an amazing reversal of all values, making them appear not only untenable, but base and dishonorable.

Men may enjoy the feeling of absolute righteousness even while they commit atrocities. Conceptual thought and moral responsibility are at their lowest ebb. As the Ukrainian proverb says: ‘When the banner is unfurled, all reason is in the trumpet’.”

“The subjective experiences just described are correlated with the following objectively demonstrable phenomena. The tone of the striated musculature is raised, the carriage is stiffened, the arms are raised from the sides and slightly rotated inward, so that the elbows point outward. The head is proudly raised, the chin stuck out, and the facial muscles mime the ‘hero face’ familiar from the films. On the back and along the outer surface of the arms, the hair stands on end. This is the objectively observed aspect of the shiver!”

“Anybody who has ever seen the corresponding behavior of the male chimpanzee defending his band or family with self-sacrificing courage will doubt the purely spiritual

character of human enthusiasm. The chimp, too, sticks out his chin, stiffens his body, and raises his elbows; his hair stands on end, producing a terrifying magnification of his body contours as seen from the front. The inward rotation of the arms obviously has the purpose of turning the longest-haired side outward to enhance the effect. The whole combination of body attitude and hair-raising constitutes a bluff. This is also seen when a cat humps its back, and is calculated to make the animal appear bigger and more dangerous than it really is. Our shiver, which in German poetry is called a 'heiliger Schauer', a 'holy' shiver, turns out to be the vestige of a prehuman vegetative response for making a fur bristle which we no longer have. To the humble seeker for biological truth, there cannot be the slightest doubt that human militant enthusiasm evolved out of a communal defense response of our prehuman ancestor."

Lorenz goes on to say, "An impartial visitor from another planet, looking at man as he is today - in his hand the atom bomb, the product of his intelligence - in his heart the aggression drive, inherited from his anthropoid ancestors, which the same intelligence cannot control - such a visitor would not give mankind much chance of survival."

In an essay entitled *The Urge to Self-Destruction*¹, Arthur Koestler says:

"Even a cursory glance at history should convince one that individual crimes, committed for selfish motives, play a quite insignificant role in the human tragedy compared with the numbers massacred in unselfish love of one's tribe, nation, dynasty, church or ideology... Wars are not fought for personal gain, but out of loyalty and devotion to king, country or cause..."

"We have seen on the screen the radiant love of the Führer on the faces of the Hitler Youth... They are transfixed with love, like monks in ecstasy on religious paintings. The sound of the nation's anthem, the sight of its proud flag, makes you feel part of a wonderfully loving community. The fanatic is prepared to lay down his life for the object of his worship, as the lover is prepared to die for his idol. He is, alas, also prepared to kill anybody who represents a supposed threat to the idol." The emotion described here by Koestler is the same as the communal defense mechanism ("militant enthusiasm") described in biological terms by Lorenz.

Generations of schoolboys have learned the Latin motto: "Dulce et decorum est pro patria mori" - it is both sweet and noble to die for one's country. Even in today's world, death in battle in defense of country and religion is still praised by nationalists. However, because of the development of weapons of mass destruction, both nationalism and narrow patriotism have become dangerous anachronisms.

In thinking of violence and war, we must be extremely careful not to confuse the behavioral patterns that lead to wife-beating or bar-room brawls with those that lead to episodes like the trench warfare of the First World War, or to the nuclear bombing of Hiroshima and Nagasaki. The first type of aggression is similar to the rank-determining fights of animals, while the second is more akin to the team-spirit exhibited by a football side. Heroic behavior in defense of one's community has been praised throughout the ages, but the

¹in *The Place of Value in a World of Facts*, A. Tiselius and S. Nielsson editors, Wiley, New York, (1970)

tendency to such behavior has now become a threat to the survival of civilization, since tribalism makes war possible, and war with thermonuclear weapons threatens civilization with catastrophe.

Warfare involves not only a high degree of aggression, but also an extremely high degree of altruism. Soldiers kill, but they also sacrifice their own lives. Thus patriotism and duty are as essential to war as the willingness to kill. As Arthur Koestler points out, "Wars are not fought for personal gain, but out of loyalty and devotion to king, country or cause..."

Tribalism involves passionate attachment to one's own group, self-sacrifice for the sake of the group, willingness both to die and to kill if necessary to defend the group from its enemies, and belief that in case of a conflict, one's own group is always in the right.

2.2 Population genetics

If we examine altruism and aggression in humans, we notice that members of our species exhibit great altruism towards their own children. Kindness towards close relatives is also characteristic of human behavior, and the closer the biological relationship is between two humans, the greater is the altruism they tend to show towards each other. This profile of altruism is easy to explain on the basis of Darwinian natural selection since two closely related individuals share many genes and, if they cooperate, the genes will be more effectively propagated.

To explain from an evolutionary point of view the communal defense mechanism discussed by Lorenz - the willingness of humans to kill and be killed in defense of their communities - we have only to imagine that our ancestors lived in small tribes and that marriage was likely to take place within a tribe rather than across tribal boundaries. Under these circumstances, each tribe would tend to consist of genetically similar individuals. The tribe itself, rather than the individual, would be the unit on which the evolutionary forces of natural selection would act. The idea of group selection in evolution was proposed in the 1930's by J.B.S. Haldane and R.A. Fisher, and more recently it has been discussed by W.D. Hamilton and E.O. Wilson.

According to the group selection model, a tribe whose members showed altruism towards each other would be more likely to survive than a tribe whose members cooperated less effectively. Since several tribes might be in competition for the same territory, intertribal aggression might, under some circumstances, increase the chances for survival of one's own tribe. Thus, on the basis of the group selection model, one would expect humans to be kind and cooperative towards members of their own group, but at the same time to sometimes exhibit aggression towards members of other groups, especially in conflicts over territory. One would also expect intergroup conflicts to be most severe in cases where the boundaries between groups are sharpest - where marriage is forbidden across the boundaries.



Figure 2.4: Sir Ronald Aylmer Fisher (1890-1962). Together with J.B.S Haldane he pioneered the theory of population genetics. Recent contributions to this theory have been made by W.D. Hamilton and E.O. Wilson.

2.3 Hope for the future

Although humans originally lived in small, genetically homogeneous tribes, the social and political groups of the modern world are much larger, and are often multiracial and multiethnic.

There are a number of large countries that are remarkable for their diversity, for example Brazil, Argentina and the United States. Nevertheless it has been possible to establish social cohesion and group identity within each of these enormous nations. India and China too, are mosaics of diverse peoples, but nevertheless, they function as coherent societies. Thus we see that group identity is a social construction, in which artificial “tribal markings” define the boundaries of the group. These tribal markings will be discussed in more detail below.

One gains hope for the future by observing how it has been possible to produce both internal peace and social cohesion over very large areas of the globe - areas that contain extremely diverse populations. The difference between making large, ethnically diverse countries function as coherent sociopolitical units and making the entire world function as a unit is not very great.

Since group identity is a social construction, it is not an impossible goal to think of enlarging the already-large groups of the modern world to include all of humanity.

2.4 Religion and ethnic identity

An acceleration of human cultural development seems to have begun approximately 70,000 years ago. The first art objects date from that period, as do migrations that ultimately took modern man across the Bering Strait to the western hemisphere. A land bridge extending from Siberia to Alaska is thought to have been formed approximately 70,000 years ago, disappearing again roughly 10,000 years before the present. Cultural and genetic studies indicate that migrations from Asia to North America took place during this period. Shamanism,² which is found both in Asia and the new world, as well as among the Sami (Lapps) of northern Scandinavia, is an example of the cultural links between the hunting societies of these regions.

Before the acceleration of human cultural development just mentioned, genetic change and cultural change went hand in hand, but during the last 70,000 years, the constantly accelerating rate of information-accumulation and cultural evolution has increasingly out-distanced the rate of genetic change in humans. Genetically we are almost identical with our hunter-gatherer ancestors of 70,000 years ago, but cultural evolution has changed our way of life beyond recognition.

Humans are capable of cultural evolution because it is so easy to overwrite and modify our instinctive behavior patterns with learned behavior. Within the animal kingdom,

²A shaman is a special member of a hunting society who, while in a trance, is thought to be able pass between the upper world, the present world, and the lower world, to cure illnesses, and to insure the success of a hunt.

humans are undoubtedly the champions in this respect. No other species is so good at learning as we are. During the early stages of cultural evolution, the tendency of humans to be religious may have facilitated the overwriting of instinctive behavior with the culture of the tribe. Since religions, like languages, are closely associated with particular cultures, they serve as marks of ethnic identity.

2.5 Tribal markings; ethnicity; pseudospeciation

In biology, a species is defined to be a group of mutually fertile organisms. Thus all humans form a single species, since mixed marriages between all known races will produce children, and subsequent generations in mixed marriages are also fertile. However, although there is never a biological barrier to marriages across ethnic and racial boundaries, there are often very severe cultural barriers.

Irenäus Eibl-Eibesfeldt, a student of Konrad Lorenz, introduced the word *pseudospeciation* to denote cases where cultural barriers between two groups of humans are so strongly marked that marriages across the boundary are difficult and infrequent. In such cases, he pointed out, the two groups function as though they were separate species, although from a biological standpoint this is nonsense. When two such groups are competing for the same land, the same water, the same resources, and the same jobs, the conflicts between them can become very bitter indeed. Each group regards the other as being “not truly human”.

In his book *The Biology of War and Peace*, Eibl-Eibesfeldt discusses the “tribal markings” used by groups of humans to underline their own identity and to clearly mark the boundary between themselves and other groups. One of the illustrations in the book shows the marks left by ritual scarification on the faces of the members of certain African tribes. These scars would be hard to counterfeit, and they help to establish and strengthen tribal identity. Seeing a photograph of the marks left by ritual scarification on the faces of African tribesmen, it is impossible not to be reminded of the dueling scars that Prussian army officers once used to distinguish their caste from outsiders.

Surveying the human scene, one can find endless examples of signs that mark the bearer as a member of a particular group - signs that can be thought of as “tribal markings”: tattoos; piercing; bones through the nose or ears; elongated necks or ears; filed teeth; Chinese binding of feet; circumcision, both male and female; unique hair styles; decorations of the tongue, nose, or naval; peculiarities of dress, fashions, veils, chadors, and headdresses; caste markings in India; use or nonuse of perfumes; codes of honor and value systems; traditions of hospitality and manners; peculiarities of diet (certain foods forbidden, others preferred); giving traditional names to children; knowledge of dances and songs; knowledge of recipes; knowledge of common stories, literature, myths, poetry or common history; festivals, ceremonies, and rituals; burial customs, treatment of the dead and ancestor worship; methods of building and decorating homes; games and sports peculiar to a culture; relationship to animals, knowledge of horses and ability to ride; nonrational systems of belief. Even a baseball hat worn backwards or the professed ability to enjoy atonal music



Figure 2.5: Scars help to establish tribal identity

can mark a person as a member of a special “tribe”. Undoubtedly there many people in New York who would never think of marrying someone who could not appreciate the the paintings of Jasper Johns, and many in London who would consider anyone had not read all the books of Virginia Wolfe to be entirely outside the bounds of civilization.

By far the most important mark of ethnic identity is language, and within a particular language, dialect and accent. If the only purpose of language were communication, it would be logical for the people of a small country like Denmark to stop speaking Danish and go over to a more universally-understood international language such as English. However, language has another function in addition to communication: It is also a mark of identity. It establishes the boundary of the group.

Within a particular language, dialects and accents mark the boundaries of subgroups. For example, in England, great social significance is attached to accents and diction, a tendency that George Bernard Shaw satirized in his play, *Pygmalion*, which later gained greater fame as the musical comedy, *My Fair Lady*. This being the case, we can ask why all citizens of England do not follow the example of Eliza Doolittle in Shaw’s play, and improve their social positions by acquiring Oxford accents. However, to do so would be to run the risk of being laughed at by one’s peers and regarded as a traitor to one’s own local community and friends. School children everywhere can be very cruel to any child who does not fit into the local pattern. At Eton, an Oxford accent is compulsory; but in a Yorkshire school, a child with an Oxford accent would suffer for it.



Figure 2.6: An example of the dueling scars that Prussian army officers once used to distinguish their caste from outsiders.

Next after language, the most important “tribal marking” is religion. As mentioned above, it seems probable that in the early history of our hunter-gatherer ancestors, religion evolved as a mechanism for perpetuating tribal traditions and culture. Like language, and like the innate facial expressions studied by Darwin, religion is a universal characteristic of all human societies. All known races and cultures practice some sort of religion. Thus a tendency to be religious seems to be built into human nature, or at any rate, the needs that religion satisfies seem to be a part of our inherited makeup. Otherwise, religion would not be so universal as it is.

Religion is often strongly associated with ethnicity and nationalism, that is to say, it is associated with the demarcation of a particular group of people by its culture or race. For example, the Jewish religion is associated with Zionism and with Jewish nationalism. Similarly Islam is strongly associated with Arab nationalism. Christianity too has played an important role in many aggressive wars, for example in the Crusades, in the European conquest of the New World, in European colonial conquests in Africa and Asia, and in the wars between Catholics and Protestants within Europe. We shall see in a later chapter how the originators of the German nationalist movement (the precursors of the Nazis), used quasi-religious psychological methods.

Human history seems to be saturated with blood. It would be impossible to enumerate the conflicts with which the story of humankind is stained. Many of the atrocities of history have involved what Irenäus Eibl-Eibesfeldt called “pseudospeciation”, that is to say, they were committed in conflicts involving groups between which sharply marked cultural barriers have made intermarriage difficult and infrequent. Examples include the present conflict between Israelis and Palestinians; “racial cleansing” in Kosovo; the devastating wars between Catholics and Protestants in Europe; the Lebanese civil war; genocide committed against Jews and Gypsies during World War II; recent genocide in Rwanda; current intertribal massacres in the Ituri Province of Congo; use of poison gas against Kurdish civilians by Saddam Hussein’s regime in Iraq; the massacre of Armenians by Turks; massacres of Hindus by Muslims and of Muslims by Hindus in post-independence India; massacres of Native Americans by white conquerors and settlers in all parts of the New World; and massacres committed during the Crusades. The list seems almost endless.

Religion often contributes to conflicts by sharpening the boundaries between ethnic groups and by making marriage across those boundaries difficult and infrequent. However, this negative role is balanced by a positive one, whenever religion is the source of ethical principles, especially the principle of universal human brotherhood.

The religious leaders of today’s world have the opportunity to contribute importantly to the solution of the problem of war. They have the opportunity to powerfully support the concept of universal human brotherhood, to build bridges between religious groups, to make intermarriage across ethnic boundaries easier, and to soften the distinctions between communities. Our political leaders have the duty to move away from nationalism and militarism. If they fail to do this, they will have failed humankind at a time of great danger and crisis.

2.6 Searching for human nature

A drop of good sense in a sea of emotion

Today, human greed and folly are destroying the global environment. As if this were not enough, there is a great threat to civilization and the biosphere from an all-destroying thermonuclear war. Both of these severe existential threats are due to faults our inherited emotional nature.

From the standpoint of evolutionary theory, this is a paradox. As a species, we are well on the road to committing collective suicide, driven by the flaws in human nature. But isn't natural selection supposed to produce traits that lead to survival? Today, our emotions are not leading us towards survival, but instead driving us towards extinction. What is the reason for this paradox?

Our emotions have an extremely long evolutionary history. However, with the rapid advance of human cultural evolution, our ancestors began to live together in progressively larger groups, and in these new societies, our inherited emotional nature was often inappropriate. What once was a survival trait became a sin which needed to be suppressed by morality and law. Today we live in a world that is entirely different from the one into which our species was born. We face the problems of the 21st century: exploding populations, vanishing resources, and the twin threats of catastrophic climate change and thermonuclear war. We face these severe problems with our poor cave-man's brain, with an emotional nature that has not changed much since our ancestors lived in small tribes, competing for territory on the grasslands of Africa.

Many of the great ethical teachers of history lived at a time when cultural evolution was changing humans from hunter-gatherers and pastoral peoples to farmers and city dwellers. To live and cooperate in larger groups, humans needed to overwrite their instinctive behavior patterns with culturally determined behavior involving a wider range of cooperation than previously.

This period of change is marked by the lives and ideas of a number of great ethical teachers - Moses, Buddha, Lao Tse, Confucius, Socrates, Aristotle, Jesus, and Saint Paul. Mohammed lived at a slightly later period, but it was still a period of transition for the Arab peoples, a period during which their range cooperation needed to be enlarged.

Most of the widely practiced religions of today contain the principle of universal human brotherhood. This is contained, for example, in Christianity, in the Sermon on the Mount and in the Parable of the Good Samaritan. The Sermon on the Mount tells us that we must love our neighbor as much as we love ourselves. When asked "But who is my neighbor?", Jesus replied with the Parable of the Good Samaritan, which says that our neighbor may belong to a different ethnic group than ourselves, or may be separated from us by geographical distance. Nevertheless, he is still our neighbor and he still deserves our love and assistance. To this, Christianity adds that we must love and forgive our enemy, and do good to those who persecute us, a principle that would make war impossible if it were only followed. Not only in Christianity, but also in Hinduism, Buddhism, and Islam, the principles of compassion and universal human brotherhood hold a high place.



Figure 2.7: An illustration from Darwin's book, "The Expression of Emotions in Man and Animals". Here a cat raises its back and fur when confronting an enemy to make itself seem larger and more dangerous. This reflex was later discussed by the ethologist Konrad Lorenz.

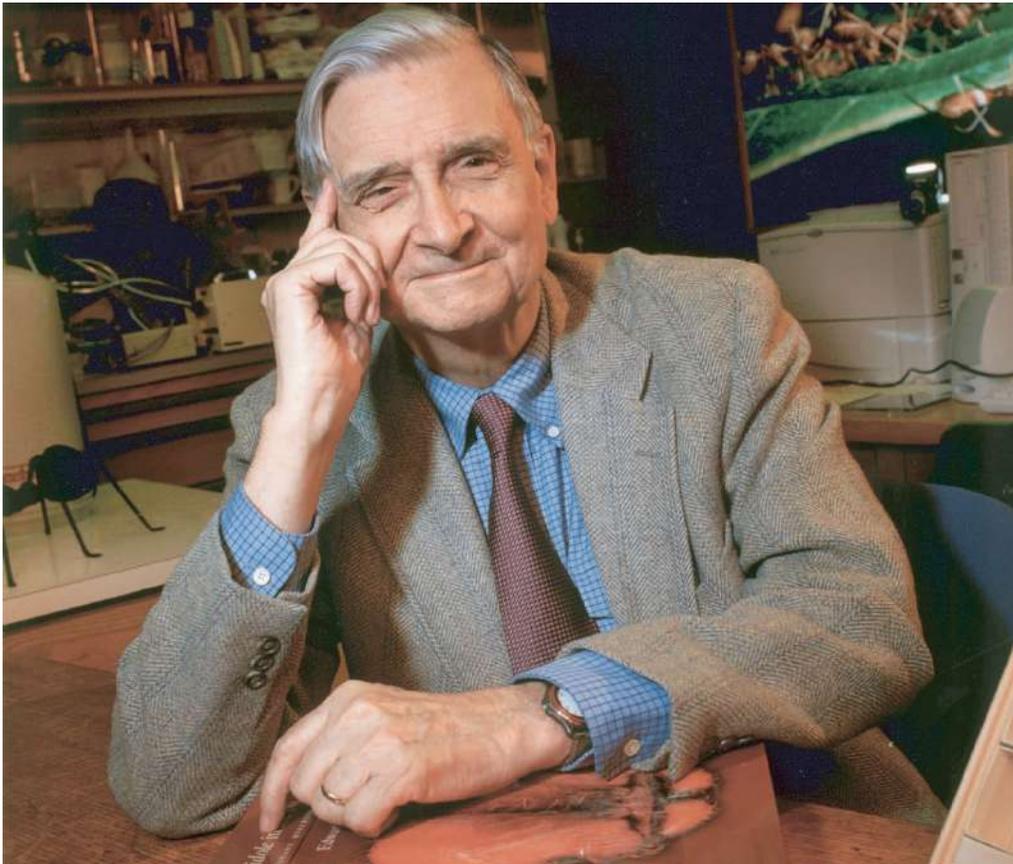


Figure 2.8: **Professor E.O. Wilson of Harvard is famous for his books on Sociobiology.**



Figure 2.9: **Professor Richard Dawkins** of Oxford, controversial author of “**The Selfish Gene**” and many other books. He has contributed much to the debate on relationships between science, religion, aggression and altruism.

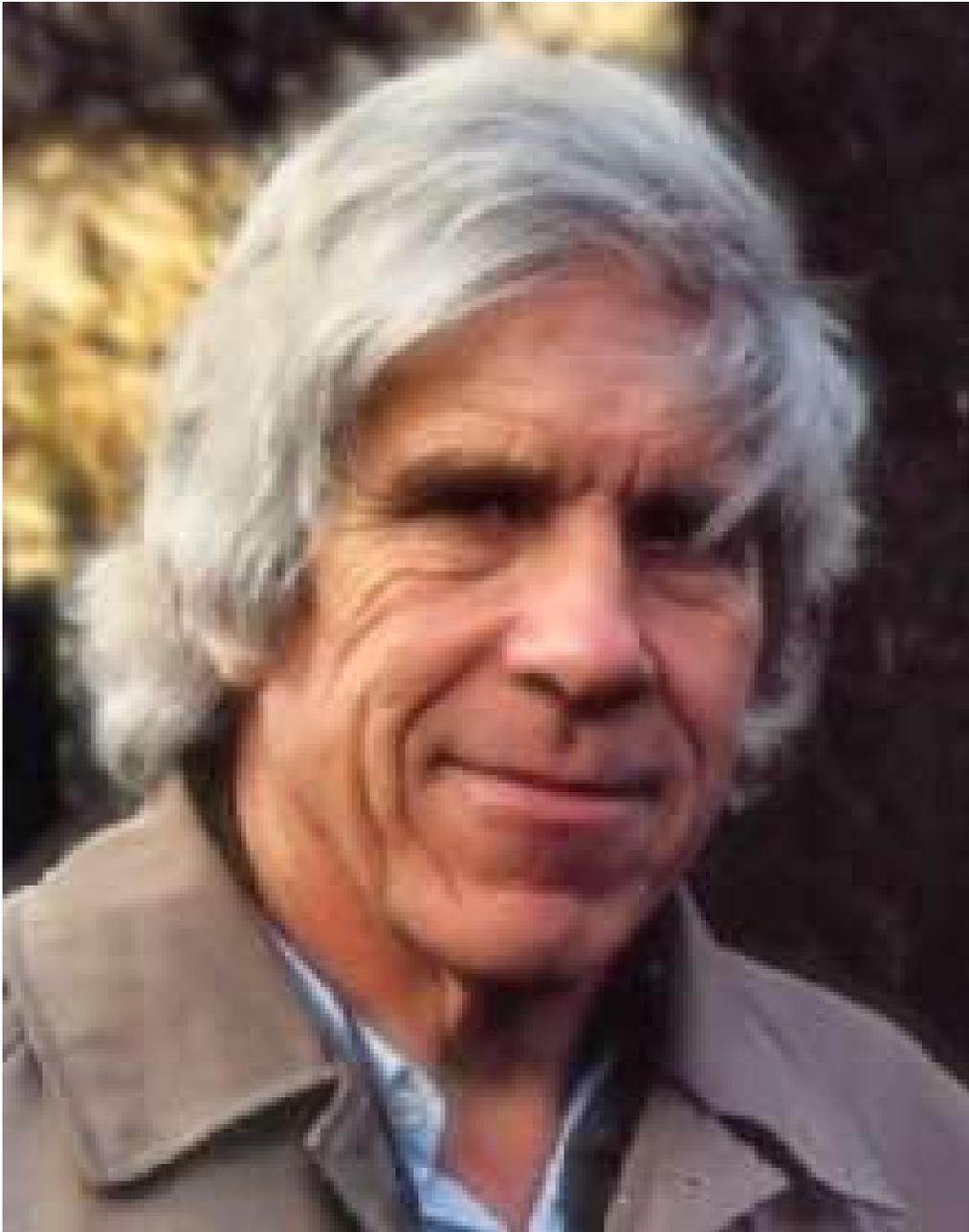


Figure 2.10: **William Donald Hamilton** was a Royal Society Research Professor at Oxford University until his death in 2000. He contributed importantly to our understanding of altruism from the standpoint of genetics.

2.7 The evolution of cooperation

The success of humans as a species is due to our genius for cooperation. Cultural evolution, a new form of evolution, in which information is passed between generations in the form of linguistic symbols rather than genetically, has been the key to human success. Cultural evolution depends on the sharing of knowledge, and humans have developed remarkable linguistic and cooperative abilities.

At the same time, human nature also has a darker side, inherited from our ancestors who were hunter-gatherers, living in small genetically homogeneous tribes, competing for territory, on the grasslands of Africa. The pattern of intra-tribal altruism and inter-tribal aggression, which humans have inherited from their remote ancestors, has been explained by the theories of population genetics and group selection put forward in the 1930's by R.A. Fisher and J.B.S Haldane, and discussed more recently by W.D. Hamilton and E.O. Wilson. In this picture, the tribe itself, rather than the individual, is the unit on which evolutionary forces acted.

We will now try to show that symbiosis and cooperation have been responsible for all of the great upward steps in evolution, including the development of the first prokaryotic cells, the first eukaryotes, the first multi-cellular organisms, and the first cooperative groups of multicellular organisms. The views of T.H. Huxley, who stressed competition as an evolutionary force, will be contrasted with the ideas of Charles Darwin, Peter Kropotkin and Lynn Margulis and others, who fully understood the importance of symbiosis and cooperation in evolution.

The explosion of human knowledge

Cultural evolution depends on the non-genetic storage, transmission, diffusion and utilization of information. The development of human speech, the invention of writing, the development of paper and printing, and finally in modern times, mass media, computers and the Internet - all these have been crucial steps in society's explosive accumulation of information and knowledge. Human cultural evolution proceeds at a constantly-accelerating speed, so great in fact that it threatens to shake society to pieces.

Every species changes gradually through genetic evolution; but with humans, cultural evolution has rushed ahead with such a speed that it has completely outstripped the slow rate of genetic change. Genetically we are quite similar to our neolithic ancestors, but their world has been replaced by a world of quantum theory, relativity, supercomputers, antibiotics, genetic engineering and space telescopes - unfortunately also a world of nuclear weapons and nerve gas.

Because of the slowness of genetic evolution in comparison to the rapid and constantly-accelerating rate of cultural change, our bodies and emotions (as Malthus put it, the "passions of mankind") are not completely adapted to our new way of life. They still reflect the way of life of our hunter-gatherer ancestors.

Within rapidly-moving cultural evolution, we can observe that technical change now moves with such astonishing rapidity that neither social institutions, nor political struc-

tures, nor education, nor public opinion can keep pace. The lightning-like pace of technical progress has made many of our ideas and institutions obsolete. For example, the absolutely-sovereign nation-state and the institution of war have both become dangerous anachronisms in an era of instantaneous communication, global interdependence and all-destroying weapons.

In many respects, human cultural evolution can be regarded as an enormous success. However, at the start of the 21st century, most thoughtful observers agree that civilization is entering a period of crisis. As all curves move exponentially upward - population, production, consumption, rates of scientific discovery, and so on - one can observe signs of increasing environmental stress, while the continued existence and spread of nuclear weapons threatens civilization with destruction. Thus while the explosive growth of knowledge has brought many benefits, the problem of achieving a stable, peaceful and sustainable world remains serious, challenging and unsolved.

Tribal emotions and nationalism

In discussing conflicts, we must be very careful to distinguish between two distinct types of aggression exhibited by both humans and animals. The first is intra-group aggression, which is often seen in rank-determining struggles, for example when two wolves fight for pack leadership, or when males fight for the privilege of mating with females. Another, completely different, type of aggression is seen when a group is threatened by outsiders. Most animals, including humans, then exhibit a communal defense response - self-sacrificing and heroic combat against whatever is perceived to be an external threat. It is this second type of aggression that makes war possible.

Arthur Koestler has described inter-group aggression in an essay entitled *The Urge to Self-Destruction*³, where he writes: “Even a cursory glance at history should convince one that individual crimes, committed for selfish motives, play a quite insignificant role in the human tragedy compared with the numbers massacred in unselfish love of one’s tribe, nation, dynasty, church or ideology... Wars are not fought for personal gain, but out of loyalty and devotion to king, country or cause...”

“We have seen on the screen the radiant love of the Führer on the faces of the Hitler Youth... They are transfixed with love, like monks in ecstasy on religious paintings. The sound of the nation’s anthem, the sight of its proud flag, makes you feel part of a wonderfully loving community. The fanatic is prepared to lay down his life for the object of his worship, as the lover is prepared to die for his idol. He is, alas, also prepared to kill anybody who represents a supposed threat to the idol.”

Members of tribe-like groups are bound together by strong bonds of altruism and loyalty. Echos of these bonds can be seen in present-day family groups, in team sports, in the fellowship of religious congregations, and in the bonds that link soldiers to their army comrades and to their nation.

³in *The Place of Value in a World of Facts*, A. Tiselius and S. Nielsson editors, Wiley, New York, (1970)

Warfare involves not only a high degree of aggression, but also an extremely high degree of altruism. Soldiers kill, but they also sacrifice their own lives. Thus patriotism and duty are as essential to war as the willingness to kill.

Tribalism involves passionate attachment to one's own group, self-sacrifice for the sake of the group, willingness both to die and to kill if necessary to defend the group from its enemies, and belief that in case of a conflict, one's own group is always in the right. Unfortunately these emotions make war possible; and today a Third World War might lead to the destruction of civilization.

Fisher, Haldane and Hamilton

The idea of group selection in evolution was proposed in the 1930's by J.B.S. Haldane and R.A. Fisher, and more recently it has been discussed by W.D. Hamilton.

If we examine altruism and aggression in humans, we notice that members of our species exhibit great altruism towards their own children. Kindness towards close relatives is also characteristic of human behavior, and the closer the biological relationship is between two humans, the greater is the altruism they tend to show towards each other. This profile of altruism is easy to explain on the basis of Darwinian natural selection since two closely related individuals share many genes and, if they cooperate, the genes will be more effectively propagated.

To explain from an evolutionary point of view the communal defense mechanism - the willingness of humans to kill and be killed in defense of their communities - we have only to imagine that our ancestors lived in small tribes and that marriage was likely to take place within a tribe rather than across tribal boundaries. Under these circumstances, each tribe would tend to consist of genetically similar individuals. The tribe itself, rather than the individual, would be the unit on which the evolutionary forces of natural selection would act.

According to the group selection model, a tribe whose members showed altruism towards each other would be more likely to survive than a tribe whose members cooperated less effectively. Since several tribes might be in competition for the same territory, successful aggression against a neighboring group could increase the chances for survival of one's own tribe. Thus, on the basis of the group selection model, one would expect humans to be kind and cooperative towards members of their own group, but at the same time to sometimes exhibit aggression towards members of other groups, especially in conflicts over territory. One would also expect intergroup conflicts to be most severe in cases where the boundaries between groups are sharpest - where marriage is forbidden across the boundaries.

The social insects

The social insects, ants, bees, wasps and termites, exhibit nearly perfect altruism towards members of their own group. This extreme form of altruism towards near relations (kin altruism) is closely connected with the peculiar method of reproduction of the social insects.

The workers are sterile or nearly sterile, while the queen is the only reproductive female. The result of this special method of reproduction is that very nearly perfect altruism is possible within a hive or nest, since genetic changes favoring antisocial behavior would be detrimental to the hive or nest as a whole. The hive or nest can, in some sense, be regarded as a superorganism, with the individuals cooperating totally in much the same way that cells cooperate within a multicellular organism. The social insects exhibit aggression towards members of their own species from other hives or nests, and can be said to engage in wars. Interestingly a similar method of reproduction, associated with extreme intra-group altruism has evolved among mammals, but is represented by only two species: the naked mole rat and Damaraland mole rat.

From Thomas Huxley to Lynn Margulis and symbiosis

Charles Darwin (1809-1882) was acutely aware of close and mutually beneficial relationships between organisms. For example, in his work on the fertilization of flowers, he studied the ways in which insects and plants can become exquisitely adapted to each other's needs.

On the other hand Thomas Henry Huxley (1825-1895), although he was a strong supporter of Darwin, saw competition as the main mechanism of evolution. In his essay *Struggle for Existence and its Bearing Upon Man* Huxley wrote: "From the point of view of the moralist, the animal world is about on the same level as a gladiators' show. The creatures are fairly well treated and set to fight; hereby the strongest, the swiftest, and the cunningest live to fight another day. The spectator has no need to turn his thumbs down, as no quarter is granted."

Prince Peter Kropotkin (1842-1921) argued strongly against Huxley's point of view in his book *Mutual Aid; A Factor of Evolution*. "If we ask Nature", Kropotkin wrote, "who are the fittest: those who are continually at war with each other, or those who support one another?", we at once see that those animals that acquire habits of mutual aid are undoubtedly the fittest. They have more chances to survive, and they attain, in their respective classes, the highest development of intelligence and bodily organization."

Today, the insights of modern biology show that although competition plays an important role, most of the great upward steps in evolution have involved cooperation. The biologist Lynn Margulis (1938-2011) has been one of the pioneers of the modern viewpoint which recognizes symbiosis as a central mechanism in evolution.

One-celled organisms seen as examples of cooperation

The first small bacterial cells (prokaryotic cells) can be thought of as cooperative communities in which autocatalytic molecules thrived better together than they had previously done separately.

The next great upward step in evolution, the development of large and complex (eukaryotic) cells, also involved cooperation: Many of their components, for example mitochondria (small granular structures that are needed for respiration) and chloroplasts (the



Figure 2.11: Thomas Henry Huxley (1825-1895), caricatured in *Vanity Fair*. Huxley was a strong supporter of Darwin, but he placed much more emphasis on competition in evolution than Darwin did. In fact, Darwin himself was strongly aware of the great role that cooperation plays.



Figure 2.12: The biologist Lynn Margulis argued strongly that eukaryotic cells should be regarded as cooperative communities of simpler organisms that once lived independently. At first she was almost alone in this view, but today it is generally accepted. Most of the great upward steps in evolution have involved cooperation.

photosynthetic units of higher plants) are believed to have begun their existence as free-living prokaryotic cells. They now have become components of complex cells, cooperating biochemically with the other subcellular structures. Both mitochondria and chloroplasts possess their own DNA, which shows that they were once free-living bacteria-like organisms, but they have survived better in a cooperative relationship.

Cooperation between cells; multicellular organisms

Multicellular organisms evolved from cooperative communities of eukaryotic cells. Some insights into how this happened can be gained from examples which are just on the borderline between the multicellular organisms and single-celled ones. The cooperative behavior of a genus of unicellular eukaryotes called slime molds is particularly interesting because it gives us a glimpse of how multicellular organisms may have originated. The name of the slime molds is misleading, since they are not fungi, but are similar to amoebae.

Under ordinary circumstances, the individual cells wander about independently searching for food, which they draw into their interiors and digest. However, when food is scarce, they send out a chemical signal of distress. (Researchers have analyzed the molecule which expresses slime mold unhappiness, and they have found it to be cyclic adenosine monophosphate.) At this signal, the cells congregate and the mass of cells begins to crawl, leaving a slimy trail. As it crawls, the community of cells gradually develops into a tall stalk, surmounted by a sphere - the "fruiting body". Inside the sphere, spores are produced by a sexual process. If a small animal, for example a mouse, passes by, the spores may adhere to its coat; and in this way they may be transported to another part of the forest where food is more plentiful.

Slime molds represent a sort of missing link between unicellular and multicellular organisms. Normally the cells behave as individualists, wandering about independently, but when challenged by a shortage of food, the slime mold cells join together into an entity which closely resembles a multicellular organism.

The cells even seem to exhibit altruism, since those forming the stalk have little chance of survival, and yet they are willing to perform their duty, holding up the sphere at the top so that the spores will survive and carry the genes of the community into the future.

Multicellular organisms often live in a symbiotic relationship with other species. For example, in both animals and humans, bacteria are essential for the digestion of food. Fungi on the roots of plants aid their absorption of water and nutrients. Communities of bacteria and other organisms living in the soil are essential for the recycling of nutrients. Insects are essential to many plants for pollination.

Cooperation in groups of animals and human groups

The social behavior of groups of animals, flocks of birds and communities of social insects involves cooperation as well as rudimentary forms of language. Various forms of language, including chemical signals, postures and vocal signals, are important tools for orchestrating cooperative behavior.



Figure 2.13: A photo showing several types of sponges. Sponges and slime molds are on the borderline between single celled organisms and multicellular ones. The single cells of these species can live independently, but they can also function as members of a cooperating colony. (Public domain)

The highly developed language of humans made possible an entirely new form of evolution. In cultural evolution (as opposed to genetic evolution), information is passed between generations not in the form of a genetic code, but in the form of linguistic symbols. With the invention of writing, and later the invention of printing, the speed of human cultural evolution greatly increased. Cooperation is central to this new form of evolution. Cultural advances can be shared by all humans.

Gracilization and decreasing sexual dimorphism

Early ancestors of modern humans had a relatively heavy (robust) bone structure in relation to their height. This robust bone structure seems to have been favored by frequent combat. During their evolution, modern humans became less robust and more gracile. In other words, their skeletons became lighter in relation to their height. Simultaneously the height and weight of males became less different from the height and weight of females. These trends are generally interpreted as indicating that combat became less important as present-day humans evolved.

Ethics and growth of the social unit

Early religions tended to be centered on particular tribes, and the ethics associated with them were usually tribal in nature. However, the more cosmopolitan societies that began to form after the Neolithic agricultural revolution required a more universal code of ethics. It is interesting to notice that many of the great ethical teachers of human history, for example Moses, Socrates, Plato, Aristotle, Lao Tzu, Confucius, Buddha, and Jesus, lived at the time when the change to larger social units was taking place. Tribalism was no longer appropriate. A wider ethic was needed.

Today the size of the social unit is again being enlarged, this time enlarged to include the entire world. Narrow loyalties have become inappropriate and there is an urgent need for a new ethic - a global ethic. Loyalty to one's nation needs to be supplemented by a higher loyalty to humanity as a whole.

Interdependence in modern human society

All of the great upward steps in the evolution of life on earth have involved cooperation: Prokaryotes, the first living cells, can be thought of as cooperative communities of autocatalysts; large, complex eukaryote cells are now believed to have evolved as cooperative communities of prokaryotes; multicellular organisms are cooperative communities of eukaryotes; multicellular organisms cooperate to form societies; and different species cooperate to form ecosystems. Indeed, James Lovelock has pointed out that the earth as a whole is a complex interacting system that can be regarded as a huge organism.

The enormous success of humans as a species is due to their genius for cooperation. The success of humans is a success of cultural evolution, a new form of evolution in which information is passed between generations, not in the form of DNA sequences but in the

form of speech, writing, printing and finally electronic signals. Cultural evolution is built on cooperation, and has reached great heights of success as the cooperating community has become larger and larger, ultimately including the entire world.

Without large-scale cooperation, modern science would never have evolved. It developed as a consequence of the invention of printing, which allowed painfully gained detailed knowledge to be widely shared. Science derives its great power from concentration. Attention and resources are brought to bear on a limited problem until all aspects of it are understood. It would make no sense to proceed in this way if knowledge were not permanent, and if the results of scientific research were not widely shared. But today the printed word and the electronic word spread the results of research freely to the entire world. The whole human community is the repository of shared knowledge.

The achievements of modern society are achievements of cooperation. We can fly, but no one builds an airplane alone. We can cure diseases, but only through the cooperative efforts of researchers, doctors and medicinal firms. We can photograph and understand distant galaxies, but the ability to do so is built on the efforts of many cooperating individuals.

An isolated sponge cell can survive, but an isolated human could hardly do so. Like an isolated bee, a human would quickly die without the support of the community. The comfort and well-being that we experience depends on far-away friendly hands and minds, since trade is global, and the exchange of ideas is also global.

Finally, we should be conscious of our cooperative relationships with other species. We could not live without the bacteria that help us to digest our food. We could not live without the complex communities of organisms in the soil that convert dead plant matter into fertile topsoil. We could not live without plants at the base of the food chain, but plants require pollination, and pollination frequently requires insects. An intricate cooperative network of inter-species relationships is necessary for human life, and indeed necessary for all life. Competition plays a role in evolution, but the role of cooperation is greater.

Two sides of human nature

Looking at human nature, both from the standpoint of evolution and from that of everyday experience, we see the two faces of Janus; one face shines radiantly; the other is dark and menacing. Two souls occupy the human breast, one warm and friendly, the other murderous. Humans have developed a genius for cooperation, the basis for culture and civilization; but they are also capable of genocide; they were capable of massacres during the Crusades, capable of genocidal wars against the Amerinds, capable of the Holocaust, of Hiroshima, of the killing-fields of Cambodia, of Rwanda, and of Darfur

As an example of the two sides of human nature, we can think of Scandinavia. The Vikings were once feared throughout Europe. The Book of Common Prayer in England contains the phrase "Protect us from the fury of the Northmen!". Today the same people are so peaceful and law-abiding that they can be taken as an example for how we would like a future world to look. Human nature has the possibility for both kinds of behavior depending on the circumstances. This being so, there are strong reasons to enlist the help

of education and religion to make the bright side of human nature win over the dark side. Today, the mass media are an important component of education, and thus the mass media have a great responsibility for encouraging the cooperative and constructive side of human nature rather than the dark and destructive side.

Some concluding remarks

We started this chapter by saying that human nature is an evolutionary paradox because natural selection is supposed to produce traits that lead to survival, but today our emotions are driving humanity towards destruction. The explanation for this paradox is the enormous and constantly accelerating speed of cultural evolution, especially scientific and technological advances. Genetic evolution is completely unable to keep up with this astonishing rate of change, which might be called an information explosion. Fortunately, human behavior is very malleable, and we can hope that it will be possible to adapt to the rapidly changing conditions of life if proper use is made of our almost miraculous modern communications technologies.

Suggestions for further reading

1. P.J. Bowler, *Evolution: The History of an Idea*, University of California Press, (1989).
2. D.J. Futuyma, *Evolutionary Biology*, Sinauer Associates, Sunderland Mass., (1986).
3. B. Glass, O. Temkin, and W.L. Strauss, eds., *Forerunners of Darwin: 1745-1859*, Johns Hopkins Press, Baltimore, (1959).
4. R. Milner, *The Encyclopedia of Evolution*, an Owl Book, Henry Holt and Company, New York, (1990).
5. T.A. Appel, *The Cuvier-Geoffroy Debate: French Biology in the Decades before Darwin*, Oxford University Press, (1987).
6. P.J. Bowler, *Fossils and Progress: Paleontology and the Idea of Progressive Evolution in the Nineteenth Century*, Science History Publications, New York, (1976).
7. P. Corsi, *The Age of Lamarck: Evolutionary Theories in France, 1790-1834*, University of California Press, Berkeley, (1988).
8. M. McNeil, *Under the Banner of Science: Erasmus Darwin and his Age*, Manchester University Press, Manchester, (1987).
9. L.G. Wilson, *Sir Charles Lyell's Scientific Journals on the Species Question*, Yale University Press, New Haven, (1970).
10. A.B. Adams, *Eternal Quest: The Story of the Great Naturalists*, G.P. Putnam's Sons, New York, (1969).
11. A.S. Packard, *Lamarck, the Founder of Evolution: His Life and Work*, Longmans, Green, and Co., New York, (1901).
12. C. Darwin, *An historical sketch of the progress of opinion on the Origin of Species, previously to the publication of this work*, Appended to third and later editions of *On the Origin of Species*, (1861).

13. L. Eiseley, *Darwin's Century: Evolution and the Men who Discovered It*, Doubleday, New York, (1958).
14. H.F. Osborne, *From the Greeks to Darwin: The Development of the Evolution Idea Through Twenty-Four Centuries*, Charles Scribner and Sons, New York, (1929).
15. Sir Julian Huxley and H.B.D. Kettlewell, *Charles Darwin and his World*, Thames and Hudson, London (1965).
16. Allan Moorehead, *Darwin and the Beagle*, Penguin Books Ltd. (1971).
17. Francis Darwin (editor), *The Autobiography of Charles Darwin and Selected Letters*, Dover, New York (1958).
18. Charles Darwin, *The Voyage of the Beagle*, J.M. Dent and Sons Ltd., London (1975).
19. Charles Darwin, *The Origin of Species*, Collier MacMillan, London (1974).
20. Charles Darwin, *The Expression of Emotions in Man and Animals*, The University of Chicago Press (1965).
21. Ruth Moore, *Evolution*, Time-Life Books (1962).
22. L. Barber, *The Heyday of Natural History: 1820-1870*, Doubleday and Co., Garden City, New York, (1980).
23. A. Desmond, *Huxley*, Addison Wesley, Reading, Mass., (1994).
24. R. Owen, (P.R. Sloan editor), *The Hunterian Lectures in Comparative Anatomy, May-June, 1837*, University of Chicago Press, (1992).
25. C. Nichols, *Darwinism and the social sciences*, Phil. Soc. Scient. **4**, 255-277 (1974).
26. M. Ruse, *The Darwinian Revolution*, University of Chicago Press, (1979).
27. A. Desmond and J. Moore, *Darwin*, Penguin Books, (1992).
28. R. Dawkins, *The Extended Phenotype*, Oxford University Press, (1982).
29. R. Dawkins, *The Blind Watchmaker*, W.W. Norton, (1987).
30. R. Dawkins, *River out of Eden: A Darwinian View of Life*, Harper Collins, (1995).
31. R. Dawkins, *Climbing Mount Improbable*, W.W. Norton, (1996).
32. S.J. Gould, *Ever Since Darwin*, W.W. Norton, (1977).
33. R.G.B. Reid, *Evolutionary Theory: The Unfinished Synthesis*, Croom Helm, (1985).
34. M. Ho and P.T. Saunders, editors, *Beyond Neo-Darwinism: An Introduction to a New Evolutionary Paradigm*, Academic Press, London, (1984).
35. J. Maynard Smith, *Did Darwin Get it Right? Essays on Games, Sex and Evolution*, Chapman and Hall, (1989).
36. E. Sober, *The Nature of Selection: Evolutionary Theory in Philosophical Focus*, University of Chicago Press, (1984).
37. B.K. Hall, *Evolutionary Developmental Biology*, Chapman and Hall, London, (1992).
38. J. Thompson, *Interaction and Coevolution*, Wiley and Sons, (1982).
39. R.A. Fischer, *The Genetical Theory of Natural Selection*, Clarendon, Oxford, (1930).
40. J.B.S. Haldane, *Population genetics*, *New Biology* **18**, 34-51, (1955).
41. N. Tinbergen, *The Study of Instinct*, Oxford University Press, (1951).
42. N. Tinbergen, *The Herring Gull's World*, Collins, London, (1953).
43. N. Tinbergen, *Social Behavior in Animals*, Methuen, London, (1953).
44. N. Tinbergen, *Curious Naturalists*, Country Life, London, (1958).

45. N. Tinbergen, *The Animal in its World: Explorations of an Ethologist*, Allan and Unwin, London, (1973).
46. K. Lorenz, *On the evolution of behavior*, Scientific American, December, (1958).
47. K. Lorenz, *Evolution and Modification of Behavior* Harvard University Press, Cambridge, MA, (1961).
48. K. Lorenz, *Studies in Animal and Human Behavior. I and II.*, Harvard University Press, (1970) and (1971).
49. P.H. Klopfer and J.P. Hailman, *An Introduction to Animal Behavior: Ethology's First Century*, Prentice-Hall, New Jersey, (1969).
50. J. Jaynes, *The historical origins of "Ethology" and "Comparative Psychology"*, Anim. Behav. **17**, 601-606 (1969).
51. W.H. Thorpe, *The Origin and Rise of Ethology: The Science of the Natural Behavior of Animals*, Heinemann, London, (1979).
52. R.A. Hinde, *Animal Behavior: A Synthesis of Ethological and Comparative Psychology*, McGraw-Hill, New York, (1970).
53. J.H. Crook, editor, *Social Behavior in Birds and Mammals*, Academic Press, London, (1970).
54. P. Ekman, editor, *Darwin and Facial Expression*, Academic Press, New York, (1973).
55. P. Ekman, W.V. Friesen and P. Ekworth, *Emotions in the Human Face*, Pergamon, New York, (1972).
56. N. Blurton Jones, editor, *Ethological Studies of Child Behavior*, Cambridge University Press, (1975).
57. M. von Cranach, editor, *Methods of Inference from Animals to Human Behavior*, Chicago/Mouton, Haag, (1976); Aldine, Paris, (1976).
58. K. Lorenz, *On Aggression*, Bantem Books, (1977).
59. I. Eibl-Eibesfeldt, *Ethology, The Biology of Behavior*, Holt, Rinehart and Winston, New York, (1975).
60. I. Eibl-Eibesfeldt and F.K. Salter, editors, *Indoctrinability, Ideology, and Warfare: Evolutionary Perspectives*, Berghahn Books, (1998).
61. I. Eibl-Eibesfeldt, *Human Ethology*, Walter De Gruyter Inc., (1989).
62. I. Eibl-Eibesfeldt, *Love and Hate*, Walter De Gruyter Inc., (1996).
63. J. Bowlby, *By ethology out of psychoanalysis: An experiment in interbreeding*, Animal Behavior, **28**, 649-656 (1980).
64. B.B. Beck, *Animal Tool Behavior*, Garland STPM Press, New York, (1980).
65. R. Axelrod, *The Evolution of Cooperation*, Basic Books, New York, (1984).
66. J.D. Carthy and F.L. Ebling, *The Natural History of Aggression*, Academic Press, New York, (1964)
67. D.L. Cheney and R.M. Seyfarth, *How Monkeys See the World: Inside the Mind of Another Species*, University of Chicago Press, (1990).
68. F. De Waal, *Chimpanzee Politics*, Cape, London, (1982).
69. M. Edmunds, *Defense in Animals*, Longman, London, (1974).
70. R.D. Estes, *The Behavior Guide to African Mammals*, University of California Press, Los Angeles, (1991).

71. R.F. Ewer, *Ethology of Mammals*, Logos Press, London, (1968).
72. E. Morgan, *The Scars of Evolution*, Oxford University Press, (1990).
73. W.D. Hamilton, *The genetical theory of social behavior. I and II*, J. Theor. Biol. **7**, 1-52 (1964).
74. R. Dawkins, *The Selfish Gene*, Oxford University Press, (1989).
75. R.W. Sussman, *The Biological Basis of Human Behavior*, Prentice Hall, Englewood Cliffs, (1997).
76. Irenäus Eibl-Eibesfeldt, *The Biology of Peace and War*, Thames and Hudson, New York (1979).
77. R.A. Hinde, *Biological Bases of Human Social Behavior*, McGraw-Hill, New York (1977).
78. R.A. Hinde, *Towards Understanding Relationships*, Academic Press, London (1979).
79. Albert Szent-Györgyi, *The Crazy Ape*, Philosophical Library, New York (1970).
80. E.O. Wilson, *Sociobiology*, Harvard University Press (1975).
81. C. Zhan-Waxler, *Altruism and Aggression: Biological and Social Origins*, Cambridge University Press (1986).
82. D.R. Griffin, *Animal Mind - Human Mind*, Dahlem Konferenzen 1982, Springer, Berlin, (1982).
83. R. Dart, *The predatory transition from ape to man*, International Anthropological and Linguistic Review, **1**, (1953).
84. S. Savage-Rumbaugh, R. Lewin, et al., *Kanzi: The Ape at the Brink of the Human Mind*, John Wiley and Sons, New York, (1996).
85. R. Dunbar, *Grooming, Gossip, and the Evolution of Language*, Harvard University Press, (1998).
86. M.E. Bitterman, *The evolution of intelligence*, Scientific American, January, (1965).
87. R. Fox, *In the beginning: Aspects of hominid behavioral evolution*, Man, **NS 2**, 415-433 (1967).
88. M.S. Gazzaniga, *The split brain in man*, Scientific American, **217**, 24-29 (1967).
89. D. Kimura, *The asymmetry of the human brain*, Scientific American, **228**, 70-78 (1973).
90. R.G. Klein, *Anatomy, behavior, and modern human origins*, Journal of World Prehistory, **9 (2)**, 167-198 (1995).
91. N.G. Jablonski and L.C. Aiello, editors, *The Origin and Diversification of Language*, Wattis Symposium Series in Anthropology. Memoirs of the California Academy of Sciences, No. 24, The California Academy of Sciences, San Francisco, (1998).
92. S. Pinker, *The Language Instinct: How the Mind Creates Language*, Harper-Collins Publishers, New York, (1995).
93. J.H. Barkow, L. Cosmides and J. Tooby, editors, *The Adapted Mind: Evolutionary Psychology and the Generation of Culture*, Oxford University Press, (1995).
94. D.R. Begun, C.V. Ward and M.D. Rose, *Function, Phylogeny and Fossils: Miocene Hominid Evolution and Adaptations*, Plenum Press, New York, (1997).

95. R.W. Byrne and A.W. Whitten, *Machiavellian Intelligence: Social Expertise and the Evolution of Intellect in Monkeys, Apes and Humans*, Cambridge University Press, (1988),
96. V.P. Clark, P.A. Escholz and A.F. Rosa, editors, *Language: Readings in Language and Culture*, St Martin's Press, New York, (1997).
97. T.W. Deacon, *The Symbolic Species: The Co-evolution of Language and the Brain*, W.W. Norton and Company, New York, (1997).
98. C. Gamble, *Timewalkers: The Prehistory of Global Colonization*, Harvard University Press, (1994).
99. K.R. Gibson and T. Ingold, editors, *Tools, Language and Cognition in Human Evolution*, Cambridge University Press, (1993).
100. P. Mellars, *The Emergence of Modern Humans: An Archaeological Perspective*, Edinburgh University Press, (1990).
101. P. Mellars, *The Neanderthal Legacy: An Archaeological Perspective of Western Europe*, Princeton University Press, (1996).
102. S. Mithen, *The Prehistory of the Mind*, Thames and Hudson, London, (1996).
103. D. Haraway, *Signs of dominance: from a physiology to a cybernetics of primate biology*, *C.R. Carpenter, 1939-1970*, Studies in History of Biology, **6**, 129-219 (1983).
104. D. Johanson and M. Edey, *Lucy: The Beginnings of Humankind*, Simon and Schuster, New York, (1981).
105. B. Kurtén, *Our Earliest Ancestors*, Columbia University Press, New York, (1992).
106. R.E. Leakey and R. Lewin, *Origins Reconsidered*, Doubleday, New York, (1992).
107. P. Lieberman, *The Biology and Evolution of Language*, Harvard University Press, (1984).
108. J.D. Wall and M. Przeworski, *When did the human population size start increasing?*, *Genetics*, **155**, 1865-1874 (2000).
109. L. Aiello and C. Dean, *An Introduction to Human Evolutionary Anatomy*, Academic Press, London, (1990).
110. F. Ikawa-Smith, ed., *Early Paleolithic in South and East Asia*, Mouton, The Hague, (1978).
111. R.R. Baker, *Migration: Paths Through Space and Time*, Hodder and Stoughton, London, (1982).
112. P. Bellwood, *Prehistory of the Indo-Malaysian Archipelago*, Academic Press, Sidney, (1985).
113. P.J. Bowler, *Theories of Human Evolution: A Century of Debate, 1884-1944*, Basil Blackwell, Oxford, (1986).
114. G. Isaac and M. McCown, eds., *Human Origins: Louis Leaky and the East African Evidence*, Benjamin, Menlo Park, (1976).
115. F.J. Brown, R. Leaky, and A. Walker, *Early Homo erectus skeleton from west Lake Turkana, Kenya*, *Nature*, **316**, 788-92, (1985).
116. K.W. Butzer, *Archeology as Human Ecology*, Cambridge University Press, (1982).
117. A.T. Chamberlain and B.A. Wood, *Early hominid phylogeny*, *Journal of Human Evolution*, **16**, 119-33, (1987).

118. P. Mellars and C. Stringer, eds., *The Human Revolution: Behavioural and Biological Perspectives in the Origins of Modern Humans*, Edinburgh University Press, (1989).
119. G.C. Conroy, *Primate Evolution*, W.W. Norton, New York, (1990).
120. R.I.M. Dunbar, *Primate Social Systems*, Croom Helm, London, (1988).
121. B. Fagan, *The Great Journey: The Peopling of Ancient America*, Thames and Hudson, London, (1987).
122. R.A. Foley, ed., *Hominid Evolution and Community Ecology*, Academic Press, New York, (1984).
123. S.R. Binford and L.R. Binford, *Stone tools and human behavior*, Scientific American, **220**, 70-84, (1969).
124. G. Klein, *The Human Career, Human Biological and Cultural Origins*, University of Chicago Press, (1989).
125. B.F. Skinner and N. Chomsky, *Verbal behavior*, *Language*, **35** 26-58 (1959).
126. D. Bickerton, *The Roots of Language*, Karoma, Ann Arbor, Mich., (1981).
127. E. Lenneberg in *The Structure of Language: Readings in the Philosophy of Language*, J.A. Fodor and J.A. Katz editors, Prentice-Hall, Englewood Cliffs N.J., (1964).
128. S. Pinker, *Talk of genetics and visa versa*, *Nature*, **413**, 465-466, (2001).
129. S. Pinker, *Words and rules in the human brain*, *Nature*, **387**, 547-548, (1997).
130. M. Ruhelen, *The Origin of Language*, Wiley, New York, (1994).
131. C.B. Stringer and R. McKie, *African Exodus: The Origins of Modern Humanity*, Johnathan Cape, London (1996).
132. R.W. Sussman, *The Biological Basis of Human Behavior*, Prentice Hall, Englewood Cliffs, (1997).
133. D.P. Barash *Sociobiology and Behavior*, Elsevier, New York, (1977).
134. J.D. Carthy and F.J. Eblin, eds., *The Natural History of Aggression*, Academic Press, New York, (1964).
135. N.A. Chagnon and W. Irons, eds., *Evolutionary Biology and Human Social Behavior, an Anthropological Perspective*, Duxbury Press, N. Scituate, MA, (1979).
136. E. Danielson, *Vold, en Ond Arv?*, Gyldendal, Copenhagen, (1929).
137. M.R. Davie, *The Evolution of War*, Yale University Press, New Haven, CT, (1929).
138. T. Dobzhanski, *Mankind Evolving*, Yale University Press, New Haven, CT, (1962).
139. I. Eibl-Eibesfeldt, *Der Vorprogrammiert Mensch*, Molden, Vienna, (1973).
140. I. Eibl-Eibesfeldt, *Ethology, the Biology of Behavior*, Holt, Rinehart and Winston, New York, (1975).
141. I. Eibl-Eibesfeldt, *Liebe und Hass*, Molden, Vienna, (1973).
142. R.L. Holloway, *Primate Aggression: Territoriality and Xenophobia*, Academic Press, New York, (1974).
143. P. Kitcher, *Vaulting Ambition: Sociobiology and the Quest for Human Nature*, MIT Press, Cambridge, MA, (1985).
144. S.L.W. Mellen, *The Evolution of Love*, Freeman, Oxford, (1981).
145. A. Roe and G.G. Simpson, *Behavior and Evolution*, Yale University Press, New Haven, CT, (1958).
146. N.J. Smelser, *The Theory of Collective Behavior*, Free Press, New York, (1963).

147. R. Trivers, *Social Evolution*, Benjamin/Cummings, Menlo Park, CA, (1985).
148. W. Weiser, *Konrad Lorenz und seine Kritiker*, Piper, Munich, (1976).
149. W. Wickler, *Biologie der 10 Gebote*, Piper, Munich, (1971).
150. E.O. Wilson, *Sociobiology*, Harvard University Press (1975).
151. E.O. Wilson, *On Human Nature*, Bantam Books, New York, (1979).
152. C. Zahn-Waxler, *Altruism and Aggression: Biological and Social Origins*, Cambridge University Press, (1986).
153. J. Galtung, *A structural theory of aggression*, Journal of Peace Research, **1**, 95-119, (1964).
154. G.E. Kang, *Exogamy and peace relations of social units: A cross-cultural test*, Ethology, **18**, 85-99, (1979).
155. A. Montagu, *Man and Aggression*, Oxford University Press, New York, (1968).
156. W.A. Nesbitt, *Human Nature and War*, State Education Department of New York, Albany, (1973).
157. W. Suttles, *Subhuman and human fighting*, Anthropologica, **3**, 148-163, (1961).
158. V. Vale and Andrea Juno, editors, *Modern Primitives: An Investigation of Contemporary Adornment and Ritual*, San Francisco Re/Search, (1990).
159. R.A. Hinde, editor, *The Institution of War*, Cambridge University Press, (1991).
160. R.A. Hinde, *Individuals, Relationships and Culture: Links Between Ethology and the Social Sciences*, Cambridge University Press, (1987).
161. R.A. Hinde, *Ethology: Its Nature and Relationship With Other Sciences*
162. R.A. Hinde, *Animal Behaviour: A Synthesis of Ethology and Comparative Psychology*
163. R.A. Hinde, *Non-Verbal Communication*, Cambridge University Press, (1972).
164. R.A. Hinde, *Why Gods Persist: A Scientific Approach to Religion*, Routledge, London, (1999).
165. P.P.G. Bateson and R.A. Hinde, editors, *Growing Points in Ethology: Based on a Conference Sponsored by St. John's College and King's College, Cambridge*, Cambridge University Press, (1976).
166. R.A. Hinde, A.-N. Perret-Clermont and J. Stevenson-Hinde, editors, *Social Relationships and Cognitive Development*, Clarendon, Oxford, (1985).
167. R.A. Hinde and J. Stevenson-Hinde, editors, *Relationships Within Families: Mutual Influences*, Clarendon Press, Oxford, (1988).
168. P. Bateson, editor, *The Development and Integration of Behaviour: Essays in Honour of Robert Hinde*, Cambridge University Press, (1991).
169. C. Darwin, *The Expression of Emotions in Man and Animals*, The University of Chicago Press (1965).
170. P. Kropotkin, *Mutual Aid, A Factor in Evolution*, Walter Heinemann, London, (1902).
171. R.A. Fischer, *The Genetical Theory of Natural Selection*, Clarendon, Oxford, (1930).
172. J.B.S. Haldane, *Population genetics*, New Biology **18**, 34-51, (1955).
173. L. Margulis, *Symbiosis as a Source of Evolutionary Innovation: Speciation and Morphogenesis*, The MIT Press, (1991).

174. L. Margulis, *Symbiosis in Cell Evolution: Microbial Communities in the Archean and Proterozoic Eons*, W.H. Freeman, (1992).
175. N. Tinbergen, *The Study of Instinct*, Oxford University Press, (1951).
176. I. Eibl-Eibesfeldt, *The Biology of Peace and War*, Thames and Hudson, New York (1979).
177. E.O. Wilson, *On Human Nature*, Bantham Books, New York, (1979).
178. R.A. Hinde, *Biological Bases of Human Social Behavior*, McGraw-Hill, New York (1977).
179. R.A. Hinde, *Individuals, Relationships and Culture: Links Between Ethology and the Social Sciences*, Cambridge University Press, (1987).
180. W.M. Senner, editor, *The Origins of Writing*, University of Nebraska Press, Lincoln and London, (1989).

Chapter 3

FROM TRIBALISM TO NATIONALISM

70,000 years ago, our hunter-gatherer ancestors lived in tribes. Loyalty to the tribe was natural for our ancestors, as was collective work on tribal projects. Today, at the start of the 21st century, we live in nation-states to which we feel emotions of loyalty very similar to the tribal emotions of our ancestors.

The enlargement of the fundamental political and social unit has been made necessary and possible by improved transportation and communication, and by changes in the techniques of warfare. In Europe, for example, the introduction of canons in warfare made it possible to destroy castles, and thus the power of central monarchs was increased at the expense of feudal barons. At the same time, improved roads made merchants wish to trade freely over larger areas. Printing allowed larger groups of people to read the same books and newspapers, and thus to experience the same emotions. Therefore the size of the geographical unit over which it was possible to establish social and political cohesion became enlarged.

The tragedy of our present situation is that the same forces that made the nation-state replace the tribe as the fundamental political and social unit have continued to operate with constantly-increasing intensity. For this reason, the totally sovereign nation-state has become a dangerous anachronism. Although the world now functions as a single unit because of modern technology, its political structure is based on fragments, on absolutely-sovereign nation states - large compared to tribes, but too small for present-day technology, since they do not include all of mankind. Gross injustices mar today's global economic interdependence, and because of the development of thermonuclear weapons, the continued existence of civilization is threatened by the anarchy that exists today at the international level.

In this chapter, we will discuss nationalism in Europe, and especially the conflicts between absolutely sovereign nation-states that led to the two World Wars. However, it is important to remember that parallel to this story, run others, equally tragic - conflicts in the Middle East, the Vietnam War, the Cuban Missile Crisis, conflicts between India and Pakistan, the Korean War, the two Gulf Wars, and so on. In all of these tragedies, the

root the trouble is that international interdependence exists in practice because of modern technology, but our political institutions, emotions and outlook are at the stunted level of the absolutely sovereign nation-state. Although we focus here on German nationalism as an example, and although historically it had terrible consequences, it is not a danger today. Germany is now one of the world's most peaceful and responsible countries, and the threats to world peace now come from nationalism outside Europe.

3.1 Nationalism in Europe

There is no doubt that the founders of nationalism in Europe were idealists; but the movement that they created has already killed more than sixty million people in two world wars, and today it contributes to the threat of a catastrophic third world war.

Nationalism in Europe is an outgrowth of the Enlightenment, the French Revolution, and the Romantic Movement. According to the philosophy of the Enlightenment and the ideas of the French Revolution, no government is legitimate unless it derives its power from the will of the people. Speaking to the Convention of 1792, Danton proclaimed that “by sending us here as deputies, the French Nation has brought into being a grand committee for the general insurrection of peoples.”

Since all political power was now believed to be vested in the “nation”, the question of national identity suddenly became acutely important. France itself was a conglomeration of peoples - Normans, Bretons, Provencaux, Burgundians, Flemings, Germans, Basques, and Catalans - but these peoples had been united under a strong central government since the middle ages, and by the time of the French Revolution it was easy for them to think of themselves as a “nation”. However, what we now call Germany did not exist. There was only a collection of small feudal principalities, in some of which the most common language was German.

The early political unity of France enabled French culture to dominate Europe during the 17th and 18th centuries. Frederick the Great of Prussia and his court spoke and wrote in French. Frederick himself regarded German as a language of ignorant peasants, and on the rare occasions when he tried to speak or write in German, the result was almost incomprehensible. The same was true in the courts of Brandenburg, Saxony, Pomerania, etc. Each of them was a small-scale Versailles. Below the French-speaking aristocracy was a German-speaking middle class and a German or Slavic-speaking peasantry.

The creators of the nationalist movement in Germany were young middle-class German-speaking students and theologians who felt frustrated and stifled by the narrow *kleinstädtisch* provincial atmosphere of the small principalities in which they lived. They also felt frustrated because their talents were completely ignored by the French-speaking aristocracy. This was the situation when the armies of Napoleon marched across Europe, easily defeating and humiliating both Prussia and Austria. The young German-speaking students asked themselves what it was that the French had that they did not have.

The answer was not hard to find. What the French had was a sense of national identity. In fact, the French Revolution had unleashed long-dormant tribal instincts in the common



Figure 3.1: A portrait of Napoleon (as he liked to see himself).

people of France. It was the fanatical support of the Marseillaise-singing masses that made the French armies invincible. The founders of the German nationalist movement concluded that if they were ever to have a chance of defeating France, they would have to inspire the same fanaticism in their own peoples. They would have to touch the same almost-forgotten cord of human nature that the French Revolution had touched.

The common soldiers who fought in the wars of Europe in the first part of the 18th century were not emotionally involved. They were recruited from the lowest ranks of society, and they joined the army of a king or prince for the sake of money. All this was changed by the French Revolution. In June, 1792, the French Legislative Assembly decreed that a Fatherland Alter be erected in each commune with the inscription, “The citizen is born, lives and dies for *la patrie*.” The idea of a “Fatherland Alter” clearly demonstrates the quasi-religious nature of French nationalism.

The soldiers in Napoleon’s army were not fighting for the sake of money, but for an ideal that they felt to be larger and more important than themselves - Republicanism and the glory of France. The masses, who for so long had been outside of the politics of a larger world, and who had been emotionally involved only in the affairs of their own village, were now fully aroused to large-scale political action. The surge of nationalist feeling in France was tribalism on an enormous scale - tribalism amplified and orchestrated by new means



Figure 3.2: **A romantic figure representing Germany**

of mass communication.

This was the phenomenon with which the German nationalists felt they had to contend.

One of the founders of the German nationalist movement was Johan Gottlieb Fichte (1762-1814), a follower of the philosopher Immanuel Kant (1724-1804). Besides rejecting objective criteria for morality, Fichte denied the value of the individual. According to him, the individual is nothing and the state is everything. Denying the value of the individual, Fichte compared the state to an organism of which the individual is a part:

“In a product of nature”, Fichte wrote, “no part is what it is but through its relation to the whole, and it would absolutely not be what it is apart from this relation; more, if it had no organic relation at all, it would be absolutely nothing, since without reciprocity in action between organic forces maintaining one another in equilibrium, no form would subsist... Similarly, man obtains a determinate position in the scheme of things and a fixity in nature only through his civil association... Between the isolated man and the citizen there is the same relation as between raw and organized matter... In an organized body, each part continuously maintains the whole, and in maintaining it, maintains itself also. Similarly the citizen with regard to the State.”

Another post-Kantian, Adam Müller (1779-1829) wrote that “the state is the intimate association of all physical and spiritual needs of the whole nation into one great, energetic, infinitely active and living whole... the totality of human affairs... If we exclude for ever from this association even the most unimportant part of a human being, if we separate private life from public life even at one point, then we no longer perceive the State as a phenomenon of life and as an idea.”

The doctrine that Adam Müller sets forth in this passage is what we now call Totalitarianism, i.e. the belief that the state ought to encompass “the totality of human affairs”. This doctrine is the opposite of the Liberal belief that the individual is all-important and that the role of the state ought to be as small as possible.

Fichte maintains that “a State which constantly seeks to increase its internal strength is forced to desire the gradual abolition of all favoritisms, and the establishment of equal rights for all citizens, in order that it, the State itself, may enter upon its own true right - to apply the whole surplus power of all its citizens without exception to the furtherance of its own purposes... Internal peace, and the condition of affairs in which everyone may by diligence earn his daily bread... is only a means, a condition and framework for what love of Fatherland really wants to bring about, namely that the Eternal and the Divine may blossom in the world and never cease to become more pure, perfect and excellent.”

Fichte proposed a new system of education which would abolish the individual will and teach individuals to become subservient to the will of the state. “The new education must consist essentially in this”, Fichte wrote, “that it completely destroys the will in the soil that it undertakes to cultivate... If you want to influence a man at all, you must do more than merely talk to him; you must fashion him, and fashion him, and fashion him in such a way that he simply cannot will otherwise than you wish him to will.”

Fichte and Herder (1744-1803) developed the idea that language is the key to national identity. They believed that the German language is superior to French because it is an “original” language, not derived from Latin. In a poem that is obviously a protest against the French culture of Frederick’s court in Prussia, Herder wrote:

“Look at other nationalities!
Do they wander about
So that nowhere in the world they are strangers
Except to themselves?
They regard foreign countries with proud disdain.
And you, German, alone, returning from abroad,
Wouldst greet your mother in French?
Oh spew it out before your door!
Spew out the ugly slime of the Seine!
Speak German, O you German!

Another poem, “The German Fatherland”, by Ernst Moritz Arndt (1769-1860), expresses a similar sentiment:

“What is the Fatherland of the German?
 Name me the great country!
 Where the German tongue sounds
 And sings *Lieder* in God’s praise,
 That’s what it ought to be
 Call that thine, valiant German!
 That is the Fatherland of the German,
 Where anger roots out foreign nonsense,
 Where every Frenchman is called enemy,
 Where every German is called friend,
 That’s what it ought to be!
 It ought to be the whole of Germany!”

It must be remembered that when these poems were written, the German nation did not exist except in the minds of the nationalists. Groups of people speaking various dialects of German were scattered throughout central and eastern Europe. In many places, the German-speaking population was a minority. To bring together these scattered German-speaking groups would require, in many cases, the conquest and subjugation of Slavic majorities; but the quasi-religious fervor of the nationalists was such that aggression took on the appearance of a “holy war”. Fichte believed that war between states introduces “a living and progressive principle into history”. By war he did not mean a decorous limited war of the type fought in the 18th century, but “...a true and proper war - *a war of subjugation!*”

The German nationalist movement was not only quasi-religious in its tone; it also borrowed psychological techniques from religion. It aroused the emotions of the masses to large-scale political activity by the use of semi-religious political liturgy, involving myth, symbolism, and festivals. In his book “German Society” (1814), Arndt advocated the celebration of “holy festivals”. For example, he thought that the celebration of the pagan festival of the summer solstice could be combined with a celebration of the victory over Napoleon at the Battle of Leipzig.

Arndt believed that special attention should be given to commemoration of the “noble dead” of Germany’s wars for, as he said, “...here history enters life, and life becomes part of history”. Arndt advocated a combination of Christian and pagan symbolism. The festivals should begin with prayers and a church service; but in addition, the Oak leaves and the sacred flame of ancient pagan tradition were to play a part.

In 1815, many of Arndt’s suggestions were followed in the celebration of the anniversary of the Battle of Leipzig. This festival clearly exhibited a mixing of secular and Christian elements to form a national cult. Men and women decorated with oak leaves made pilgrimages to the tops of mountains, where they were addressed by priests speaking in front of alters on which burned “the sacred flame of Germany’s salvation”. This borrowing of psychological techniques from religion was deliberate, and it was retained by the Nazi Party when the latter adopted the methods of the early German nationalists. The Nazi mass rallies retained the order and form of Protestant liturgy, including hymns, confessions of



Figure 3.3: Celebration of the “German May” at Hambrach Castle

faith, and responses between the leader and the congregation.¹

In 1832, the first mass meeting in German history took place, when 32,000 men and women gathered to celebrate the “German May”. Singing songs, wearing black, red, and gold emblems, and carrying flags, they marched to Hambrach Castle, where they were addressed by their leaders.

By the 1860’s the festivals celebrating the cult of nationalism had acquired a definite form. Processions through a town, involving elaborate national symbolism, were followed by unison singing by men’s choirs, patriotic plays, displays by gymnasts and sharpshooters, and sporting events. The male choirs, gymnasts and sharpshooters were required to wear uniforms; and the others attending the festivals wore oak leaves in their caps. The cohesion of the crowd was achieved not only by uniformity of dress, but also by the space in which the crowd was contained. Arndt advocated the use of a “sacred space” for mass meetings. The idea of the “sacred space” was taken from Stonehenge, which was seen by the nationalists as a typical ancient Germanic meeting place. The Nazi art historian Hubert Schrade wrote: “The space which urges us to join the community of the *Volk* is of greater importance than the figure which is meant to represent the Fatherland.”

Dramas were also used to promote a feeling of cohesion and national identity. An example of this type of propagandist drama is Kleist’s play, “Hermann’s Battle”, (1808). The play deals with a Germanic chieftain who, in order to rally the tribes against the Romans, sends his own men, disguised as Roman soldiers, to commit atrocities in the neighboring German villages. At one point in the play, Hermann is told of a Roman soldier

¹ The Nazi sacred symbols and the concept of the swastika or “gamma cross”, the eagle, the red/black/white color scheme, the ancient Nordic runes (one of which became the symbol of the SS), were all adopted from esoteric traditions going back centuries, shared by Brahmins, Scottish Masons, Rosicrucians, the Knights Templars and other esoteric societies.

who risked his own life to save a German child in a burning house. Hearing this report, Hermann exclaims, "May he be cursed if he has done this! He has for a moment made my heart disloyal; he has made me for a moment betray the august cause of Germany!... I was counting, by all the gods of revenge, on fire, loot, violence, murder, and all the horrors of unbridled war! What need have I of Latins who use me well?"

At another point in the play, Hermann's wife, Thusnelda, tempts a Roman Legate into a romantic meeting in a garden. Instead of finding Thusnelda, the Legate finds himself locked in the garden with a starved and savage she-bear. Standing outside the gate, Thusnelda urges the Legate to make love to the she-bear, and, as the bear tears him to pieces, she faints with pleasure.

Richard Wagner's dramas were also part of the nationalist movement. They were designed to create "an unending dream of sacred *völkisch* revelation". No applause was permitted, since this would disturb the reverential atmosphere of the cult. A new type of choral theater was developed which "...no longer represented the fate of the individual to the audience, but that which concerns the community, the *Volk*... Thus, in contrast to the bourgeois theater, private persons are no longer represented, but only types."

We have primarily been discussing the growth of German nationalism, but very similar movements developed in other countries throughout Europe and throughout the world. Characteristic for all these movements was the growth of state power, and the development of a reverential, quasi-religious, attitude towards the state. Patriotism became "a sacred duty." According to Georg Wilhelm Fredrich Hegel, "The existence of the State is the movement of God in the world. It is the ultimate power on earth; it is its own end and object. It is an ultimate end that has absolute rights against the individual."

Nationalism in England (as in Germany) was to a large extent a defensive response against French nationalism. At the end of the 18th century, the liberal ideas of the Enlightenment were widespread in England. There was much sympathy in England with the aims of the French Revolution, and a similar revolution almost took place in England. However, when Napoleon landed an army in Ireland and threatened to invade England, there was a strong reaction towards national self-defense. The war against France gave impetus to nationalism in England, and military heroes like Wellington and Nelson became objects of quasi-religious worship. British nationalism later found an outlet in colonialism.

Italy, like Germany, had been a collection of small principalities, but as a reaction to the other nationalist movements sweeping across Europe, a movement for a united Italy developed. The conflicts between the various nationalist movements of Europe produced the frightful world wars of the 20th century. Indeed, the shot that signaled the outbreak of World War I was fired by a Serbian nationalist.

War did not seem especially evil to the 18th and 19th century nationalists because technology had not yet given humanity the terrible weapons of the 20th century. In the 19th century, the fatal combination of space-age science and stone-age politics still lay in the future. However, even in 1834, the German writer Heinrich Heine was perceptive enough to see the threat:

"There will be", Heine wrote, "Kantians forthcoming who, in the world to come, will



Figure 3.4: Wagner's dramas were part of the quasi-religious cult of German nationalism

know nothing of reverence for aught, and who will ravage without mercy, and riot with sword and axe through the soil of all European life to dig out the last root of the past. There will be well-weaponed Fichtians upon the ground, who in the fanaticism of the Will are not restrained by fear or self-advantage, for they live in the Spirit.”

3.2 The two world wars

In 1870, the fiercely nationalistic Prussian Chancellor, Otto von Bismark, won revenge for the humiliations which his country had suffered under Napoleon Bonaparte. In a lightning campaign, Prussia’s modern army overran France and took Emperor Napoleon III prisoner. The victorious Prussians demanded from France not only the payment of a huge sum of money - five billion francs - but also the annexation of the French provinces of Alsace and Lorraine. In 1871, Kaiser Wilhelm I was proclaimed Emperor of all Germany in the Hall of Mirrors at Versailles. The dreams of the German nationalists had been realized! The small German-speaking states of central Europe were now united into a powerful nation dominated by Prussia.

Bismark had provoked a number of wars in order to achieve his aim - the unification of Germany under Prussia; but after 1871 he strove for peace, fearing that war would harm his new creation. “I am bored”, Bismark remarked to his friends, “The great things are done. The German Reich is made.”

In order to preserve the status quo in Europe, Bismark now made alliances not only with Austria-Hungary and Italy, but also with Russia. To make alliances with both Austria-Hungary and Russia required considerable diplomatic skill, since the two empires were enemies - rivals for influence in the Balkan Peninsula. Several small Balkan states had broken away from the decaying Turkish Empire. Both the Hapsburg Emperors and the Romanoff Czars were anxious to dominate these small states. However, nationalist emotions were even more frenzied in the Balkans than they were elsewhere in Europe. Nationalism was a cause for which 19th century Europeans were willing to kill each other, just as three centuries earlier they had been willing to kill each other over their religious differences.

Serbia was an independent state, but the fanatical Serbian nationalists were far from satisfied. Their real aim was to create an independent Pan-Serbia (or Yugoslavia) which would include all the Slavic parts of Austria-Hungary. Thus, at the turn of the century, the Balkans were a trouble spot, much as the Middle East is a trouble spot today.

Kaiser Wilhelm I was a stable monarch, but in 1888 he died and the German throne passed to his son, Frederick III, who was incurably ill with cancer of the throat. After reigning only 90 days, Frederick also died, and his 29 year old son became the new German Emperor - Kaiser Wilhelm II. Wilhelm II had been born with a withered arm, and as a boy he had been constantly told that he must become a great warrior. His adult behavior sometimes showed tendencies towards both paranoia and megalomania.

In 1890, Wilhelm dismissed Otto von Bismark (“dropping the pilot”). Bismark was now on the side of peace, and he might have guided Germany safely through the troubled waters of European politics if he had been allowed to continue; but Wilhelm wanted to



Figure 3.5: **Otto von Bismarck**

play Bismarck himself.

Wilhelm's first act was to break off Germany's alliance with Russia. Czar Alexander III, against his principles, then formed an alliance with republican France. Realizing that he had blundered, Wilhelm tried to patch up relations with the Czar, but it was too late. Europe was now divided into two armed camps - Germany, Austria-Hungary and Italy, opposed by Russia and France.

Wilhelm's government then began to build a huge modern navy, much to the consternation of the English. The government of England felt that it was necessary for their country to have control of the sea, since England was a densely-populated island, dependent on imports of food. It was not only with respect to naval power that England felt threatened: After being united in 1871, Germany had undergone an industrial revolution; and German industries were pouring out steel and high-quality manufactured goods that threatened England's dominance of world trade. Commercial and naval competition with the rising German Empire drove England into an informal alliance with Russia and France - the Triple Entente.

Meanwhile the situation in the Balkans became increasingly troubled, and at the end of July, 1914, the Austrian Foreign Minister, Count Brechtold, used the assassination of Archduke Francis Ferdinand and his wife as a pretext for crushing the Serbian Pan-Slavic movement. Russia mobilized against Austria in defense of the Serbs, and the Austrian government interpreted the mobilization as a declaration of war. Germany was linked to Austria by an alliance, while France was linked to Russia. In this way, both France and

Russia were drawn into the conflict.

On August 2, Wilhelm demanded free passage of German troops through Belgium. The Belgians refused. They gave warning that an invasion would be resisted, and they appealed to England for support of their country's neutrality. On August 4, Britain sent an ultimatum to the Kaiser: Unless he halted the invasion of Belgium, Britain would enter the war. The invasion of Belgium rolled on. It was now too late to stop the great death-machine, and as it gained momentum, Sir Edward Grey spoke the sad and prophetic words. "The lamps are going out all over Europe; we shall not see them lit again in our lifetime."

None of the people who started the First World War had the slightest idea what it would be like. The armies of Europe were dominated by the old feudal landowning class, whose warlike traditions were rooted in the Middle Ages. The counts and barons who still ruled Europe's diplomatic and military establishments knew how to drink champaign, dance elegantly, ride horses, and seduce women. They pranced off to war in high spirits, the gold on their colorful uniforms glittering in the sunshine, full of expectations of romantic cavalry charges, kisses stolen from pretty girls in captured villages, decorations, glory and promotion, like characters in "The Chocolate Soldier" or "Die Fledermaus". The romantic dreams of glory of every small boy who ever played with toy soldiers were about to become a thrilling reality!

But the war, when it came, was not like that. Technology had taken over. The railroads, the telegraph, high explosives and the machine gun had changed everything. The opposing armies, called up by means of the telegraph and massed by means of the railroads, were the largest ever assembled up to that time in the history of the world. In France alone, between August 2 and August 18, 1914, the railway system transported 3,781,000 people under military orders. Across Europe, the railways hurled more than six million highly armed men into collision with each other. Nothing on that scale had ever happened before, and no one had any idea of what it would be like.

At first the Schlieffen Plan seemed to be working perfectly. When Kaiser Wilhelm had sent his troops into battle, he had told them: "You will be home before the leaves are off the trees", and at first it seemed that his prediction would be fulfilled. However, the machine gun had changed the character of war. Attacking infantry could be cut down in heaps by defending machine gunners. The war came to a stalemate, since defense had an advantage over attack.

On the western front, the opposing armies dug lines of trenches stretching from the Atlantic to the Swiss border. The two lines of trenches were separated by a tangled mass of barbed wire. Periodically the generals on one side or the other would order their armies to break through the opposing line. They would bring forward several thousand artillery pieces, fire a million or so high explosive shells to cut the barbed wire and to kill as many as possible of the defenders, and then order their men to attack. The soldiers had to climb out of the trenches and struggle forward into the smoke. There was nothing else for them to do. If they disobeyed orders, they would be court-martialed and shot as deserters. They were driven forward and slaughtered in futile attacks, none of which gained anything. Their leaders had failed them. Civilization had failed them. There was nothing for them to do



but to die, to be driven forward into the poison gas and barbed wire and to be scythed down by machine gun fire, for nothing, for the ambition, vanity and stupidity of their rulers.

At the battle of Verdun, 700,000 young men were butchered in this way, and at the battle of Somme, 1,100,000 young lives were wasted. On the German side, the soldiers sang “Lili Marlein” - “She waits for a boy who’s far away...” and on the other side, British and American soldiers sang:

“There’s a long long trail a-winding
 into the land of my dreams
 where the nightingale is singing
 and the pale moon beams.
 There’s a long long night of waiting
 until my dreams all come true,
 ’til the day that I’ll be going
 down that long long trail with you.”

For millions of Europe’s young men, the long, long trail lead only to death in the mud and smoke; and for millions of mothers and sweethearts waiting at home, dreams of the future were shattered by a telegram announcing the death of the boy for whom they were waiting.

When the war ended four years later, ten million young men had been killed and twenty million wounded, of whom six million were crippled for life. The war had cost 350,000,000,000 1919 dollars. This was a calculable cost; but the cost in human suffering and brutalization of values was incalculable. It hardly mattered whose fault the catastrophe had been. Perhaps the Austrian government had been more to blame than any other. But

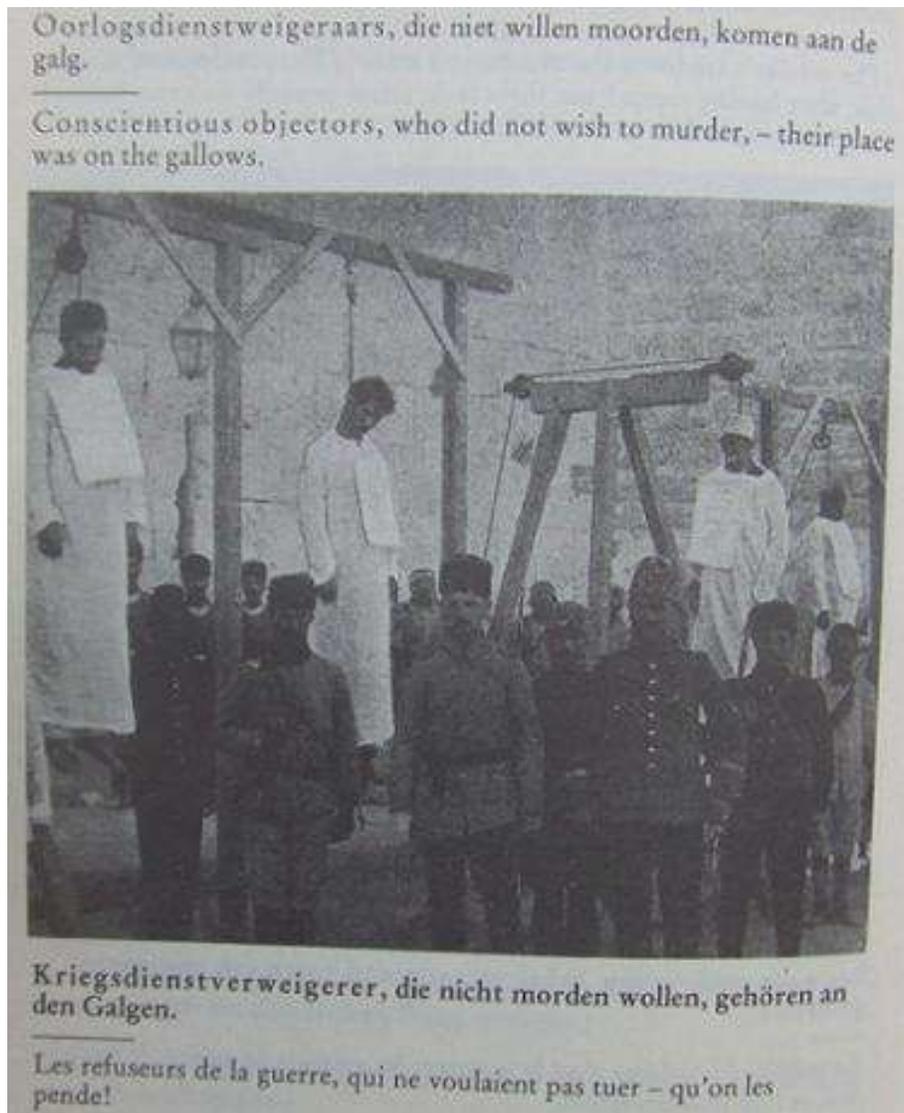
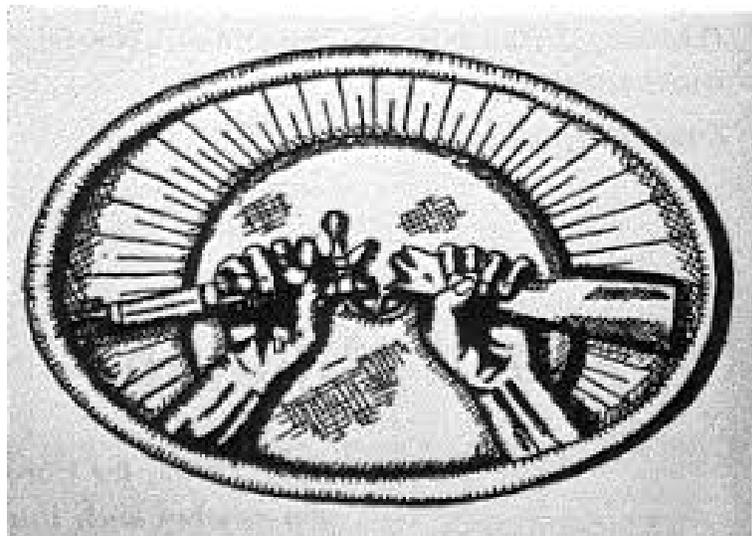
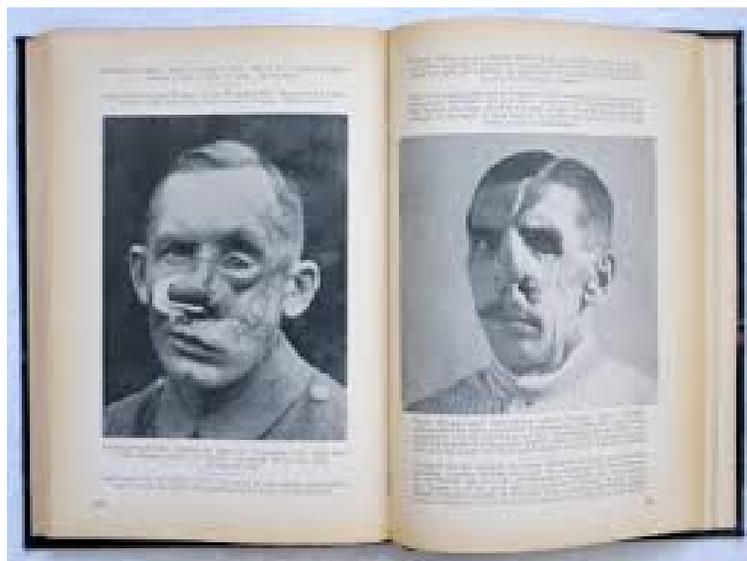
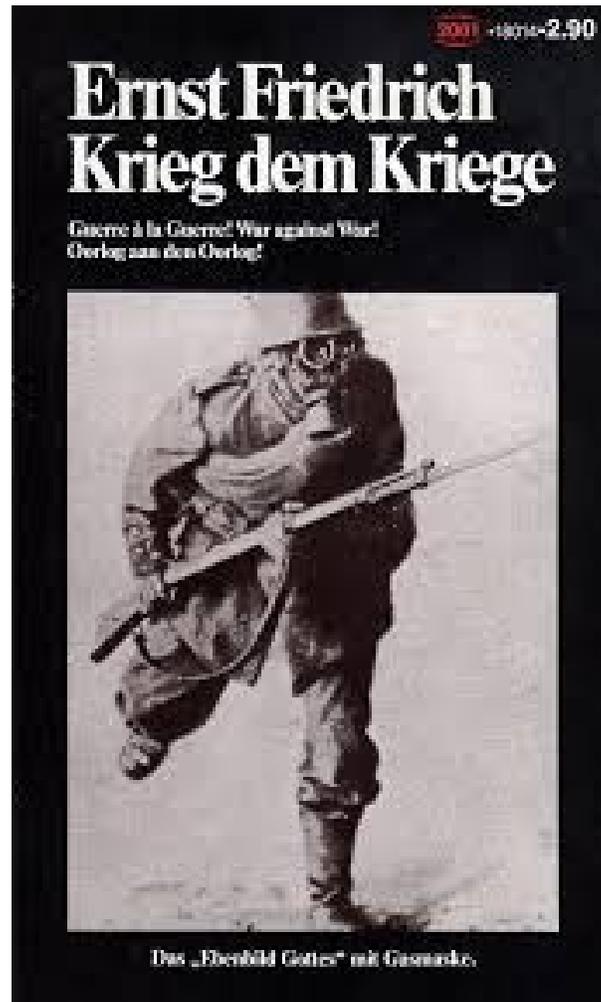


Figure 3.6: The fate of conscientious objectors.





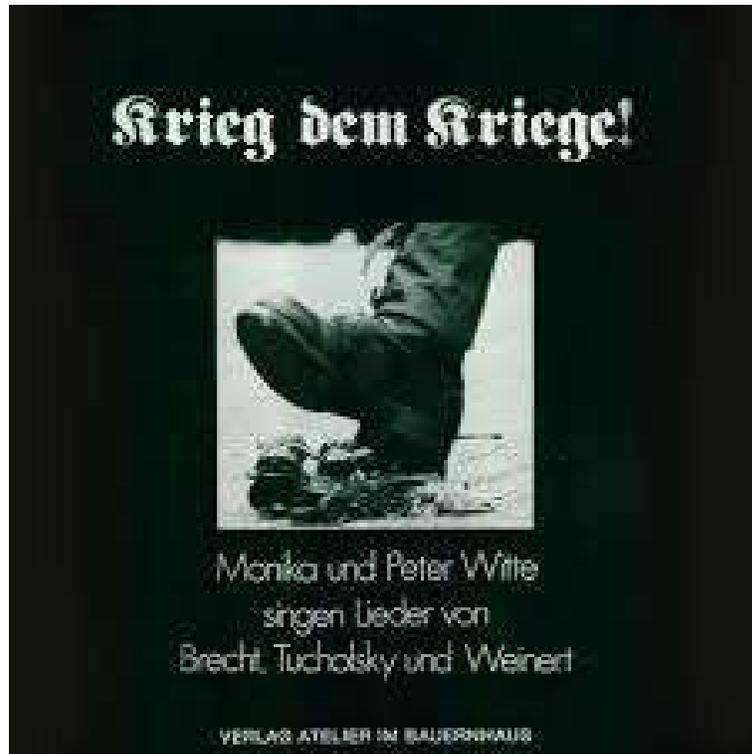






Figure 3.7: World War I casualties.

blame for the war certainly did not rest with the Austrian people nor with the young Austrians who had been forced to fight. However, the tragedy of the First World War was that it created long-lasting hatred between the nations involved; and in this way it led, only twenty years later, to an even more catastrophic global war.

The First World War brought about the downfall of four emperors: the Russian Czar, the Turkish Sultan, the Austro-Hungarian Emperor and the German Kaiser. The decaying and unjust Czarist government had for several years been threatened by revolution; and the horrors of the war into which the Czar had led his people were enough to turn them decisively against his government. During 1915 alone, Russia lost more than two million men, either killed or captured. Finally the Russian soldiers refused to be driven into battle and began to shoot their officers. In February, 1917, the Czar abdicated; and on December 5, 1917, the new communist government of Russia signed an armistice with Germany.

The German Chief of Staff, General Ludendorff, then shifted all his troops to the west in an all-out offensive. In March, 1918, he threw his entire army into a gigantic offensive which he called "the Emperor's Battle". The German army drove forward, and by June they were again on the Marne, only 50 miles from Paris. However, the Allies counterattacked, strengthened by the first American troops, and using, for the first time, large numbers of tanks. The Germans fell back, and by September they had lost more than a million men in six months. Morale in the retreating German army was falling rapidly, and fresh American troops were landing in France at the rate of 250,000 per month. Ludendorff realized that the German cause was hopeless and that if peace were not made quickly, a communist revolution would take place in Germany just as it had in Russia.

The old feudal Prussian military caste, having led Germany into disaster, now unloaded responsibility onto the liberals. Ludendorff advised the Kaiser to abdicate, and a liberal leader, Prince Max of Baden, was found to head the new government. On November 9,

1918, Germany was proclaimed a republic. Two days later, an armistice was signed and the fighting stopped.

During the last years of the war the world, weary of the politics of power and nationalist greed, had looked with hope towards the idealism of the American President, Woodrow Wilson. He had proposed a “peace without victory” based on his famous Fourteen Points”. Wilson himself considered that the most important of his Fourteen Points was the last one, which specified that “A general association of nations must be formed... for the purpose of affording mutual guaranties of political independence and territorial integrity of great and small states alike.”

When Wilson arrived in Europe to attend the peace conference in Paris, he was wildly cheered by crowds of ordinary people, who saw in his idealism new hope for the world. Unfortunately, the hatred produced by four years of horrible warfare was now too great to be overcome. At the peace conference, the aged nationalist Georges Clemenceau was unswerving in his deep hatred of Germany. France had suffered greatly during the war. Half of all French males who had been between the ages of 20 and 32 in 1914 had been killed; much of the French countryside had been devastated; and the retreating German armies had destroyed the French coal mines. Clemenceau was determined to extract both revenge and financial compensation from the Germans.

In the end, the peace treaty was a compromise. Wilson was given his dream, the League of Nations; and Clemenceau was given the extremely harsh terms which he insisted should be imposed on Germany. By signing the treaty, Germany would be forced to acknowledge sole responsibility for having caused the war; it would be forced to hand over the Kaiser and other leaders to be tried as war criminals; to pay for all civilian damage during the war; to agree to internationalization of all German rivers and the Kiel Canal; to give France, Belgium and Italy 25 million tons of coal annually as part of the reparations payments; to surrender the coal mines in Alsace-Lorraine to France; to give up all foreign colonies; to lose all property owned by Germans abroad; and to agree to Allied occupation of the Rhineland for fifteen years.

The loss of coal, in particular, was a death-blow aimed at German industry. Reading the terms of the treaty, the German Chancellor cried: “May the hand wither that signs such a peace!” The German Foreign Minister, Count Ulrich von Brockendorff-Rantzau, refused to sign, and the German government made public the terms of the treaty which it had been offered.

French newspapers picked up the information, and at 4 a.m. one morning, a messenger knocked at the door of the Paris hotel room where Herbert Hoover (the American war relief administrator) was staying, and handed him a copy of the terms. Hoover was so upset that he could sleep no more that night. He dressed and went out into the almost deserted Paris streets, pacing up and down, trying to calm himself. “It seemed to me”, Hoover wrote later, “that the economic consequences alone would pull down all Europe and thus injure the United States.” By chance, Hoover met the British economist, John Maynard Keynes, who was walking with General Jan Smuts in the pre-dawn Paris streets. Both of them had received transcripts of the terms offered to Germany, and both were similarly upset. “We agreed that it was terrible”, Hoover wrote later, “and we agreed that we would do what

we could... to make the dangers clear.”

In the end, continuation of the blockade forced the Germans to sign the treaty; but they did so with deeply-felt bitterness. Describing the signing of the Versailles treaty on June 28, 1919, a member of the American delegation wrote: “It was not unlike when in olden times the conqueror dragged the conquered at his chariot wheel.”

While he participated in the peace negotiations, Wilson had been absent from the United States for six months. During that time, Wilson’s Democratic Party had been without its leader, and his Republican opponents made the most of the opportunity. Republican majorities had been returned in both the House of Representatives and the Senate. When Wilson placed the peace treaty before the Senate, the Senate refused to ratify it. Wilson desperately wanted America to join the League of Nations, and he took his case to the American people. He traveled 8,000 miles and delivered 36 major speeches, together with scores of informal talks urging support for the League. Suddenly, in the middle of this campaign, he was struck with a cerebral thrombosis from which he never recovered.

Without Wilson’s leadership, the campaign collapsed. The American Senate for a second time rejected the peace treaty, and with it the League of Nations. Without American participation, the League was greatly handicapped. It had many successes, especially in cultural and humanitarian projects and in settling disputes between small nations; but it soon became clear that the League of Nations was not able to settle disputes between major powers.

Postwar Germany was in a state of chaos - its economy in ruins. The nation was now a republic, with its capital in Weimar, but this first experiment in German democracy was not running smoothly. Many parts of the country, especially Bavaria, were swarming with secret societies led by former officers of the German army. They blamed the republican government for the economic chaos and for signing a disgraceful peace treaty. The “war guilt” clause of the treaty especially offended the German sense of honor.

In 1920 a group of nationalist and monarchist army officers led by General Ludendorff staged an army revolt or “Putsch”. They forcibly replaced the elected officials of the Weimar Republic by a puppet head of state named Dr. Kapp. However, the republic was saved by the workers of Berlin, who turned off the public utilities.

After the failure of the “Kapp Putsch”, Ludendorff went to Bavaria, where he met Adolf Hitler, a member of a small secret society called the National Socialist German Workers Party. (The name was abbreviated as “Nazi” after the German pronunciation of the first two syllables of “National”). Together, Ludendorff and Hitler began to plot another “Putsch”.

In 1921, the Reparations Commission fixed the amount that Germany would have to pay at 135,000,000,000 gold marks. Various western economists realized that this amount was far more than Germany would be able to pay; and in fact, French efforts to collect it proved futile. Therefore France sent army units to occupy industrial areas of the Ruhr in order to extract payment in kind. The German workers responded by sitting down at their jobs. Their salaries were paid by the Weimar government, which printed more and more paper money. The printing presses ran day and night, flooding Germany with worthless currency. By 1923, inflation had reached such ruinous proportions that baskets



Figure 3.8: **Hitler addresses a rally at Dortmund in 1932**

full of money were required to buy a loaf of bread. At one point, four trillion paper marks were equal to one dollar. This catastrophic inflation reduced the German middle class to poverty and destroyed its faith in the orderly working of society.

The Nazi Party had only seven members when Adolf Hitler joined it in 1919. By 1923, because of the desperation caused by economic chaos, it had grown to 70,000 members. On November 8, 1923, there was a meeting of nationalists and monarchists at the Bürgerbräu beer hall in Munich. The Bavarian State Commissioner, Dr. Gustav von Kahr, gave a speech denouncing the Weimar Republic. He added, however, that the time was not yet ripe for armed revolt.

In the middle of Kahr's speech, Adolf Hitler leaped to the podium. Firing two revolver bullets into the ceiling Hitler screamed that the revolution was on - it would begin immediately! He ordered his armed troopers to bar the exits, and he went from one Bavarian leader to the other, weeping with excitement, a beer stein in one hand and a revolver in the other, pleading with them to support the revolution. At this point, the figure of General Ludendorff suddenly appeared. In full uniform, and wearing all his medals, he added his pleading to that of Hitler. The Bavarian leaders appeared to yield to Hitler and Ludendorff; and that night the Nazis went into action. Wild disorder reigned in Munich. Republican newspapers and trade union offices were smashed, Jewish homes were raided, and an attempt was made to seize the railway station and the post office. However, units of policemen and soldiers were forming to resist the Nazis. Hitler realized that the Bavarian government officials under Kahr had only pretended to go along with the revolution in order to escape from the armed troopers in the beer hall.

At dawn, Hitler grouped his followers together for a parade to show their strength and to intimidate opposition. With swastika flags flying, the Nazis marched to the main square of Munich. There they met troops of Bavarian government soldiers and policemen massed in force. A volley of shots rang out, and 18 Nazis fell dead. Many other Nazis were

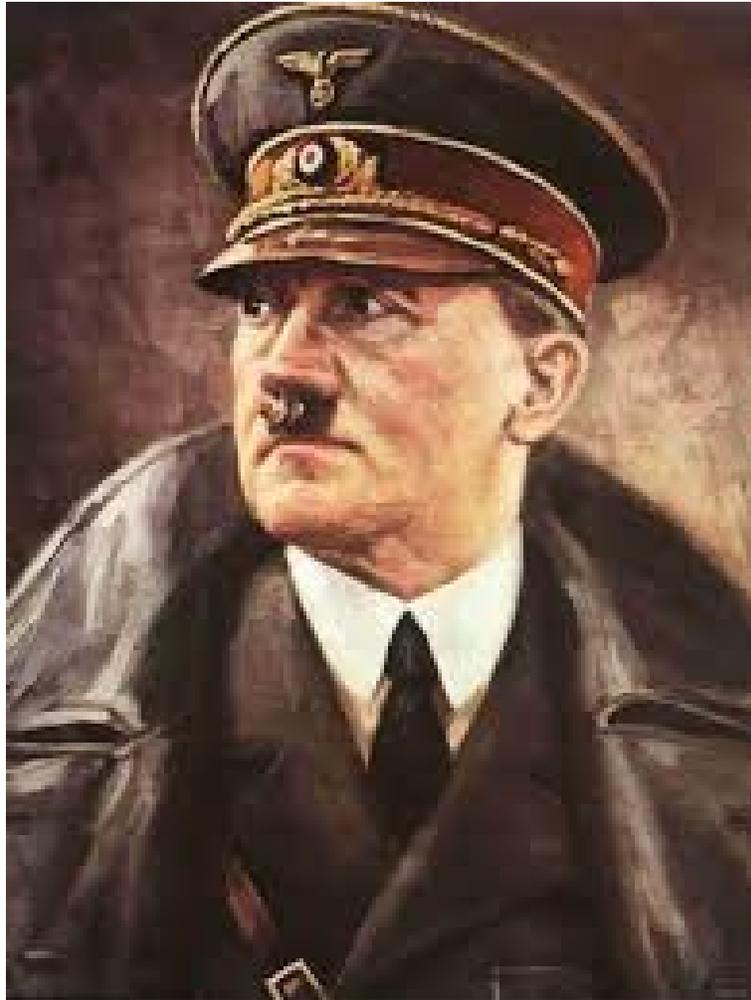


Figure 3.9: A portrait of Adolf Hitler

wounded, and the remainder scattered. Hitler broke his shoulder diving for the pavement. Only General Ludendorff remained standing where he was. The half-demented old soldier, who had exercised almost dictatorial power over Germany during the last years of the war, marched straight for the Bavarian government troops. They stepped aside and let him pass.

Adolf Hitler was arrested and sentenced to five years in prison. After serving less than a year of his sentence, he was released. He had used the time in prison to write a book, *Mein Kampf*.

3.3 Lessons from the First World War

We have recently marked the 100th anniversary of the outbreak of the First World War. It is important for society to look back at this catastrophic event, which still casts a dark shadow over the future of human civilization. We must learn the bitter lessons which it has to teach us, in order to avoid a repetition of the disaster.

As we have seen, World War I had its roots in the fanatical and quasi-religious nationalist movements that developed in Europe during the 19th century. Nationalism is still a potent force in today's world, but in an era of all-destroying weapons, instantaneous worldwide communication, and global economic interdependence, fanatical nationalism has become a dangerous anachronism. Of course, we should continue to be loyal to our families, our local groups and our nations. But this must be supplemented by a wider loyalty to the human race as a whole.

Hearing Beethoven's 9th Symphony, with Schiller's words, most of us experience a feeling that resembles patriotism, but is broader: "All men are brothers!" Not just some, but all. The choral movement of the symphony is like a national anthem of humanity. All humans are brothers and sisters! All!

All nations and races have contributed to the great monument of human civilization. It is a treasure that we all hold in common. We must join hands and work together for our common future. Human unity has become more and more essential, because of the serious problems that we are facing, for example climate change, vanishing resources, and threats to food security. The problems are soluble, but only within a framework of peace and cooperation.

Secondly, we can remember that the First World War started as a small operation by the Austrian government to punish the Serbian nationalists; but it escalated uncontrollably into a global disaster. Today, there are many parallel situations, where uncontrollable escalation might produce a world-destroying conflagration.

Israel's Prime Minister, Benjamin Netanyahu has frequently stated that, with or without US backing, Israel intends to bomb Iran, an act that would be not only criminal but also insane. Why criminal? Because it would violate both the UN Charter and the Nuremberg Principles. Why insane? Because the Middle East is already a deeply troubled region, and a military attack on Iran could escalate uncontrollably into a general war in the Middle East. Perhaps it could even escalate into World War III. Netanyahu has told

the people of Israel that the attack would involve only about 500 Israeli deaths and that it would be over in a month. One is reminded of Kaiser Wilhelm's words to his departing troops: "You will be home before the leaves are off the trees!"

In general, aggressive interventions, in Syria, Ukraine, the Korean Peninsula and elsewhere, all present dangers for uncontrollable escalation into large and disastrous conflicts, which might potentially threaten the survival of human civilization.

Another lesson from the history of World War I comes from the fact that none of the people who started it had the slightest idea of what it would be like. Science and technology had changed the character of war. The politicians and military figures of the time ought to have known this, but they didn't. They ought to have known it from the million casualties produced by the use of the breach-loading rifle in the American Civil War. They ought to have known it from the deadly effectiveness of the Maxim machine gun against the native populations of Africa, but the effects of the machine gun in a European war caught them by surprise.

Today, science and technology have again changed the character of war beyond all recognition. In the words of the Nobel Laureate biochemist, Albert Szent-Györgyi, "The story of man consists of two parts, divided by the appearance of modern science.... In the first period, man lived in the world in which his species was born and to which his senses were adapted. In the second, man stepped into a new, cosmic world to which he was a complete stranger....The forces at man's disposal were no longer terrestrial forces, of human dimension, but were cosmic forces, the forces which shaped the universe. The few hundred Fahrenheit degrees of our flimsy terrestrial fires were exchanged for the ten million degrees of the atomic reactions which heat the sun....Man lives in a new cosmic world for which he was not made. His survival depends on how well and how fast he can adapt himself to it, rebuilding all his ideas, all his social and political institutions."

Few politicians or military figures today have any imaginative understanding of what a war with thermonuclear weapons would be like. Recent studies have shown that in a nuclear war, the smoke from firestorms in burning cities would rise to the stratosphere where it would remain for a decade, spreading throughout the world, blocking sunlight, blocking the hydrological cycle and destroying the ozone layer. The effect on global agriculture would be devastating, and the billion people who are chronically undernourished today would be at risk. Furthermore, the tragedies of Chernobyl and Fukushima remind us that a nuclear war would make large areas of the world permanently uninhabitable because of radioactive contamination. A full-scale thermonuclear war would destroy human civilization and much of the biosphere.

Finally, we must remember the role of the arms race in the origin of World War I, and ask what parallels we can find in today's world. England was the first nation to complete the first stages of the Industrial Revolution. Industrialism and colonialism are linked, and consequently England obtained an extensive colonial empire. In Germany, the Industrial Revolution occurred somewhat later. However, by the late 19th century, Germany had surpassed England in steel production, and, particularly at the huge Krupp plants in Essen, Germany was turning to weapons production. The Germans felt frustrated because by that time there were fewer opportunities for the acquisition of colonies.

According to the historian David Stevensen (1954 -), writing on the causes of World War I, “A self-reinforcing cycle of heightened military preparedness... was an essential element in the conjuncture that led to disaster... The armaments race... was a necessary precondition for the outbreak of hostilities.”

Today, the seemingly endless conflicts that threaten to destroy our beautiful world are driven by what has been called “The Devil’s Dynamo”. In many of the larger nations of the world a military-industrial complex seems to have enormous power. Each year the world spends roughly 1,700,000,000.000 US dollars on armaments, almost 2 trillion. This vast river of money, almost too large to be imagined, pours into the pockets of weapons manufacturers, and is used by them to control governments. This is the reason for the seemingly endless cycle of threats to peace with which the ordinary people of the world are confronted. Threats are needed to justify the diversion of such enormous quantities of money from urgently needed social projects into the bottomless pit of war.

3.4 What is to be done?

No single person can achieve the changes that we need, but together we can do it. The problem of building a stable, just, and war-free world is difficult, but it is not impossible. The large regions of our present-day world within which war has been eliminated can serve as models. There are a number of large countries with heterogeneous populations within which it has been possible to achieve internal peace and social cohesion, and if this is possible within such extremely large regions, it must also be possible globally.

In the long run, the survival of human civilization can only be ensured by abolition of the institution of war.

Suggestions for further reading

1. E.J. Hobsbawn, *The Age of Empire, 1875-1914*, Vintage Books, (1989).
2. L. James, *The Rise and Fall of the British Empire*, St Martin’s Press, (1997).
3. N. Ferguson, *Empire: The Rise and Demise of the British World Order and the Lessons for Global Power*, Basic Books, (2003).
4. S. Schama, *The Fate of Empire, 1776-2000*, Miramax, (2002).
5. A.P. Thorton, *The Imperial Idea and Its Enemies: A Study in British Power*, Palgrave Macmillan, (1985).
6. H. Mejcher, *Imperial Quest for Oil: Iraq, 1910-1928*, Ithaca Books, London, (1976).
7. P. Sluglett, *Britain in Iraq, 1914-1932*, Ithaca Press, London, (1976).
8. D.E. Omissi, *British Air Power and Colonial Control in Iraq, 1920-1925*, Manchester University Press, Manchester, (1990).
9. V.G. Kiernan, *Colonial Empires and Armies, 1815-1960*, Sutton, Stroud, (1998).
10. R. Solh, *Britain’s 2 Wars With Iraq*, Ithaca Press, Reading, (1996).
11. D. Hiro, *The Longest War: The Iran-Iraq Military Conflict*, Routledge, New York, (1991).

12. T.E. Lawrence, *A Report on Mesopotamia by T.E. Lawrence*, Sunday Times, August 22, (1920).
13. D. Fromkin, *A Peace to End All Peace: The Fall of the Ottoman Empire and the Creation of the Modern Middle East*, Owl Books, (2001).
14. T. Rajamoorthy, *Deceit and Duplicity: Some Reflections on Western Intervention in Iraq*, Third World Resurgence, March-April, (2003).
15. P. Knightley and C. Simpson, *The Secret Lives of Lawrence of Arabia*, Nelson, London, (1969).
16. G. Lenczowski, *The Middle East in World Affairs*, Cornell University Press, (1962).
17. John A. Hobson, *Imperialism; A Study*, (1902).
18. P. Cain and T. Hopkins, *British Imperialism, 1688-200*, Longman, (2000).
19. N. Ferguson, *Empire: The Rise and Demise of the British World Order and the Lessons for Global Power*, Basic Books, (2003).
20. G. Kolko, *Another Century of War*, New Press, (2002).
21. G. Kolko, *Confronting the Third World: United States Foreign Policy, 1945-1980*, Pantheon Books, (1988).
22. M.T. Klare, *Resource Wars: The New Landscape of Global Conflict*, Owl Books reprint edition, New York, (2002).
23. Y. Nakash, *The Shi'is of Iraq*, Princeton University Press, (1994).
24. D. Fromkin, *A Peace to End All Peace: The Fall of the Ottoman Empire and the Creation of the Modern Middle East*, Owl Books, (2001).
25. S.K. Aburish, *Saddam Hussein: The Politics of Revenge*, Bloomsbury, London, (2001).
26. M. Muffti, *Sovereign Creations: Pan-Arabism and Political Order in Syria and Iraq*, Cornell University Press, (1996).
27. C. Clover, *Lessons of the 1920 Revolt Lost on Bremer*, Financial Times, November 17, (2003).
28. J. Kifner, *Britain Tried First. Iraq Was No Picnic Then*, New York Times, July 20, (2003).
29. J. Feffer, B. Egrenreich and M.T. Klare, *Power Trip: US Unilateralism and Global Strategy After September 11*, Seven Stories Press, (2003).
30. J.D. Rockefeller, *Random Reminiscences of Men and Events*, Doubleday, New York, (1909).
31. M.B. Stoff, *Oil, War and American Security: The Search for a National Policy on Oil, 1941-1947*, Yale University Press, New Haven, (1980).
32. W.D. Muscable, *George F. Kennan and the Making of American Foreign Policy*, Princeton University Press, Princeton, (1992).
33. J. Stork, *Middle East Oil and the Energy Crisis*, Monthly Review, New York, (1976).
34. F. Benn, *Oil Diplomacy in the Twentieth Century*, St. Martin's Press, New York, (1986).
35. R. Sale, *Saddam Key in Early CIA Plot*, United Press International, April 10, (2003).
36. K. Roosevelt, *Countercoup: The Struggle for the Control of Iran*, McGraw-Hill, New York, (1979).

37. J. Fitchett and D. Ignatius, *Lengthy Elf Inquiry Nears Explosive Finish*, International Herald Tribune, February 1, (2002).
38. M.T. Klare, *Resource Wars: The New Landscape of Global Conflict*, Owl Books reprint edition, New York, (2002).
39. M. Klare, *Bush-Cheney Energy Strategy: Procuring the Rest of the World's Oil*, Foreign Policy in Focus, (Interhemispheric Resource Center/Institute for Policy Studies/SEEN), Washington DC and Silver City NM, January, (2004).
40. M. Klare, *Endless Military Superiority*, The Nation magazine, July 15, (2002).
41. M.T. Klare, *Geopolitics Reborn: The Global Struggle Over Oil and Gas Pipelines*, Current History, December issue, 428-33, (2004).
42. P. Grose, *Allen Dulles: The Life of a Gentleman Spy*, Houghton Mifflin, Boston, (1994).
43. S. Warren, *Exxon's Profit Surged in 4th Quarter*, Wall Street Journal, February 12, (2004).
44. R. Suskind, *The Price of Loyalty: George W. Bush, the White House and the Education of Paul O'Neill*, Simon and Schuster, New York, (2004).
45. D. Morgan and D.B. Ottaway, *In Iraqi War Scenario, Oil is Key Issue as U.S. Drillers Eye Huge petroleum Pool*, Washington Post, September 15, (2002).
46. D. Rose, *Bush and Blair Made Secret Pact for Iraqi War*, The Observer, April 4, (2004).
47. E. Vulliamy, P. Webster and N.P. Walsh, *Scramble to Carve Up Iraqi Oil Reserves Lies Behind US Diplomacy*, The Observer, October 6, (2002).
48. Y. Ibrahim, *Bush's Iraq Adventure is Bound to Backfire*, International Herald Tribune, November 1, (2002).
49. P. Beaumont and F. Islam, *Carve-Up of Oil Riches Begins*, The Observer, November 3, (2002).
50. M. Dobbs, *US Had Key Role in Iraq Buildup*, Washington Post, December 30, (2002).
51. R. Sale, *Saddam Key in Early CIA Plot*, United Press International, April 10, (2003).
52. R. Morris, *A Tyrant Forty Years in the Making*, New York Times, March 14, (2003).
53. H. Batatu, *The Old Social Classes and the Revolutionary Movements of Iraq*, Princeton University Press, (1978).
54. D.W. Riegel, Jr., and A.M. D'Amato, *US Chemical and Biological Warfare-Related Dual Use Exports to Iraq and their Possible Impact on the Health Consequences of the Persian Gulf War*, Report to US Senate ("The Riegel Report"), May 25, (1994).
55. P.E. Tyler, *Officers Say US Aided Iraq in War Despite Use of Gas*, New York Times, August 18, (2002).
56. D. Priest, *Rumsfeld Visited Baghdad in 1984 to Reassure Iraqis, Documents Show*, Washington Post, December 19, (2003).
57. S. Zunes, *Saddam's Arrest Raises Troubling Questions*, Foreign Policy in Focus, <http://www.globalpolicy.org/>, December (2003).
58. D. Leigh and J. Hooper, *Britain's Dirty Secret*, Guardian, March 6, (2003).

59. J. Battle, (Ed.), *Shaking Hands With Saddam Hussein: The US Tilts Towards Iraq, 1980-1984*, National Security Archive Electronic Briefing Book No. 82, February 25, (2003).
60. J.R. Hiltermann, *America Didn't Seem to Mind Poison Gas*, International Herald Tribune, January 17, (2003).
61. D. Hiro, *Iraq and Poison Gas*, Nation, August 28, (2002).
62. T. Weiner, *Iraq Uses Techniques in Spying Against its Former Tutor, the US*, Philadelphia Inquirer, February 5, (1991).
63. S. Hussein and A. Glaspie, *Excerpts From Iraqi Document on Meeting with US Envoy*, The New York Times, International, September 23, (1990).
64. D. Omissi, *Baghdad and British Bombers*, Guardian, January 19, (1991).
65. D. Vernet, *Postmodern Imperialism*, Le Monde, April 24, (2003).
66. J. Buchan, *Miss Bell's Lines in the Sand*, Guardian, March 12, (2003).
67. C. Tripp, *Iraq: The Imperial Precedent*, Le Monde Diplomatique, January, (2003).
68. G.H.W. Bush and B. Scowcroft, *Why We Didn't Remove Saddam*, Time, 2 March, (1998).
69. J.A. Baker III, *The Politics of Diplomacy: Revolution, War and Peace, 1989-1992*, G.P. Putnam's Sons, New York, (1995).
70. H. Thomas, *Preventive War Sets Serious Precedent*, Seattle Post Intelligencer, March 20, (2003).
71. R.J. Barnet, *Intervention and Revolution: The United States in the Third World*, World Publishing, (1968).
72. T. Bodenheimer and R. Gould, *Rollback: Right-wing Power in U.S. Foreign Policy*, South End Press, (1989).
73. G. Guma, *Uneasy Empire: Repression, Globalization, and What We Can Do, Toward Freedom*, (2003).
74. W. Blum, *A Brief History of U.S. Interventions: 1945 to the Present*, Z magazine, June, (1999).
75. W. Blum, *Killing Hope: U.S. Military and CIA Intervention Since World War II*
76. J.M. Cypher, *The Iron Triangle: The New Military Buildup*, Dollars and Sense magazine, January/February, (2002).
77. L. Meyer, *The Power of One*, (World Press Review), Reforma, Mexico City, August 5, (1999).
78. W. Hartung, F. Berrigan and M. Ciarrocca, *Operation Endless Deployment: The War With Iraq Is Part of a Larger Plan for Global Military Dominance*, The Nation magazine, October 21, (2002).
79. I. Ramonet, *Servile States*, Le Monde diplomatique, Fromkin Paris, October (2002), World Press Review, December, (2002).
80. J.K. Galbraith, *The Unbearable Costs of Empire*, American Prospect magazine, November, (2002).
81. G. Monbiot, *The Logic of Empire*, The Guardian, August 6, (2002), World Press Review, October, (2002).
82. W.R. Pitt, *The Greatest Sedition is Silence*, Pluto Press, (2003).

83. J. Wilson, *Republic or Empire?*, The Nation magazine, March 3, (2003).
84. W.B. Gallie, *Understanding War: Points of Conflict*, Routledge, London, (1991).
85. R. Falk and S.S. Kim, eds., *The War System: An Interdisciplinary Approach*, Westview, Boulder, CO, (1980).
86. J.D. Clarkson and T.C. Cochran, eds., *War as a Social Institution*, Columbia University Press, New York, (1941).
87. S. Melman, *The Permanent War Economy*, Simon and Schuster, (1974). Morgan
88. H. Mejer, *Imperial Quest for Oil: Iraq, 1910-1928*, Ithaca Books, London, (1976).
89. D. Hiro, *The Longest War: The Iran-Iraq Military Conflict*, Routledge, New York, (1991).
90. M. Klare, *Bush-Cheney Energy Strategy: Procuring the Rest of the World's Oil*, Foreign Policy in Focus, (Interhemispheric Resource Center/Institute for Policy Studies/SEEN), Washington DC and Silver City NM, January, (2004).
91. J. Fitchett and D. Ignatius, *Lengthy Elf Inquiry Nears Explosive Finish*, International Herald Tribune, February 1, (2002).
92. T. Rajamoorthy, *Deceit and Duplicity: Some Reflections on Western Intervention in Iraq*, Third World Resurgence, March-April, (2003).
93. P. Knightley and C. Simpson, *The Secret Lives of Lawrence of Arabia*, Nelson, London, (1969).
94. G. Lenczowski, *The Middle East in World Affairs*, Cornell University Press, (1962).
95. D. Rose, *Bush and Blair Made Secret Pact for Iraq War*, Observer, April 4, (2004).
96. B. Gellman, *Allied Air War Struck Broadly in Iraq; Officials Acknowledge Strategy Went Beyond Purely Military Targets*, Washington Post, June 23, (1991).
97. M. Fletcher and M. Theodoulou, *Baker Says Sanctions Must Stay as Long as Saddam Holds Power*, Times, May 23, (1991).
98. J. Pienaar and L. Doyle, *UK Maintains Tough Line on Sanctions Against Iraq*, Independent, May 11, (1991).
99. B. Blum (translator), *Ex-National Security Chief Brzezinski Admits: Afghan Islamism Was Made in Washington*, Nouvel Observateur, January 15, (1998).
100. G. Vidal, *Dreaming War: Blood for Oil and the Bush-Cheney Junta*, Thunder's Mouth Press, (2002).
101. H. Thomas, *Preventive War Sets Serious Precedent*, Seattle Post-Intelligencer, March 20, (2003).
102. C. Johnson, *The Sorrows of Empire: Militarism, Secrecy, and the End of the Republic*, Henry Hold and Company, New York, (2004).
103. C. Johnson, *Blowback: The Costs and Consequences of American Empire*, Henry Hold and Company, New York, (2000).
104. M. Parenti, *Against Empire: The Brutal Realities of U.S. Global Domination*, City Lights Books, 261 Columbus Avenue, San Francisco, CA94133, (1995).
105. E. Ahmad, *Confronting Empire*, South End Press, (2000).
106. W. Greider, *Fortress America*, Public Affairs Press, (1998).
107. J. Pilger, *Hidden Agendas*, The New Press, (1998).
108. S.R. Shalom, *Imperial Alibis*, South End Press, (1993).

109. C. Boggs (editor), *Masters of War: Militarism and Blowback in the Era of American Empire*, Routledge, (2003).
110. J. Pilger, *The New Rulers of the World*, Verso, (2002).
111. G. Vidal, *Perpetual War for Perpetual Peace: How We Got To Be So Hated*, Thunder's Mouth Press, (2002).
112. W. Blum, *Rogue State: A Guide to the World's Only Superpower*, Common Courage Press, (2000).
113. M. Parenti, *The Sword and the Dollar*, St. Martin's Press, 175 Fifth Avenue, New York, NY 10010, (1989).
114. T. Bodenheimer and R. Gould, *Rollback: Right-wing Power in U.S. Foreign Policy*, South End Press, (1989).
115. G. Guma, *Uneasy Empire: Repression, Globalization, and What We Can Do*, Toward Freedom, (2003).
116. W. Blum, *A Brief History of U.S. Interventions: 1945 to the Present*, Z magazine, June, (1999).
117. W. Blum, *Killing Hope: U.S. Military and CIA Intervention Since World War II*
118. J.M. Cypher, *The Iron Triangle: The New Military Buildup*, Dollars and Sense magazine, January/February, (2002).
119. L. Meyer, *The Power of One*, (World Press Review), Reforma, Mexico City, August 5, (1999).
120. C. Johnson, *Time to Bring the Troops Home*, The Nation magazine, May 14, (2001).
121. W. Hartung, F. Berrigan and M. Ciarrocca, *Operation Endless Deployment: The War With Iraq Is Part of a Larger Plan for Global Military Dominance*, The Nation magazine, October 21, (2002).
122. C. Johnson, *The Sorrows of Empire: Militarism, Secrecy, and the End of the Republic*, Henry Hold and Company, New York, (2004).
123. C. Johnson, *Blowback: The Costs and Consequences of American Empire*, Henry Hold and Company, New York, (2000).
124. I. Ramonet, *Servile States*, Le Monde diplomatique, Paris, October (2002), World Press Review, December, (2002).
125. J.K. Galbraith, *The Unbearable Costs of Empire*, American Prospect magazine, November, (2002).
126. G. Monbiot, *The Logic of Empire*, The Guardian, August 6, (2002), World Press Review, October, (2002).
127. W.R. Pitt and S. Ritter, *War on Iraq*, Context Books
128. W.R. Pitt, *The Greatest Seditious Silence*, Pluto Press, (2003).
129. J. Wilson, *Republic or Empire?*, The Nation magazine, March 3, (2003).
130. R. Dreyfuss, *Just the Beginning: Is Iraq the Opening Salvo in a War to Remake the World?*, The American Prospect magazine, April, (2003).
131. D. Moberg, *The Road From Baghdad: The Bush Team Has Big Plans For the 21st Century. Can the Rest of the World Stop Them?*, These Times magazine, May, (2003).
132. J.M. Blair, *The Control of Oil*, Random House, New York, (1976).

133. R.S. Foot, S.N. MacFarlane and M. Mastanduno, *US Hegemony and International Organizations: The United States and Multilateral Institutions*, Oxford University Press, (2003).
134. P. Bennis and N. Chomsky, *Before and After: US Foreign Policy and the September 11th Crisis*, Olive Branch Press, (2002).
135. J. Garrison, *America as Empire: Global Leader or Rouge Power?*, Berrett-Koehler Publishers, (2004).
136. A.J. Bacevich, *American Empire: The Realities and Consequences of US Diplomacy*, Harvard University Press, (2002).
137. D.R. Francis, *Hidden Defense Costs Add Up to Double Trouble*, Christian Science Monitor, February 23, (2004).
138. A. Sampson, *The Seven Sisters: The Great Oil Companies of the World and How They Were Made*, Hodder and Staughton, London, (1988).
139. D. Yergin, *The Prize*, Simon and Schuster, New York, (1991).
140. E. Abrahamian, *Iran Between Two Revolutions*, Princeton University Press, Princeton, (1982).

Chapter 4

WAR IS INSANITY, NOT WISDOM

4.1 The training of soldiers

Within individual countries, murder is rightly considered to be the worst of crimes. But the institution of war tries to convince us that if a soldier murders someone from another country, whom the politicians have designated as an “enemy”, it is no longer a crime, no longer a violation of the common bonds of humanity. It is “heroic”.

In their hearts, soldiers know that this is nonsense. Murder is always murder. The men, women and children who are supposed to be the “enemy”, are just ordinary people, with whom the soldier really has no quarrel. Therefore when the training of soldiers wears off a little, so that they realize what they have done, they have to see themselves as murderers, and many commit suicide.

A recent article in the journal “Epidemiology” pointed out a startling statistic: for every American soldier killed in combat this year, 25 will commit suicide. The article also quotes the Department of Veterans Affairs, which says that 18 veterans commit suicide every day.

Obviously, the training of soldiers must overwrite fundamental ethical principles. This training must make a soldier abandon his or her individual conscience and sense of responsibility. It must turn the soldier from a compassionate human being into an automaton, a killing machine. How is this accomplished? Through erosion of the soldier’s self-respect. Through the endless repetition of senseless rituals where obedience is paramount and from which rational thought and conscience are banished.

In his book on fanaticism, *The True Believer* (1951), the American author Eric Hoffer gives the following description of the factors promoting self-sacrifice:

“To ripen a person for self-sacrifice, he must be stripped of his individual identity. He must cease to be George, Hans, Ivan or Tado - a human atom with an existence bounded by birth and death. The most drastic way to achieve this end is by the complete assimilation of the individual into a collective body. The fully assimilated individual does not see himself

and others as human beings. When asked who he is, his automatic response is that he is a German, a Russian, a Japanese, a Christian, a Muslim, a member of a certain tribe or family. He has no purpose, worth or destiny apart from his collective body, and as long as that body lives, he cannot really die. ...”

“The effacement of individual separateness must be thorough. In every act, however trivial, the individual must, by some ritual, associate himself with the congregation, the tribe, the party, etcetera. His joys and sorrows, his pride and confidence must spring from the fortunes and capacities of the group, rather than from his individual prospects or abilities. Above all, he must never feel alone. Though stranded on a desert island, he must feel that he is under the eyes of the group. To be cast out from the group must be equivalent to being cut off from life.”

“This is undoubtedly a primitive state of being, and its most perfect examples are found among primitive tribes. Mass movements strive to approximate this primitive perfection, and we are not imagining things when the anti-individualist bias of contemporary mass movements strikes us as being a throwback to the primitive.”

The conditioning of a soldier in a modern army follows the pattern described in Eric Hoffer’s book. The soldier’s training aims at abolishing his sense of individual separateness, individual responsibility, and moral judgment. It is filled with rituals, such as saluting, by which the soldier identifies with his tribe-like army group. His uniform also helps to strip him of his individual identity and to assimilate him into the group. The result of this psychological conditioning is that the soldier’s mind reverts to a primitive state. He surrenders his moral responsibility, and when the politicians tell him to kill, he kills.

4.2 Killing civilians

Between 2 September and 5 September, 1807, the civilian population of Copenhagen was subjected to a bombardment by British military forces, without any declaration of war. The purpose of the bombardment was to induce terror in the population, and to thereby force the surrender of the Danish fleet, which the British feared might otherwise fall into the hands of Napoleon. It was one of the first occasions on which civilians were deliberately targeted in this manner.

Copenhagen was almost undefended, since the Danish army was positioned at the southern boundary of the country, ready to repel a possible attack by Napoleon’s army. British troops and artillery were thus easily able to surround the city, while the British fleet occupied the harbor. On the first night of the bombardment, 5000 rounds were fired into the city, on the second night 2000, and on the third night 7000. New incendiary rockets developed by William Congreve were also used. More than 2000 civilians were killed by the bombardment, and about 30 percent of Copenhagen’s buildings were destroyed. The bicentenary of this barbaric event might be an appropriate time to think about state-sponsored terror, in which innocent civilians are deliberately targeted.



Figure 4.1: Contemporary Danish painting of the bombardment at night.



Figure 4.2: An illustration by Eckersberg of the Church of Our Lady being bombarded.



Figure 4.3: *The Most Terrible Night*. View of Kongens Nytorv in Copenhagen During the English Bombardment of Copenhagen at Night between 4 and 5 September 1807.

The erosion of ethical principles during World War II

When Hitler invaded Poland in September, 1939, US President Franklin Delano Roosevelt appealed to Great Britain, France, and Germany to spare innocent civilians from terror bombing. "The ruthless bombing from the air of civilians in unfortified centers of population during the course of the hostilities", Roosevelt said (referring to the use of air bombardment during World War I) "...has sickened the hearts of every civilized man and woman, and has profoundly shocked the conscience of humanity." He urged "every Government which may be engaged in hostilities publicly to affirm its determination that its armed forces shall in no event, and under no circumstances, undertake the bombardment from the air of civilian populations or of unfortified cities."

Two weeks later, British Prime Minister Neville Chamberlain responded to Roosevelt's appeal with the words: "Whatever the lengths to which others may go, His Majesty's Government will never resort to the deliberate attack on women and children and other civilians for purposes of mere terrorism."

Much was destroyed during World War II, and among the casualties of the war were the ethical principles that Roosevelt and Chamberlain announced at its outset. At the time of Roosevelt and Chamberlain's declarations, terror bombing of civilians had already begun in the Far East. On 22 and 23 September, 1937, Japanese bombers attacked civilian populations in Nanjing and Canton. The attacks provoked widespread protests. The British Under Secretary of State for Foreign Affairs, Lord Cranborne, wrote: "Words cannot express the feelings of profound horror with which the news of these raids has been received by the whole civilized world. They are often directed against places far from the actual area of hostilities. The military objective, where it exists, seems to take a completely second place. The main object seems to be to inspire terror by the indiscriminate slaughter of civilians..."

On the 25th of September, 1939, Hitler's air force began a series of intense attacks on Warsaw. Civilian areas of the city, hospitals marked with the Red Cross symbol, and fleeing refugees all were targeted in a effort to force the surrender of the city through terror. On the 14th of May, 1940, Rotterdam was also devastated. Between the 7th of September 1940 and the 10th of May 1941, the German Luftwaffe carried out massive air attacks on targets in Britain. By May, 1941, 43,000 British civilians were killed and more than a million houses destroyed.

Although they were not the first to start it, by the end of the war the United States and Great Britain were bombing of civilians on a far greater scale than Japan and Germany had ever done. For example, on July 24-28, 1943, British and American bombers attacked Hamburg with an enormous incendiary raid whose official intention "the total destruction" of the city.

The result was a firestorm that did, if fact, lead to the total destruction of the city. One airman recalled, that "As far as I could see was one mass of fire. 'A sea of flame' has been the description, and that's an understatement. It was so bright that I could read the target maps and adjust the bomb-sight." Another pilot was "...amazed at the awe-inspiring sight of the target area. It seemed as though the whole of Hamburg was on fire from one



Figure 4.4: Picasso's famous painting *Guernica* was a protest following the Nazi bombing of civilians in a Basque town,

end to the other and a huge column of smoke was towering well above us - and we were on 20,000 feet! It all seemed almost incredible and, when I realized that I was looking at a city with a population of two millions, or about that, it became almost frightening to think of what must be going on down there in Hamburg.”

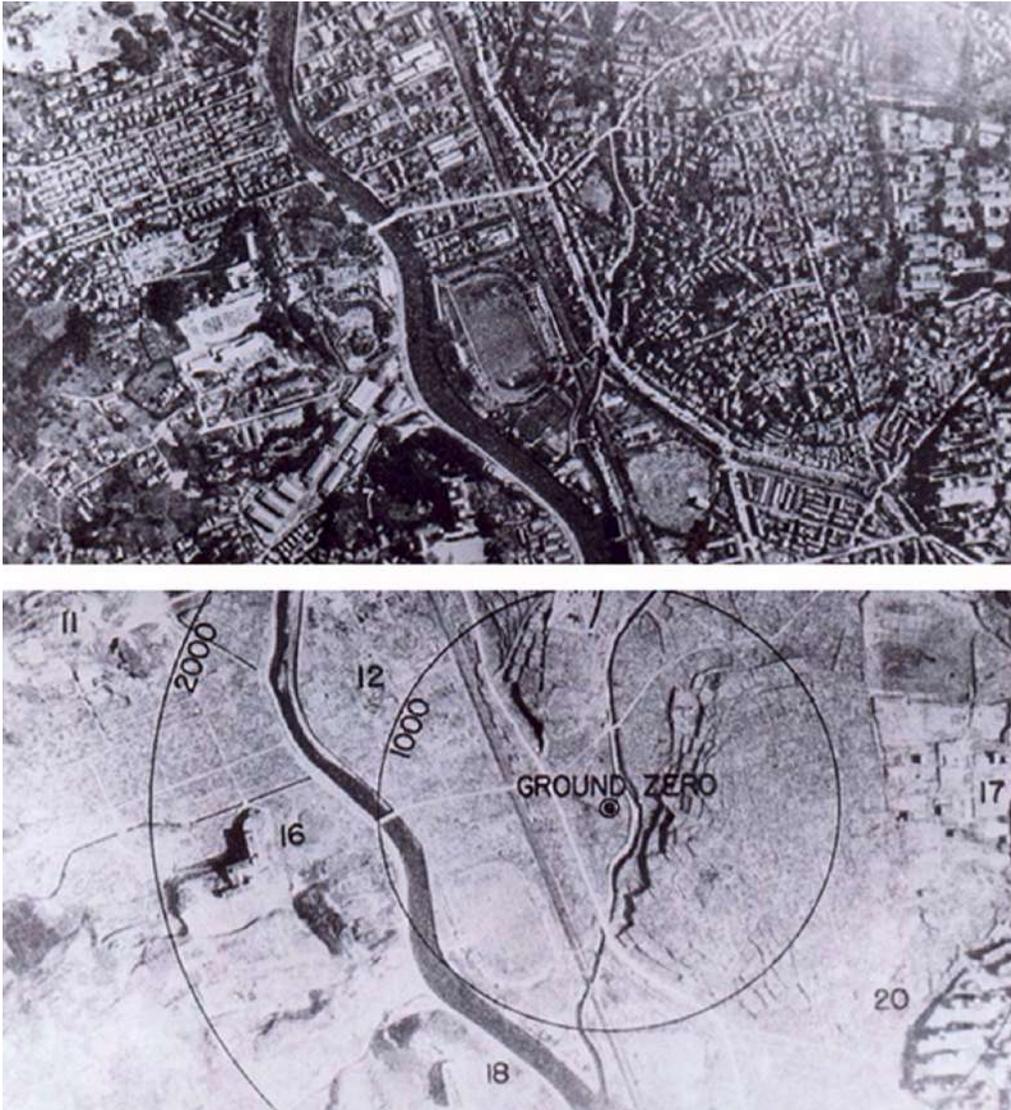
Below, in the burning city, temperatures reached 1400 degrees Fahrenheit, a temperature at which lead and aluminum have long since liquefied. Powerful winds sucked new air into the firestorm. There were reports of babies being torn by the high winds from their mothers' arms and sucked into the flames. Of the 45,000 people killed, it has been estimated that 50 percent were women and children and many of the men killed were elderly, above military age. For weeks after the raids, survivors were plagued by "...droves of vicious rats, grown strong by feeding on the corpses that were left unburied within the rubble as well as the potatoes and other food supplies lost beneath the broken buildings.”

The German cities Kassel, Pforzheim, Mainz, Dresden and Berlin were similarly destroyed, and in Japan, US bombing created firestorms in many cities, for example Tokyo, Kobe and Yokohama. In Tokyo alone, incendiary bombing caused more than 100,000 civilian casualties.

Hiroshima and Nagasaki

On August 6, 1945, at 8.15 in the morning, a nuclear fission bomb was exploded in the air over the civilian population of Hiroshima in an already virtually defeated Japan. The force of the explosion was equivalent to fifteen thousand tons of TNT. Out of a city of two hundred and fifty thousand, one hundred thousand were killed immediately, and another





hundred thousand were hurt. Many of the injured died later from radiation sickness. A few days later, Nagasaki was similarly destroyed.

The tragic destruction of the two Japanese cities was horrible enough in itself, but it also marked the start of a nuclear arms race that continues to cast a very dark shadow over the future of civilization. Not long afterwards, the Soviet Union exploded its own atomic bomb, creating feelings of panic in the United States. President Truman authorized an all-out effort to build superbombs based on thermonuclear reactions, the reactions that heat the sun and stars.

In March, 1954, the US tested a thermonuclear bomb at Bikini Atoll in the Pacific Ocean. It was 1000 times more powerful than the Hiroshima bomb. The Japanese fishing boat, Lucky Dragon, was 135 kilometers from the Bikini explosion, but radioactive fallout

from the explosion killed one crew member and made all the others seriously ill. The distance to the Marshall Islands was equally large, but even today, islanders continue to suffer from the effects of fallout from the test, for example frequent birth defects.

Driven by the paranoia of the Cold War, the number of nuclear weapons on both sides reached truly insane heights. At the worst point, there were 50,000 nuclear weapons in the world, with a total explosive power roughly a million times the power of the Hiroshima bomb. This was equivalent to 4 tons of TNT for every person on the planet - enough to destroy human civilization many times over - enough to threaten the existence of all life on earth.

At the end of the Cold War, most people heaved a sigh of relief and pushed the problem of nuclear weapons away from their minds. It was a threat to life too horrible to think about. People felt that they could do nothing in any case, and they hoped that the problem had finally disappeared.

Today, however, many thoughtful people realize that the problem of nuclear weapons has by no means disappeared, and in some ways it is even more serious now than it was during the Cold War. There are still over 15,000 nuclear weapons in the world, many of them hydrogen bombs, many on hair-trigger alert, ready to be fired with only a few minutes warning. The world has frequently come extremely close to accidental nuclear war. If nuclear weapons are allowed to exist for a long period of time, the probability for such a catastrophic accident to happen will grow into a certainty.

Current dangers also come from proliferation. Recently, more and more nations have come to possess nuclear weapons, and thus the danger that they will be used increases. For example, if Pakistan's less-than-stable government should fall, its nuclear weapons might find their way into the hands of terrorists, and against terrorism deterrence has no effect.

Thus we live at a special time in history - a time of crisis for civilization. We did not ask to be born at a moment of crisis, but such is our fate. Every person now alive has a special responsibility: We owe it, both to our ancestors and to future generations, to build a stable and cooperative future world. It must be a war-free world, from which nuclear weapons have been completely abolished. No person can achieve these changes alone, but together we can build the world that we desire. This will not happen through inaction, but it can happen through the dedicated work of large numbers of citizens.

Civilians have for too long played the role of passive targets, hostages in the power struggles of politicians. It is time for civil society to make its will felt. If our leaders continue to enthusiastically support the institution of war, if they will not abolish nuclear weapons, then let us have new leaders.

4.3 The direct and indirect costs of war

The costs of war, both direct and indirect, are so enormous that they are almost beyond comprehension. We face a direct threat because a thermonuclear war may destroy human civilization and much of the biosphere, and an indirect threat because the institution of war interferes seriously with the use of tax money for constructive and peaceful purposes.

Today, despite the end of the Cold War, the world spends roughly 1.7 trillion (i.e. 1.7 million million) US dollars each year on armaments. This colossal flood of money could have been used instead for education, famine relief, development of infrastructure, or on urgently needed public health measures.

The World Health Organization lacks funds to carry through an antimalarial program on as large a scale as would be desirable, but the entire program could be financed for less than our military establishments spend in a single day. Five hours of world arms spending is equivalent to the total cost of the 20-year WHO campaign that resulted in the eradication of smallpox. For every 100,000 people in the world, there are 556 soldiers, but only 85 doctors. Every soldier costs an average of \$20,000 per year, while the average spent on education is only \$380 per school-aged child. With a diversion of funds consumed by three weeks of military spending, the world could create a sanitary water supply for all its people, thus eliminating the cause of almost half of all human illness.

A new drug-resistant form of tuberculosis has recently become widespread in Asia and in the former Soviet Union. In order to combat this new and highly dangerous form of tuberculosis and to prevent its spread, WHO needs \$500 million, an amount equivalent to 1.2 hours of world arms spending.

Today's world is one in which roughly ten million children die every year from starvation or from diseases related to poverty. Besides this enormous waste of young lives through malnutrition and preventable disease, there is a huge waste of opportunities through inadequate education. The rate of illiteracy in the 25 least developed countries is 80%, and the total number of illiterates in the world is estimated to be 800 million. Meanwhile every 60 seconds the world spends \$6.5 million on armaments.

It is plain that if the almost unbelievable sums now wasted on the institution of war were used constructively, most of the pressing problems of humanity could be solved, but today the world spends more than 20 times as much on war as it does on development.

4.4 Medical and psychological consequences; loss of life

While in earlier epochs it may have been possible to confine the effects of war mainly to combatants, in the 20th century the victims of war were increasingly civilians, and especially children. For example, according to Quincy Wright's statistics, the First and Second World Wars cost the lives of 26 million soldiers, but the toll in civilian lives was much larger: 64 million.

Since the Second World War, despite the best efforts of the UN, there have been over 150 armed conflicts; and, if civil wars are included, there are on any given day an average of 12 wars somewhere in the world. In the conflicts in Indo-China, the proportion of civilian victims was between 80% and 90%, while in the Lebanese civil war some sources state that the proportion of civilian casualties was as high as 97%.

Civilian casualties often occur through malnutrition and through diseases that would

be preventable in normal circumstances. Because of the social disruption caused by war, normal supplies of food, safe water and medicine are interrupted, so that populations become vulnerable to famine and epidemics.¹

4.5 Effects of war on children

According to UNICEF figures, 90% of the casualties of recent wars have been civilians, and 50% children. The organization estimates that in recent years, violent conflicts have driven 20 million children from their homes. They have become refugees or internally displaced persons within their own countries.

During the last decade 2 million children have been killed and 6 million seriously injured or permanently disabled as the result of armed conflicts, while 1 million children have been orphaned or separated from their families. Of the ten countries with the highest rates of death of children under five years of age, seven are affected by armed conflicts. UNICEF estimates that 300,000 child soldiers are currently forced to fight in 30 armed conflicts throughout the world. Many of these have been forcibly recruited or abducted.

Even when they are not killed or wounded by conflicts, children often experience painful psychological traumas: the violent death of parents or close relatives, separation from their families, seeing family members tortured, displacement from home, disruption of ordinary life, exposure to shelling and other forms of combat, starvation and anxiety about the future.²

4.6 Refugees

Human Rights Watch estimates that in 2001 there were 15 million refugees in the world, forced from their countries by war, civil and political conflict, or by gross violations of human rights. In addition, there were an estimated 22 million internally displaced persons, violently forced from their homes but still within the borders of their countries.

In 2001, 78% of all refugees came from ten areas: Afghanistan, Angola, Burma, Burundi, Congo-Kinshasa, Eritrea, Iraq, the Palestinian territories, Somalia and Sudan. A quarter of all refugees are Palestinians, who make up the world's oldest and largest refugee population. 45% of the world's refugees have found sanctuaries in Asia, 30% in Africa, 19% in Europe and 5% in North America.

Refugees who have crossed an international border are in principle protected by Article 14 of the Universal Declaration of Human Rights, which affirms their right "to seek and to enjoy in other countries asylum from persecution". In 1950 the Office of the High Commissioner for Refugees was created to implement Article 14, and in 1951 the Convention Relating to the Status of Refugees was adopted by the UN. By 2002 this legally binding

¹<http://www.cadmusjournal.org/article/volume-2/issue-2-part-3/lessons-world-war-i>
<http://www.truth-out.org/opinion/item/27201-the-leading-terrorist-state>

²<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2080482/>

treaty had been signed by 140 nations. However the industrialized countries have recently adopted a very hostile and restrictive attitude towards refugees, subjecting them to arbitrary arrests, denial of social and economic rights, and even forcible return to countries in which they face persecution.

The status of internally displaced persons is even worse than that of refugees who have crossed international borders. In many cases the international community simply ignores their suffering, reluctant to interfere in the internal affairs of sovereign states. In fact, the United Nations Charter is self-contradictory in this respect, since on the one hand it calls for non-interference in the internal affairs of sovereign states, but on the other hand, people everywhere are guaranteed freedom from persecution by the Charter's Universal Declaration of Human Rights.³

4.7 Damage to infrastructure

Most insurance policies have clauses written in fine print exempting companies from payment of damage caused by war. The reason for this is simple. The damage caused by war is so enormous that insurance companies could never come near to paying for it without going bankrupt.

We mentioned above that the world spends 1.7 trillion dollars each year on preparations for war. A similarly colossal amount is needed to repair the damage to infrastructure caused by war. Sometimes this damage is unintended, but sometimes it is intentional.

During World War II, one of the main aims of air attacks by both sides was to destroy the industrial infrastructure of the opponent. This made some sense in a war expected to last several years, because the aim was to prevent the enemy from producing more munitions. However, during the Gulf War of 1990, the infrastructure of Iraq was attacked, even though the war was expected to be short. Electrical generating plants and water purification facilities were deliberately destroyed with the apparent aim of obtaining leverage over Iraq after the war.

In general, because war has such a catastrophic effect on infrastructure, it can be thought of as the opposite of development. War is the greatest generator of poverty.⁴

4.8 Ecological damage

Warfare during the 20th century has not only caused the loss of 175 million lives (primarily civilians) - it has also caused the greatest ecological catastrophes in human history. The damage takes place even in times of peace. Studies by Joni Seager, a geographer at the

³<https://www.hrw.org/topic/refugees>

⁴<https://www.wsws.org/en/articles/2002/11/iraq-n04.html>
<http://www.globalresearch.ca/crimes-against-humanity-the-destruction-of-iraqs-electricity-infrastructure-the-social-economic-and-environmental-impacts/5355665>
<http://www.afdb.org/fileadmin/uploads/afdb/Documents/Publications/00157630-EN-ERP-48.PDF>

University of Vermont, conclude that “a military presence anywhere in the world is the single most reliable predictor of ecological damage”.

Modern warfare destroys environments to such a degree that it has been described as an “environmental holocaust.” For example, herbicides use in the Vietnam War killed an estimated 6.2 billion board-feet of hardwood trees in the forests north and west of Saigon, according to the American Association for the Advancement of Science. Herbicides such as Agent Orange also made enormous areas of previously fertile land unsuitable for agriculture for many years to come. In Vietnam and elsewhere in the world, valuable agricultural land has also been lost because land mines or the remains of cluster bombs make it too dangerous for farming.

During the Gulf War of 1990, the oil spills amounted to 150 million barrels, 650 times the amount released into the environment by the notorious Exxon Valdez disaster. During the Gulf War an enormous number of shells made of depleted uranium were fired. When the dust produced by exploded shells is inhaled it often produces cancer, and it will remain in the environment of Iraq for decades.

Radioactive fallout from nuclear tests pollutes the global environment and causes many thousands of cases of cancer, as well as birth abnormalities. Most nuclear tests have been carried out on lands belonging to indigenous peoples. Agent Orange also produced cancer, birth abnormalities and other serious forms of illness both in the Vietnamese population and among the foreign soldiers fighting in Vietnam⁵

4.9 Links between poverty and war

There are several relationships between intolerable economic inequality and war. Today 2.7 billion people live on less than 2 dollars a day - 1.1 billion on less than 1 dollar per day. 18 million of our fellow humans die each year from poverty-related causes. In 2006, 1.1 billion people lacked safe drinking water, and waterborne diseases killed an estimated 1.8 million people. The developing countries are also the scene of a resurgence of other infectious diseases, such as malaria, drug-resistant tuberculosis and HIV/AIDS.

Meanwhile, in 2011, world military budgets reached 1,700,000,000,000 dollars (i.e. 1.7 million million dollars). This amount of money is almost too large to be imagined. The fact that it is being spent means that many people are making a living from the institution of war. Wealthy and powerful lobbies from the military-industrial complex are able to influence mass media and governments. Thus the institution of war persists, although we know very well that it is a threat to civilization and that it responsible for much of the suffering that humans experience.

Today’s military spending of almost two trillion US dollars per year would be more than enough to finance safe drinking water for the entire world, and to bring primary health care and family planning advice to all. If used constructively, the money now wasted (or worse

⁵<http://www.dailymail.co.uk/news/article-2401378/Agent-Orange-Vietnamese-children-suffering-effects-herbicide-sprayed-US-Army-40-years-ago.html>

than wasted) on the institution of war could also help the world to make the transition from fossil fuel use to renewable energy systems.

Military might is used by powerful industrialized nations to maintain economic hegemony over less developed countries. This is true today, even though the colonial era is supposed to be over (as has been amply documented by Professor Michael Klare in his books on “Resource Wars”).

The way in which the industrialized countries maintain their control over less developed nations can be illustrated by the “resource curse”, i.e. the fact that resource-rich developing countries are no better off economically than those that lack resources, but are cursed with corrupt and undemocratic governments. This is because foreign corporations extracting local resources under unfair agreements exist in a symbiotic relationship with corrupt local officials.

One might think that taxation of foreign resource-extracting firms would provide developing countries with large incomes. However, there is at present no international law governing multinational tax arrangements. These are usually agreed to on a bilateral basis, and the industrialized countries have stronger bargaining powers in arranging the bilateral agreements.

Another important poverty-generating factor in the developing countries is war - often civil war. The five permanent members of the U.N. Security Council are, ironically, the five largest exporters of small arms. Small arms have a long life. The weapons poured into Africa by both sides during the Cold War are still there, and they contribute to political chaos and civil wars that block development and cause enormous human suffering.

The United Nations website on Peace and Security through Disarmament states that “Small arms and light weapons destabilize regions; spark, fuel and prolong conflicts; obstruct relief programmes; undermine peace initiatives; exacerbate human rights abuses; hamper development; and foster a ‘culture of violence’.”

An estimated 639 million small arms and light weapons are in circulation worldwide, one for every ten people. Approximately 300,000 people are killed every year by these weapons, many of them women and children.

There is also another, less obvious, link between intolerable economic inequality war: Abolition of the institution of war will require the replacement of “might makes right” by the rule international law. It will require development of effective global governance. But reform and strengthening of the United Nations is blocked by wealthy countries because they are afraid of losing their privileged positions. If global economic inequality were less enormous, the problem of unifying the world would be simplified.

Let us work to break the links between poverty and war! To do that, we must work for laws that will restrict the international sale of small arms; we must work for a fair relationship between developing countries and multinational corporations; and above all, we must question the need for colossal military budgets. By following this path we can free the world from the intolerable suffering caused by poverty and from the equally intolerable suffering caused by war.

4.10 The threat of nuclear war

As bad as conventional arms and conventional weapons may be, it is the possibility of a catastrophic nuclear war that poses the greatest threat to humanity. There are today roughly 16,000 nuclear warheads in the world. The total explosive power of the warheads that exist or that could be made on short notice is approximately equal to 500,000 Hiroshima bombs.

To multiply the tragedy of Hiroshima by a factor of half a million makes an enormous difference, not only quantitatively, but also qualitatively. Those who have studied the question believe that a nuclear catastrophe today would inflict irreversible damage on our civilization, genetic pool and environment.

Thermonuclear weapons consist of an inner core where the fission of uranium-235 or plutonium takes place. The fission reaction in the core is able to start a fusion reaction in the next layer, which contains isotopes of hydrogen. It is possible to add a casing of ordinary uranium outside the hydrogen layer, and under the extreme conditions produced by the fusion reaction, this ordinary uranium can undergo fission. In this way, a fission-fusion-fission bomb of almost limitless power can be produced.

For a victim of severe radiation exposure, the symptoms during the first week are nausea, vomiting, fever, apathy, delirium, diarrhoea, oropharyngeal lesions and leukopenia. Death occurs during the first or second week.

We can perhaps be helped to imagine what a nuclear catastrophe means in human terms by reading the words of a young university professor, who was 2,500 meters from the hypocenter at the time of the bombing of Hiroshima: "Everything I saw made a deep impression: a park nearby covered with dead bodies... very badly injured people evacuated in my direction... Perhaps most impressive were girls, very young girls, not only with their clothes torn off, but their skin peeled off as well. ... My immediate thought was that this was like the hell I had always read about. ... I had never seen anything which resembled it before, but I thought that should there be a hell, this was it."

One argument that has been used in favor of nuclear weapons is that no sane political leader would employ them. However, the concept of deterrence ignores the possibility of war by accident or miscalculation, a danger that has been increased by nuclear proliferation and by the use of computers with very quick reaction times to control weapons systems.

Recent nuclear power plant accidents remind us that accidents frequently happen through human and technical failure, even for systems which are considered to be very "safe." We must also remember the time scale of the problem. To assure the future of humanity, nuclear catastrophe must be avoided year after year and decade after decade. In the long run, the safety of civilization cannot be achieved except by the abolition of nuclear weapons, and ultimately the abolition of the institution of war.

In 1985, International Physicians for the Prevention of Nuclear War received the Nobel Peace Prize. IPPNW had been founded in 1980 by six physicians, three from the Soviet Union and three from the United States. Today, the organization has wide membership among the world's physicians. Professor Bernard Lowen of the Harvard School of Public Health, one of the founders of IPPNW, said in a recent speech:

“...No public health hazard ever faced by humankind equals the threat of nuclear war. Never before has man possessed the destructive resources to make this planet uninhabitable... Modern medicine has nothing to offer, not even a token benefit, in the event of nuclear war...”

“We are but transient passengers on this planet Earth. It does not belong to us. We are not free to doom generations yet unborn. We are not at liberty to erase humanity’s past or dim its future. Social systems do not endure for eternity. Only life can lay claim to uninterrupted continuity. This continuity is sacred.”

The danger of a catastrophic nuclear war casts a dark shadow over the future of our species. It also casts a very black shadow over the future of the global environment. The environmental consequences of a massive exchange of nuclear weapons have been treated in a number of studies by meteorologists and other experts from both East and West. They predict that a large-scale use of nuclear weapons would result in fire storms with very high winds and high temperatures, which would burn a large proportion of the wild land fuels in the affected nations. The resulting smoke and dust would block out sunlight for a period of many months, at first only in the northern hemisphere but later also in the southern hemisphere.

Temperatures in many places would fall far below freezing, and much of the earth’s plant life would be killed. Animals and humans would then die of starvation. The nuclear winter effect was first discovered as a result of the Mariner 9 spacecraft exploration of Mars in 1971. The spacecraft arrived in the middle of an enormous dust-storm on Mars, and measured a large temperature drop at the surface of the planet, accompanied by a heating of the upper atmosphere. These measurements allowed scientists to check their theoretical models for predicting the effect of dust and other pollutants distributed in planetary atmospheres.

Using experience gained from the studies of Mars, R.P. Turco, O.B. Toon, T. Ackerman, J.B. Pollack and C. Sagan made a computer study of the climatic effects of the smoke and dust that would result from a large-scale nuclear war. This early research project is sometimes called the TTAPS Study, after the initials of the authors.

In April 1983, a special meeting was held in Cambridge, Massachusetts, where the results of the TTAPS Study and other independent studies of the nuclear winter effect were discussed by more than 100 experts. Their conclusions were presented at a forum in Washington, D.C., the following December, under the chairmanship of U.S. Senators Kennedy and Hatfield. The numerous independent studies of the nuclear winter effect all agreed of the following main predictions:

High-yield nuclear weapons exploded near the earth’s surface would put large amounts of dust into the upper atmosphere. Nuclear weapons exploded over cities, forests, oilfields and refineries would produce fire storms of the type experienced in Dresden and Hamburg after incendiary bombings during the Second World War. The combination of high-altitude dust and lower altitude soot would prevent sunlight from reaching the earth’s surface, and the degree of obscuration would be extremely high for a wide range of scenarios.

A baseline scenario used by the TTAPS study assumes a 5,000-megaton nuclear exchange, but the threshold for triggering the nuclear winter effect is believed to be much

lower than that. After such an exchange, the screening effect of pollutants in the atmosphere might be so great that, in the northern and middle latitudes, the sunlight reaching the earth would be only 1% of ordinary sunlight on a clear day, and this effect would persist for many months. As a result, the upper layers in the atmosphere might rise in temperature by as much as 100 °C, while the surface temperatures would fall, perhaps by as much as 50 °C.

The temperature inversion produced in this way would lead to superstability, a condition in which the normal mixing of atmospheric layers is suppressed. The hydrological cycle (which normally takes moist air from the oceans to a higher and cooler level, where the moisture condenses as rain) would be strongly suppressed. Severe droughts would thus take place over continental land masses. The normal cleansing action of rain would be absent in the atmosphere, an effect which would prolong the nuclear winter.

In the northern hemisphere, forests would die because of lack of sunlight, extreme cold, and drought. Although the temperature drop in the southern hemisphere would be less severe, it might still be sufficient to kill a large portion of the tropical forests, which normally help to renew the earth's oxygen.

The oxygen content of the atmosphere would then fall dangerously, while the concentration of carbon dioxide and oxides of nitrogen produced by firestorms would remain high. The oxides of nitrogen would ultimately diffuse to the upper atmosphere, where they would destroy the ozone layer.

Thus, even when the sunlight returned after an absence of many months, it would be sunlight containing a large proportion of the ultraviolet frequencies which are normally absorbed by the ozone in the stratosphere, and therefore a type of light dangerous to life. Finally, after being so severely disturbed, there is no guarantee that the global climate would return to its normal equilibrium.

Even a nuclear war below the threshold of nuclear winter might have climatic effects very damaging to human life. Professor Paul Ehrlich, of Stanford University, has expressed this in the following words:

“...A smaller war, which set off fewer fires and put less dust into the atmosphere, could easily depress temperatures enough to essentially cancel grain production in the northern hemisphere. That in itself would be the greatest catastrophe ever delivered upon Homo Sapiens, just that one thing, not worrying about prompt effects. Thus even below the threshold, one cannot think of survival of a nuclear war as just being able to stand up after the bomb has gone off.”⁶

⁶<http://www.voanews.com/content/pope-francis-calls-for-nuclear-weapons-ban/2909357.html>
<http://www.cadmusjournal.org/article/issue-4/flaws-concept-nuclear-deterrance>
<http://www.countercurrents.org/avery300713.htm>
<https://www.wagingpeace.org/author/john-avery/>
<http://www.commondreams.org/news/2015/08/06/70-years-after-bombing-hiroshima-calls-abolish-nuclear-weapons>
<http://www.informationclearinghouse.info/article42488.htm>
<http://www.informationclearinghouse.info/article42492.htm>
<http://www.commondreams.org/views/2015/08/06/hiroshima-and-nagasaki-remembering-power>
<http://human-wrongs-watch.net/2015/07/22/israel-iran-and-the-nuclear-non-proliferation-treaty/>



Figure 4.5: U.N. Secretary General António Guterres addressed the Human Rights Council at the United Nations in Geneva, Switzerland February 26, 2018.

Speaking to the Conference on Disarmament at the U.N. complex in Geneva, Guterres said many states still wrongly thought that nuclear weapons made the world safer.

“There is great and justified anxiety around the world about the threat of nuclear war,” he said.

“Countries persist in clinging to the fallacious idea that nuclear arms make the world safer ... At the global level, we must work towards forging a new momentum on eliminating nuclear weapons.”

World War II: a continuation of World War I

In the Second World War, the number of soldiers killed was roughly the same as in World War I, but the numbers of civilian deaths was much larger. In the USSR alone, about 20 million people are thought to have been killed, directly or indirectly, by World War II, and of these only 7.5 million were battle deaths. Many of the USSR’s civilian deaths were caused by starvation, disease or exposure. Civilian populations also suffered greatly in the devastating bombings of cities such as London, Coventry, Rotterdam, Warsaw, Dresden, Cologne, Berlin, Tokyo, Hiroshima and Nagasaki. In World War II, the total number of deaths, civilian and military, is estimated to have been between 62 and 78 million.

Do Benjamin Netanyahu and Ehud Barak, who are contemplating starting what might develop into World War III, have any imaginative concept of what it would be like? Netanyahu has told the Israeli people that only 500 of their citizens would be killed, and that the conflict would be over in a month. One is reminded of the Austrian leaders in 1914, who started a what they thought would be a small action to punish the Serbian nationalists for their Pan-Slavic ambitions. When the result was a world-destroying war, they said “That is not what we intended.” Of course it is not what they intended, but nobody can control the escalation of conflicts. The astonishing unrealism of the Netanyahu-Barak

<http://human-wrongs-watch.net/2015/06/25/militarisms-hostages/>
<http://human-wrongs-watch.net/2015/05/24/the-path-to-zero-dialogues-on-nuclear-dangers-by-richard-falk-and-david-krieger/>
<http://human-wrongs-watch.net/2015/03/30/europe-must-not-be-forced-into-a-nuclear-war-with-russia/>
<http://www.truth-out.org/opinion/item/32073-the-us-should-eliminate-its-nuclear-arsenal-not-modernize-it>
<http://www.cadmusjournal.org/article/issue-4/flaws-concept-nuclear-deterrance>
<http://www.cadmusjournal.org/article/issue-6/arms-trade-treaty-opens-new-possibilities-u>
<http://eruditio.worldacademy.org/issue-6/article/remember-your-humanity>
<http://www.informationclearinghouse.info/article42568.htm>
<https://firstlook.org/theintercept/2014/09/23/nobel-peace-prize-fact-day-syria-7th-country-bombed-obama/>
<http://www.informationclearinghouse.info/article42577.htm>
<http://www.informationclearinghouse.info/article42580.htm>
<http://human-wrongs-watch.net/2015/08/06/us-unleashing-of-atomic-weapons-against-civilian-populations-was-a-criminal-act-of-the-first-order/>
<http://human-wrongs-watch.net/2015/08/06/hiroshima-and-nagasaki-remembering-the-power-of-peace/>
<http://human-wrongs-watch.net/2015/08/04/atomic-bombing-hear-the-story-setsuko-thurlow/>
<http://human-wrongs-watch.net/2015/08/04/atomic-bombing-hear-the-story-yasuaki-yamashita/>
<http://human-wrongs-watch.net/2015/08/03/why-nuclear-weapons/>

statements also reminds one of Kaiser Wilhelm's monumentally unrealistic words to his departing troops: "You will be home before the leaves are off the trees."

The planned attack on Iran would not only violate international law, but would also violate common sense and the wishes of the people of Israel. The probable result would be a massive Iranian missile attack on Tel Aviv, and Iran would probably also close the Straits of Hormuz. If the United States responded by bombing Iranian targets, Iran would probably use missiles to sink one or more of the US ships in the Persian Gulf. One can easily imagine other steps in the escalation of the conflict: a revolution in Pakistan; the entry of nuclear-armed Pakistan into the war on the side of Iran; a preemptive nuclear strike by Israel against Pakistan's nuclear weapons; and Chinese-Russian support of Iran. In the tense atmosphere of such a war, the danger of a major nuclear exchange, due to accident or miscalculation, would be very great.

Today, because the technology of killing has continued to develop, the danger of a catastrophic war with hydrogen bombs hangs like a dark cloud over the future of human civilization. The total explosive power of today's weapons is equivalent to roughly half a million Hiroshima bombs. To multiply the tragedy of Hiroshima and Nagasaki by a factor of half a million changes the danger qualitatively. What is threatened today is the complete breakdown of human society.

There are more than 15,000 nuclear weapons in the world today, about 4,000 of them on hair-trigger alert. The phrase "hair trigger alert" means that the person in charge has only 15 minutes to decide whether the warning from the radar system was true or false, and to decide whether or not to launch a counterattack. The danger of accidental nuclear war continues to be high. Technical failures and human failures have many times brought the world close to a catastrophic nuclear war. Those who know the system of "deterrence" best describe it as "an accident waiting to happen".

No one can win a nuclear war, just as no one can win a natural catastrophe like an earthquake or a tsunami. The effects of a nuclear war would be global, and all the nations of the world would suffer - also neutral nations.

Recent studies by atmospheric scientists have shown that the smoke from burning cities produced by even a limited nuclear war would have a devastating effect on global agriculture. The studies show that the smoke would rise to the stratosphere, where it would spread globally and remain for a decade, blocking sunlight, blocking the hydrological cycle and destroying the ozone layer. Because of the devastating effect on global agriculture, darkness from even a small nuclear war could result in an estimated billion deaths from famine. This number corresponds to the fact that today, a billion people are chronically undernourished. If global agriculture were sufficiently damaged by a nuclear war, these vulnerable people might not survive. A large-scale nuclear war would be an even greater global catastrophe, completely destroying all agriculture for a period of ten years.

The tragedies of Chernobyl and Fukushima remind us that a nuclear war would make large areas of the world permanently uninhabitable because of long-lasting radioactive contamination.

The First World War was a colossal mistake. Today, the world stands on the threshold of an equally enormous disaster. Must we again be led into a world-destroying war by a



few blind individuals who do not have the slightest idea of what such a war would be like?

4.11 Atoms for peace?

“Atoms for Peace”, the title of U.S. President Dwight D. Eisenhower’s 1953 speech to the U.N. General Assembly, may be regarded by future generations as being tragically self-contradictory. Nuclear power generation has led not only to dangerous proliferation of nuclear weapons, but also to disasters which have made large areas of the world permanently uninhabitable because of long-lived radioactive contamination.

According to Wikipedia, “...Under Atoms for Peace related programs, the US exported 25 tons of highly enriched uranium to 30 countries, mostly to fuel research reactors....The Soviet Union also exported 11 tons of HEU under a similar program.” This enormous quantity of loose weapons-usable highly enriched uranium, is now regarded as very worrying because of proliferation and terrorism risks.

A recent article in “The Examiner” (<http://www.examiner.com/article/nuclear-security-u-s-fails-to-protect-its-nuclear-materials-overseas>) pointed out that “...NRC and DOE could not account for the current location and disposition of U.S. HEW overseas in response to

a 1992 congressional mandate. U.S. agencies, in a 1993 report produced in response to the mandate, were able to verify the location of only 1.160 kilograms out of 17,500 kilograms of U.S. HEW estimated to have been exported.”

The dangers of nuclear power generation are exemplified by the Chernobyl disaster: On the 26th of April, 1986, during the small hours of the morning, the staff of the Chernobyl nuclear reactor in Ukraine turned off several safety systems in order to perform a test. The result was a core meltdown in Reactor 4, causing a chemical explosion that blew off the reactor’s 1,000-ton steel and concrete lid. 190 tons of highly radioactive uranium and graphite were hurled into the atmosphere.

The resulting radioactive fallout was 200 times greater than that caused by the nuclear bombs that destroyed Hiroshima and Nagasaki. The radioactive cloud spread over Belarus, Ukraine, Russia, Finland, Sweden and Eastern Europe, exposing the populations of these regions to levels of radiation 100 times the normal background. Ultimately, the radioactive cloud reached as far as Greenland and parts of Asia.

The exact number of casualties resulting from the Chernobyl meltdown is a matter of controversy, but according to a United Nations report, as many as 9 million people have been adversely affected by the disaster. Since 1986, the rate of thyroid cancer in affected areas has increased ten-fold. An area of 155,000 square kilometers (almost half the size of Italy) in Belarus, Ukraine and Russia is still severely contaminated. Even as far away as Wales, hundreds of farms are still under restrictions because of sheep eating radioactive grass.

The more recent disaster of 11 March, 2011, may prove to be very much worse than Chernobyl. According to an article by Harvey Wasserman (<http://www.commondreams.org/view/2014/02/03-3>), the ongoing fallout from the Fukushima catastrophe is already far in excess of that from Chernobyl. Ecosystems of the entire Pacific ocean are being contaminated by the 300 tons of radioactive water from Fukushima that continue to pour into the Pacific every day.

Meanwhile, the increasingly militaristic government of Japan’s Prime Minister Shinzo Abe has passed a State Secrets Act that makes it an offense punishable by 5 year’s imprisonment for journalists to report on the situation. Under this cloak of secrecy, attempts are being made to remove highly radioactive used fuel rods balanced precariously in a partially destroyed container hanging in the air above the stricken Unit Four. If an accident should occur, the released radioactivity could dwarf previous disasters.

Public opinion turned against nuclear power generation as a result of the Chernobyl and Fukushima catastrophes. Nevertheless, many governments insist on pushing forward their plans for opening new nuclear power plants, despite popular opposition. Nuclear power could never compete in price with solar energy or wind energy if it were not heavily subsidized by governments. Furthermore, if a careful accounting is made of the CO₂ released in the construction of nuclear power plants, the mining, refining and transportation of uranium ore, and the final decommissioning of the plants, the amount of CO₂ released is seen to be similar to that of coal-fired plants.

There are three basic reasons why nuclear power generation is one of the worst ideas ever conceived: First is the danger of proliferation of nuclear weapons, which will be



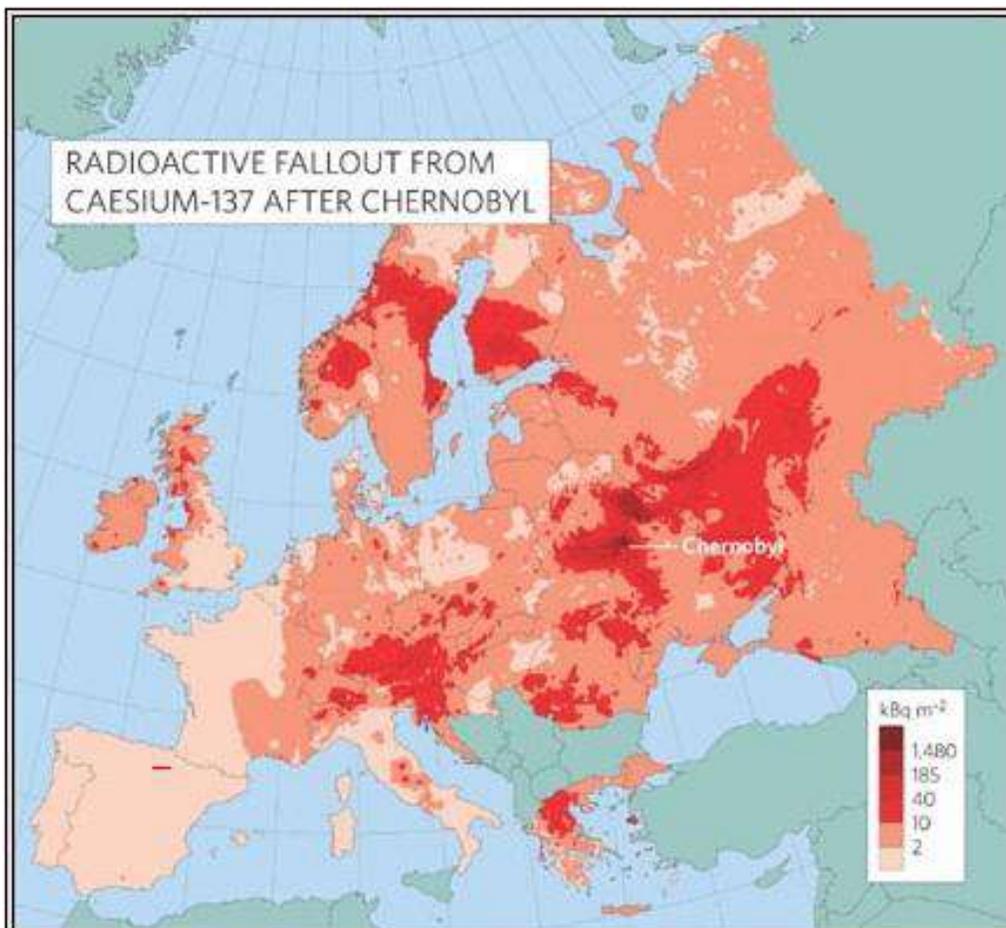
discussed in detail below. Secondly, there is the danger of catastrophic accidents, such as the ones that occurred at Chernobyl and Fukushima. Finally, the problem of how to safely dispose of or store used fuel rods has not been solved.

In thinking about the dangers posed by radioactive waste, we should remember that many of the dangerous radioisotopes involved have half-lives of hundreds of thousands of years. Thus, it is not sufficient to seal them in containers that will last for a century, or even a millennium. We must find containers that will last for a hundred thousand years or more, longer than any human structure has ever lasted.

Of the two bombs that destroyed Hiroshima and Nagasaki, one made use of the rare isotope of uranium, U-235, while the other used plutonium. Both of these materials can be made by a nation with a nuclear power generation program.

Uranium has atomic number 92, i.e., a neutral uranium atom has a nucleus containing 92 positively-charged protons, around which 92 negatively-charged electrons circle. All of the isotopes of uranium have the same number of protons and electrons, and hence the same chemical properties, but they differ in the number of neutrons in their nuclei. For example, the nucleus of U-235 has 143 neutrons, while that of U-238 has 146. Notice that $92+143=235$, while $92+146=238$. The number written after the name of an element to specify a particular isotope is the number of neutrons plus the number of protons. This is called the “nucleon number”, and the weight of an isotope is roughly proportional to it. This means that U-238 is slightly heavier than U-235. If the two isotopes are to be separated, difficult physical methods dependent on mass must be used, since their chemical properties are identical. In natural uranium, the amount of the rare isotope U-235 is only 0.7 percent.

A paper published in 1939 by Niels Bohr and John A. Wheeler indicated that it was the rare isotope of uranium, U-235, that undergoes fission. A bomb could be constructed,



J. SMITH & N. A. BERESFORD CHERNOBYL: CATASTROPHE AND CONSEQUENCES (PRAXIS, CHICHESTER, 2005)



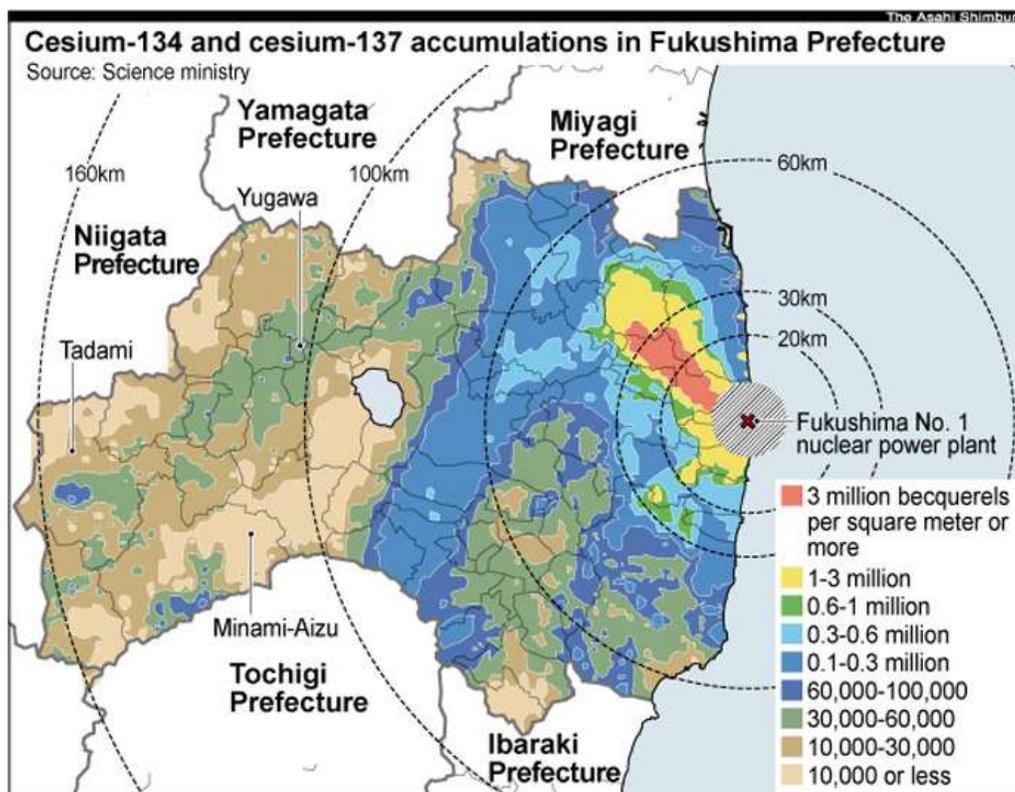


Figure 4.6: People evacuated from the region near to Fukushima wonder when they will be able to return to their homes. The honest answer is “never”.

they pointed out, if enough highly enriched U-235 could be isolated from the more common isotope, U-238. Calculations later performed in England by Otto Frisch and Rudolf Peierls showed that the “critical mass” of highly enriched uranium needed is quite small: only a few kilograms.

The Bohr-Wheeler theory also predicted that an isotope of plutonium, Pu-239, should be just as fissionable as U-235. Both U-235 and Pu-239 have odd nucleon numbers. When U-235 absorbs a neutron, it becomes U-236, while when Pu-239 absorbs a neutron it becomes Pu-240. In other words, absorption of a neutron converts both these species to nuclei with even nucleon numbers.

According to the Bohr-Wheeler theory, nuclei with even nucleon numbers are especially tightly-bound. Thus absorption of a neutron converts U-235 to a highly-excited state of U-236, while Pu-239 is similarly converted to a highly excited state of Pu-240. The excitation energy distorts the nuclei to such an extent that fission becomes possible. Instead of trying to separate the rare isotope, U-235, from the common isotope, U-238, physicists could just operate a nuclear reactor until a sufficient amount of Pu-239 accumulated, and then separate it out by ordinary chemical means.

Thus in 1942, when Enrico Fermi and his coworkers at the University of Chicago produced the world’s first controlled chain reaction within a pile of cans containing ordinary (nonenriched) uranium powder, separated by blocks of very pure graphite, the chain-reacting pile had a double significance: It represented a new source of energy, but it also had a sinister meaning. It represented an easy path to nuclear weapons, since one of the by-products of the reaction was a fissionable isotope of plutonium, Pu-239. The bomb dropped on Hiroshima in 1945 used U-235, while the Nagasaki bomb used Pu-239.

By reprocessing spent nuclear fuel rods, using ordinary chemical means, a nation with a power reactor can obtain weapons-usable Pu-239. Even when such reprocessing is performed under international control, the uncertainty as to the amount of Pu-239 obtained is large enough so that the operation might superficially seem to conform to regulations while still supplying enough Pu-239 to make many bombs.

The enrichment of uranium, i.e. production of uranium with a higher percentage of U-235 than is found in natural uranium is also linked to reactor use. Many reactors of modern design make use of low enriched uranium (LEU) as a fuel. Nations operating such a reactor may claim that they need a program for uranium enrichment in order to produce LEU for fuel rods. However, by operating their ultracentrifuges a little longer, they can easily produce highly enriched uranium (HEU), i.e. uranium containing a high percentage of the rare isotope U-235, and therefore usable in weapons.

Nuclear power generation is not a solution to the problem of obtaining energy without producing dangerous climate change: Known reserves of uranium are only sufficient for the generation of about 25 terawatt-years of electrical energy (Craig, J.R., Vaugn, D.J. and Skinner, B.J., “Resources of the Earth: Origin, Use and Environmental Impact, Third Edition”, page 210). This can be compared with the world’s current rate of energy use of over 14 terrawatts. Thus, if all of our energy were obtained from nuclear power, existing reserves of uranium would only be sufficient for about 2 years.

It is sometimes argued that a larger amount of electricity could be obtained from the

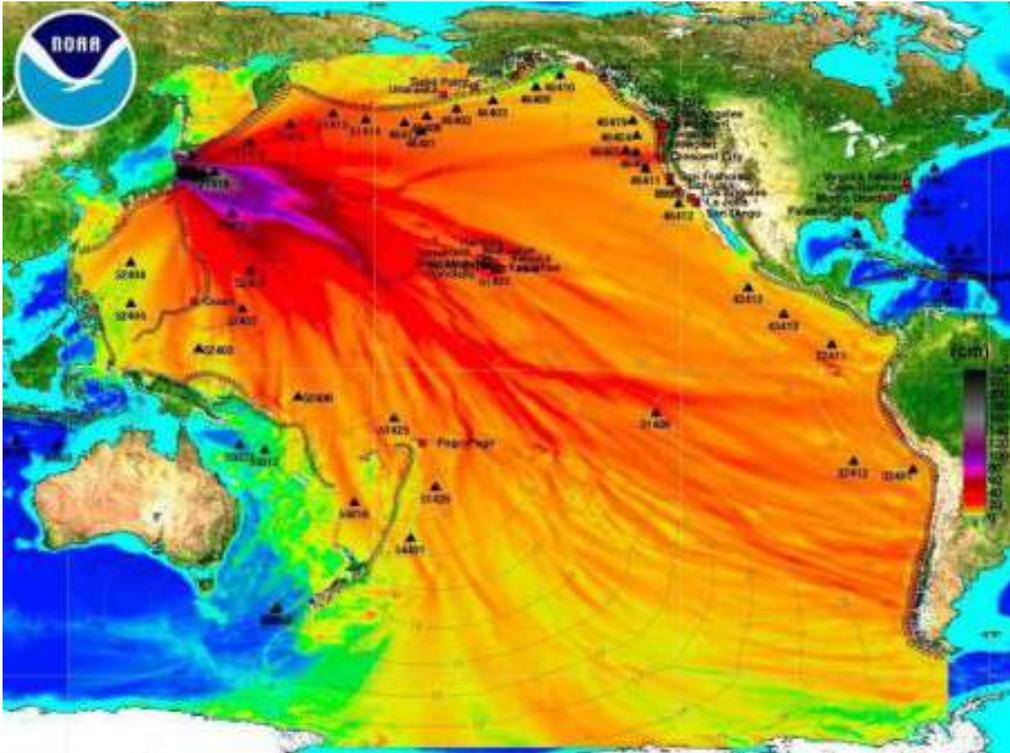


Figure 4.7: **Radioactive contamination from the Fukushima disaster is spreading through the food chain of marine life throughout the Pacific region.**

same amount of uranium through the use of fast breeder reactors, but this would involve totally unacceptable proliferation risks. In fast breeder reactors, the fuel rods consist of highly enriched uranium. Around the core, is an envelope of natural uranium. The flux of fast neutrons from the core is sufficient to convert a part of the U-238 in the envelope into Pu-239, a fissionable isotope of plutonium.

Fast breeder reactors are prohibitively dangerous from the standpoint of nuclear proliferation because both the highly enriched uranium from the fuel rods and the Pu-239 from the envelope are directly weapons-usable. It would be impossible, from the standpoint of equity, to maintain that some nations have the right to use fast breeder reactors, while others do not. If all nations used fast breeder reactors, the number of nuclear weapons states would increase drastically.

It is interesting to review the way in which Israel, South Africa, Pakistan, India and North Korea obtained their nuclear weapons, since in all these cases the weapons were constructed under the guise of “atoms for peace”, a phrase that future generations may someday regard as being tragically self-contradictory.

Israel began producing nuclear weapons in the late 1960’s (with the help of a “peaceful” nuclear reactor provided by France, and with the tacit approval of the United States) and the country is now believed to possess 100-150 of them, including neutron bombs. Israel’s policy is one of visibly possessing nuclear weapons while denying their existence.



Figure 4.8: The Israeli nuclear technician and whistleblower Mordechai Vanunu called public attention to Israel's nuclear weapons while on a trip to England. He was lured to Italy by a Mossad "honey trap", where he was drugged, kidnapped and transported to Israel by Mossad.



Figure 4.9: Vanunu was imprisoned for 18 years, during 11 of which he was held in solitary confinement and subjected to psychological torture, such as not being allowed to sleep for long periods.

South Africa, with the help of Israel and France, also weaponized its civil nuclear program, and it tested nuclear weapons in the Indian Ocean in 1979. In 1991 however, South Africa destroyed its nuclear weapons and signed the Nuclear Non-Proliferation Treaty.

India produced what it described as a "peaceful nuclear explosion" in 1974. By 1989 Indian scientists were making efforts to purify the lithium-6 isotope, a key component of the much more powerful thermonuclear bombs. In 1998, India conducted underground tests of nuclear weapons, and is now believed to have roughly 60 warheads, constructed from Pu-239 produced in "peaceful" reactors.

Pakistan's efforts to obtain nuclear weapons were spurred by India's 1974 "peaceful nuclear explosion". As early as 1970, the laboratory of Dr. Abdul Qadeer Khan, (a metallurgist who was to become Pakistan's leading nuclear bomb maker) had been able to obtain from a Dutch firm the high-speed ultracentrifuges needed for uranium enrichment. With unlimited financial support and freedom from auditing requirements, Dr. Khan purchased restricted items needed for nuclear weapon construction from companies in Europe and the United States. In the process, Dr. Khan became an extremely wealthy man. With additional help from China, Pakistan was ready to test five nuclear weapons in 1998.

The Indian and Pakistani nuclear bomb tests, conducted in rapid succession, presented the world with the danger that these devastating weapons would be used in the conflict over Kashmir. Indeed, Pakistan announced that if a war broke out using conventional weapons, Pakistan's nuclear weapons would be used "at an early stage".

In Pakistan, Dr. A.Q. Khan became a great national hero. He was presented as the person who had saved Pakistan from attack by India by creating Pakistan's own nuclear weapons. In a Washington Post article (1 February, 2004) Pervez Hoodbhoy wrote: "Nuclear nationalism was the order of the day as governments vigorously promoted the bomb as the symbol of Pakistan's high scientific achievement and self-respect..." Similar manifestations of nuclear nationalism could also be seen in India after India's 1998 bomb tests.

Early in 2004, it was revealed that Dr. Khan had for years been selling nuclear secrets and equipment to Libya, Iran and North Korea, and that he had contacts with Al Qaeda. However, observers considered that it was unlikely that Khan would be tried, since a trial might implicate Pakistan's army as well as two of its former prime ministers.

There is a danger that Pakistan's unpopular government may be overthrown, and that the revolutionists might give Pakistan's nuclear weapons to a subnational organization. This type of danger is a general one associated with nuclear proliferation. As more and more countries obtain nuclear weapons, it becomes increasingly likely that one of them will undergo a revolution, during the course of which nuclear weapons will fall into the hands of criminals or terrorists.

There is also a possibility that poorly-guarded fissionable material could fall into the hands of subnational groups, who would then succeed in constructing their own nuclear weapons. Given a critical mass of highly-enriched uranium, a terrorist group, or an organized criminal (Mafia) group, could easily construct a crude gun-type nuclear explosive device. Pu-239 is more difficult to use since it is highly radioactive, but the physicist Frank Barnaby believes that a subnational group could nevertheless construct a crude nuclear

bomb (of the Nagasaki type) from this material.

We must remember the remark of U.N. Secretary General Kofi Annan after the 9/11/2001 attacks on the World Trade Center. He said, "This time it was not a nuclear explosion". The meaning of his remark is clear: If the world does not take strong steps to eliminate fissionable materials and nuclear weapons, it will only be a matter of time before they will be used in terrorist attacks on major cities, or by organized criminals for the purpose of extortion. Neither terrorists nor organized criminals can be deterred by the threat of nuclear retaliation, since they have no territory against which such retaliation could be directed. They blend invisibly into the general population. Nor can a "missile defense system" prevent criminals or terrorists from using nuclear weapons, since the weapons can be brought into a port in any one of the hundreds of thousands of containers that enter on ships each year, a number far too large to be checked exhaustively.

Finally we must remember that if the number of nations possessing nuclear weapons becomes very large, there will be a greatly increased chance that these weapons will be used in conflicts between nations, either by accident or through irresponsible political decisions.

The slogan "Atoms for Peace" has proved to be such a misnomer that it would be laughable if it were not so tragic. Nuclear power generation has been a terrible mistake. We must stop before we turn our beautiful earth into a radioactive wasteland.

4.12 Cancer threat from radioactive leaks at Hanford

On August 9, 1945, a nuclear bomb was dropped on the Japanese city of Nagasaki. Within a radius of one mile, destruction was total. People were vaporized so that the only shadows on concrete pavements were left to show where they had been. Many people outside the radius of total destruction were trapped in their collapsed houses, and were burned alive by the fire that followed. By the end of 1945, an estimated 80,000 men, women, young children, babies and old people had died as a result of the bombing. As the years passed more people continued to die from radiation sickness.

Plutonium for the bomb that destroyed Nagasaki had been made at an enormous nuclear reactor station located at Hanford in the state of Washington. During the Cold War, the reactors at Hanford produced enough weapons-usable plutonium for 60,000 nuclear weapons. The continued existence of plutonium and highly-enriched uranium-235 in the stockpiles of nuclear weapons states hangs like a dark cloud over the future of humanity. A full scale thermonuclear war would be the ultimate ecological catastrophe, threatening to make the world permanently uninhabitable.

Besides playing a large role in the tragedy of Nagasaki, the reactor complex at Hanford has damaged the health of many thousands of Americans. The prospects for the future are even worse. Many millions of gallons of radioactive waste are held in Hanford's aging storage tanks, the majority of which have exceeded their planned lifetimes. The following quotations are taken from a Wikipedia article on Hanford, especially the section devoted to ecological concerns:

“A huge volume of water from the Columbia River was required to dissipate the heat produced by Hanford’s nuclear reactors. From 1944 to 1971, pump systems drew cooling water from the river and, after treating this water for use by the reactors, returned it to the river. Before being released back into the river, the used water was held in large tanks known as retention basins for up to six hours. Longer-lived isotopes were not affected by this retention, and several tetrabecquerels entered the river every day. These releases were kept secret by the federal government. Radiation was later measured downstream as far west as the Washington and Oregon coasts.”

“The plutonium separation process also resulted in the release of radioactive isotopes into the air, which were carried by the wind throughout southeastern Washington and into parts of Idaho, Montana, Oregon and British Columbia. Downwinders were exposed to radionuclides, particularly Iodine 131... These radionuclides filtered into the food chain via contaminated fields where dairy cows grazed; hazardous fallout was ingested by communities who consumed the radioactive food and drank the milk. Most of these airborne releases were a part of Hanford’s routine operations, while a few of the larger releases occurred in isolated incidents.”

“In response to an article in the Spokane Spokesman Review in September 1985, the Department of Energy announced its intent to declassify environmental records and in February, 1986 released to the public 19,000 pages of previously unavailable historical documents about Hanford’s operations. The Washington State Department of Health collaborated with the citizen-led Hanford Health Information Network (HHIN) to publicize data about the health effects of Hanford’s operations. HHIN reports concluded that residents who lived downwind from Hanford or who used the Columbia River downstream were exposed to elevated doses of radiation that placed them at increased risk for various cancers and other diseases.”

“The most significant challenge at Hanford is stabilizing the 53 million U.S. Gallons (204,000 m³) of high-level radioactive waste stored in 177 underground tanks. About a third of these tanks have leaked waste into the soil and groundwater. As of 2008, most of the liquid waste has been transferred to more secure double-shelled tanks; however, 2.8 million U.S. Gallons (10,600 m³) of liquid waste, together with 27 million U.S. gallons (100,000 m³) of salt cake and sludge, remains in the single-shelled tanks. That waste was originally scheduled to be removed by 2018. The revised deadline is 2040. Nearby aquifers contain an estimated 270 billion U.S. Gallons (1 billion m³) of contaminated groundwater as a result of the leaks. As of 2008, 1 million U.S. Gallons (4,000 m³) of highly radioactive waste is traveling through the groundwater toward the Columbia River.”

The documents made public in 1986 revealed that radiation was intentionally and secretly released by the plant and that people living near to it acted as unknowing guinea pigs in experiments testing radiation dangers. Thousands of people who live in the vicinity of the Hanford Site have suffered an array of health problems including thyroid cancers, autoimmune diseases and reproductive disorders that they feel are the direct result of these releases and experiments.

In thinking about the dangers posed by leakage of radioactive waste, we should remember that many of the dangerous radioisotopes involved have half-lives of hundreds of

thousands of years. Thus, it is not sufficient to seal them into containers that will last for a century or even a millennium. We must find containers that will last for a hundred thousand years or more, longer than any human structure has ever lasted. This logic has led Finland to deposit its radioactive waste in a complex of underground tunnels carved out of solid rock. But looking ahead for a hundred thousand years involves other problems: If humans survive for that long, what language will they speak? Certainly not the languages of today. How can we warn them that the complex of tunnels containing radioactive waste is a death trap? The reader is urged to see a film exploring these problems, “Into Eternity”, by the young Danish film-maker Michael Madsen. Here is the link: <http://dotsub.com/view/8e40ebda-5966-4212-9b96-6abbce3c6577>.

We have already gone a long way towards turning our beautiful planet earth into a nuclear wasteland. In the future, let us be more careful, as guardians of a precious heritage, the natural world and the lives of all future generations.

4.13 An accident waiting to happen

In Stanley Kubrick’s film, “Dr. Strangelove”, a paranoid ultra-nationalist brigadier general, Jack D. Ripper, orders a nuclear attack on the Soviet Union because he believes that the Soviets are using water fluoridation as a means to rob Americans of their “precious bodily fluids”. Efforts are made to recall the US bombers, but this proves to be impossible, and the attack triggers the Soviet “Doomsday Machine”. The world is destroyed.

Kubrick’s film is a black comedy, and we all laugh at it, especially because of the brilliant performance of Peter Sellers in multiple roles. Unfortunately, however, the film comes uncomfortably close to reality. An all-destroying nuclear war could very easily be started by an insane or incompetent person whose hand happens to be on the red button.

This possibility (or probability) has recently come to public attention through newspaper articles revealing that 11 of the officers responsible for launching US nuclear missiles have been fired because of drug addiction. Furthermore, a larger number of missile launch officers were found to be cheating on competence examinations. Three dozen officers were involved in the cheating ring, and some reports state that an equal number of others may have known about it., and remained silent. Finally, it was shown that safety rules were being deliberately ignored. The men involved, were said to be “burned out”.

According to an article in *The Guardian* (Wednesday, 15 January, 2014), “Revelations of misconduct and incompetence in the nuclear missile program go back at least to 2007, when six nuclear-tipped cruise missiles were accidentally loaded onto a B-52 bomber in Minot, North Dakota, and flown to a base in Louisiana.”

“Last March, military inspectors gave officers at the ICBM base in Minot the equivalent of a ‘D’ grade for launch mastery. A month later, 17 officers were stripped of their authority to launch the missiles.”

“In October, a senior air force officer in charge of 450 ICBM’s, major general Michael Carey, was fired after accusations of drunken misconduct during a summer trip to Moscow.



Figure 4.10: Peter Sellers (left) listens while Brigadier General Jack D. Ripper tells him about the Soviet conspiracy to steal his “precious bodily fluids”.

An internal investigation \hat{A} found \hat{A} that Carey drank heavily, cavorted with two foreign women and visited a nightclub called La Cantina, where Maj. Gen. Carey had alcohol and kept trying to get the band to let him play with them.”

The possibility that a catastrophic nuclear war could be triggered by a madman gains force from the recent statements of Benjamin Netanyahu, who has said repeatedly that, with or without US help, Israel intends to attack Iran. Such an attack, besides being a war crime, would be literally insane.

If Netanyahu believes that a war with Iran would be short or limited, he is ignoring several very obvious dangers. Such a war would most probably escalate into a widespread general war in the Middle East. It could cause a revolution in Pakistan, and the new revolutionary government of Pakistan would be likely to enter the war on the side of Iran, bringing with it Pakistan’s nuclear weapons. Russia and China, both staunch allies of Iran, might be drawn into the conflict. There is a danger that the conflict could escalate into a Third World War, where nuclear weapons might easily be used, either by accident or intentionally. .

China could do grave economic damage to the United States through its large dollar holdings. Much of the world’s supply of petroleum passes through the Straits of Hormuz, and a war in the region could greatly raise the price of oil, triggering a depression that might rival or surpass the Great Depression of the 1920’s and 1930’s. \hat{A}

The probability of a catastrophic nuclear war occurring by accident is made greater by the fact that several thousand nuclear weapons are kept on “hair-trigger alert” with a quasi-automatic reaction time measured in minutes. There is a constant danger that a nuclear war will be triggered by an error in evaluating a signal on a radar screen.



Figure 4.11: Peter Sellers as Dr. Strangelove. He has to restrain his black-gloved crippled hand, which keeps trying to give a Nazi salute.



Figure 4.12: General Buck Turgidson (George C. Scott) struggles with the Russian Ambassador. Peter Sellers (right) playing the US President, rebukes them for fighting in the War Room.



Figure 4.13: Major T. “King” Kong rides a nuclear bomb on its way down, where it will trigger the Soviet Doomsday Machine and ultimately destroy the world.



Figure 4.14: Benjamin Netanyahu has stated repeatedly that, with or without US support, Israel will attack Iran, an action that could escalate uncontrollably into World War III.



4.14 Flaws in the concept of nuclear deterrence

Before discussing other defects in the concept of deterrence, it must be said very clearly that the idea of “massive nuclear retaliation” is completely unacceptable from an ethical point of view. The doctrine of retaliation, performed on a massive scale, violates not only the principles of common human decency and common sense, but also the ethical principles of every major religion. Retaliation is especially contrary to the central commandment of Christianity which tells us to love our neighbor, even if he or she is far away from us, belonging to a different ethnic or political group, and even if our distant neighbor has seriously injured us. This principle has a fundamental place not only in Christianity but also in Buddhism. “Massive retaliation” completely violates these very central ethical principles, which are not only clearly stated and fundamental but also very practical, since they prevent escalatory cycles of revenge and counter-revenge.

Contrast Christian ethics with estimates of the number of deaths that would follow a US nuclear strike against Russia: Several hundred million deaths. These horrifying estimates shock us not only because of the enormous magnitude of the expected mortality, but also because the victims would include people of every kind: women, men, old people, children and infants, completely irrespective of any degree of guilt that they might have. As a result of such an attack, many millions of people in neutral countries would also die. This type of killing has to be classified as genocide.

When a suspected criminal is tried for a wrongdoing, great efforts are devoted to clarifying the question of guilt or innocence. Punishment only follows if guilt can be proved beyond any reasonable doubt. Contrast this with the totally indiscriminate mass slaughter that results from a nuclear attack!

It might be objected that disregard for the guilt or innocence of victims is a universal characteristic of modern war, since statistics show that, with time, a larger and larger percentage of the victims have been civilians, and especially children. For example, the air attacks on Coventry during World War II, or the fire bombings of Dresden and Tokyo, produced massive casualties which involved all segments of the population with complete disregard for the question of guilt or innocence. The answer, I think, is that modern war has become generally unacceptable from an ethical point of view, and this unacceptability

is epitomized in nuclear weapons.

The enormous and indiscriminate destruction produced by nuclear weapons formed the background for an historic 1996 decision by the International Court of Justice in the Hague. In response to questions put to it by WHO and the UN General Assembly, the Court ruled that “the threat and use of nuclear weapons would generally be contrary to the rules of international law applicable in armed conflict, and particularly the principles and rules of humanitarian law.” The only *possible* exception to this general rule might be “an extreme circumstance of self-defense, in which the very survival of a state would be at stake”. But the Court refused to say that even in this extreme circumstance the threat or use of nuclear weapons would be legal. It left the exceptional case undecided. In addition, the World Court added unanimously that “there exists an obligation to pursue in good faith *and bring to a conclusion* negotiations leading to nuclear disarmament in all its aspects under strict international control.”

This landmark decision has been criticized by the nuclear weapon states as being decided “by a narrow margin”, but the structuring of the vote made the margin seem more narrow than it actually was. Seven judges voted against Paragraph 2E of the decision (the paragraph which states that the threat or use of nuclear weapons would be generally illegal, but which mentions as a possible exception the case where a nation might be defending itself from an attack that threatened its very existence.) Seven judges voted for the paragraph, with the President of the Court, Muhammad Bedjaoui of Algeria casting the deciding vote. Thus the Court adopted it, seemingly by a narrow margin. But three of the judges who voted against 2E did so because they believed that no possible exception should be mentioned! Thus, if the vote had been slightly differently structured, the result would have been ten to four.

Of the remaining four judges who cast dissenting votes, three represented nuclear weapons states, while the fourth thought that the Court ought not to have accepted the questions from WHO and the UN. However Judge Schwebel from the United States, who voted against Paragraph 2E, nevertheless added, in a separate opinion, “It cannot be accepted that the use of nuclear weapons on a scale which would - or could - result in the deaths of many millions in indiscriminate inferno and by far-reaching fallout, have pernicious effects in space and time, and render uninhabitable much of the earth, could be lawful.” Judge Higgins from the UK, the first woman judge in the history of the Court, had problems with the word “generally” in Paragraph 2E and therefore voted against it, but she thought that a more profound analysis might have led the Court to conclude in favor of illegality in all circumstances. Judge Fleischhauer of Germany said in his separate opinion, “The nuclear weapon is, in many ways, the negation of the humanitarian considerations underlying the law applicable in armed conflict and the principle of neutrality. The nuclear weapon cannot distinguish between civilian and military targets. It causes immeasurable suffering. The radiation released by it is unable to respect the territorial integrity of neutral States.”

President Bedjaoui, summarizing the majority opinion, called nuclear weapons “the ultimate evil”, and said “By its nature, the nuclear weapon, this blind weapon, destabilizes humanitarian law, the law of discrimination in the use of weapons... The ultimate aim of

every action in the field of nuclear arms will always be nuclear disarmament, an aim which is no longer utopian and which all have a duty to pursue more actively than ever.”

Thus the concept of nuclear deterrence is not only unacceptable from the standpoint of ethics; it is also contrary to international law. The World Courts 1996 advisory Opinion unquestionably also represents the opinion of the majority of the worlds peoples. Although no formal plebiscite has been taken, the votes in numerous resolutions of the UN General Assembly speak very clearly on this question. For example the New Agenda Resolution (53/77Y) was adopted by the General Assembly on 4 December 1998 by a massively affirmative vote, in which only 18 out of the 170 member states voted against the resolution.⁷ The New Agenda Resolution proposes numerous practical steps towards complete nuclear disarmament, and it calls on the Nuclear-Weapon States “to demonstrate an unequivocal commitment to the speedy and total elimination of their nuclear weapons and without delay to pursue in good faith and bring to a conclusion negotiations leading to the elimination of these weapons, thereby fulfilling their obligations under Article VI of the Treaty on the Non-Proliferation of Nuclear Weapons (NPT)”. Thus, in addition to being ethically unacceptable and contrary to international law, nuclear weapons also contrary to the principles of democracy.

Having said these important things, we can now turn to some of the other defects in the concept of nuclear deterrence. One important defect is that nuclear war may occur through accident or miscalculation - through technical defects or human failings. This possibility is made greater by the fact that despite the end of the Cold War, thousands of missiles carrying nuclear warheads are still kept on a “hair-trigger” state of alert with a quasi-automatic reaction time measured in minutes. There is a constant danger that a nuclear war will be triggered by error in evaluating the signal on a radar screen. For example, the BBC reported recently that a group of scientists and military leaders are worried that a small asteroid entering the earths atmosphere and exploding could trigger a nuclear war if mistaken for a missile strike.

A number of prominent political and military figures (many of whom have ample knowledge of the system of deterrence, having been part of it) have expressed concern about the danger of accidental nuclear war. Colin S. Grey⁸ expressed this concern as follows: “The problem, indeed the enduring problem, is that we are resting our future upon a nuclear deterrence system concerning which we cannot tolerate even a single malfunction.” General Curtis E. LeMay⁹ has written, “In my opinion a general war will grow through a series of political miscalculations and accidents rather than through any deliberate attack by either side.” Bruce G. Blair¹⁰ has remarked that “It is obvious that the rushed nature of the process, from warning to decision to action, risks causing a catastrophic mistake.”... “This system is an accident waiting to happen.”

⁷Of the 18 countries that voted against the New Agenda resolution, 10 were Eastern European countries hoping for acceptance into NATO, whose votes seem to have been traded for increased probability of acceptance.

⁸Chairman, National Institute for Public Policy

⁹Founder and former Commander in Chief of the United States Strategic Air Command

¹⁰Brookings Institute

Today, the system that is supposed to give us security is called Mutually Assured Destruction, appropriately abbreviated as MAD. It is based on the idea of deterrence, which maintains that because of the threat of massive retaliation, no sane leader would start a nuclear war.

Before discussing other defects in the concept of deterrence, it must be said very clearly that the idea of “massive nuclear retaliation” is a form of genocide and is completely unacceptable from an ethical point of view. It violates not only the principles of common human decency and common sense, but also the ethical principles of every major religion.

Having said this, we can now turn to some of the other faults in the concept of nuclear deterrence. One important defect is that nuclear war may occur through accident or miscalculation, through technical defects or human failings, or by terrorism. This possibility is made greater by the fact that despite the end of the Cold War, thousands of missiles carrying nuclear warheads are still kept on “hair-trigger alert” with a quasi-automatic reaction time measured in minutes. There is a constant danger that a nuclear war will be triggered by error in evaluating the signal on a radar screen.

Incidents in which global disaster is avoided by a hair’s breadth are constantly occurring.

Will we use the discoveries of modern science constructively, and thus choose the path leading towards life? Or will we use science to produce more and more lethal weapons, which sooner or later, through a technical or human failure, will result in a catastrophic nuclear war? Will we thoughtlessly destroy our beautiful planet through unlimited growth of population and industry? The choice among these alternatives is ours to make. We live at a critical moment of history, a moment of crisis for civilization.

No one alive today asked to be born at a time of crisis, but history has given each of us an enormous responsibility. Of course we have our ordinary jobs, which we need to do in order to stay alive; but besides that, each of us has a second job, the duty to devote both time and effort to solving the serious problems that face civilization during the 21st century. We cannot rely on our politicians to do this for us. Many politicians are under the influence of powerful lobbies. Others are waiting for a clear expression of popular will. It is the people of the world themselves who must choose their own future and work hard to build it.

No single person can achieve the changes that we need, but together we can do it. The problem of building a stable, just, and war-free world is difficult, but it is not impossible. The large regions of our present-day world within which war has been eliminated can serve as models. There are a number of large countries with heterogeneous populations within which it has been possible to achieve internal peace and social cohesion, and if this is possible within such extremely large regions, it must also be possible globally.

We must replace the old world of international anarchy, chronic war, and institutionalized injustice by a new world of law. The United Nations Charter, the Universal Declaration of Human Rights and the International Criminal Court are steps in the right direction. These institutions need to be greatly strengthened and reformed. We also need a new global ethic, where loyalty to one’s family and nation will be supplemented by a higher loyalty to humanity as a whole. Tipping points in public opinion can occur suddenly. We can think, for example, of the Civil Rights Movement, or the rapid fall of the Berlin Wall,

or the sudden change that turned public opinion against smoking, or the sudden movement for freedom and democracy in the Arab world. A similar sudden change can occur soon regarding war and nuclear weapons.

We know that war is madness. We know that it is responsible for much of the suffering that humans experience. We know that war pollutes our planet and that the almost unimaginable sums wasted on war prevent the happiness and prosperity of mankind. We know that nuclear weapons are insane, and that the precariously balanced deterrence system can break down at any time through human error or computer errors or through terrorist actions, and that it definitely will break down within our lifetimes unless we abolish it. We know that nuclear war threatens to destroy civilization and much of the biosphere.

The logic is there. We must translate into popular action which will put an end to the undemocratic, money-driven, power-lust-driven war machine. The peoples of the world must say very clearly that nuclear weapons are an absolute evil; that their possession does not increase anyone's security; that their continued existence is a threat to the life of every person on the planet; and that these genocidal and potentially omnicidal weapons have no place in a civilized society.

Modern science has abolished time and distance as factors separating nations. On our shrunken globe today, there is room for one group only: the family of humankind. We must embrace all other humans as our brothers and sisters. More than that, we must feel that all of nature is part of the same sacred family; meadow flowers, blowing winds, rocks, trees, birds, animals, and other humans, all these are our brothers and sisters, deserving our care and protection. Only in this way can we survive together. Only in this way can we build a happy future.

"But nobody can predict that the fatal accident or unauthorized act will never happen", Fred Ikle of the Rand Corporation has written, "Given the huge and far-flung missile forces, ready to be launched from land and sea on on both sides, the scope for disaster by accident is immense... In a matter of seconds - through technical accident or human failure - mutual deterrence might thus collapse."

Another serious failure of the concept of nuclear deterrence is that it does not take into account the possibility that atomic bombs may be used by terrorists. Indeed, the threat of nuclear terrorism has today become one of the most pressing dangers that the world faces, a danger that is particularly acute in the United States.

Since 1945, more than 3,000 metric tons (3,000,000 kilograms) of highly enriched uranium and plutonium have been produced - enough for several hundred thousand nuclear weapons. Of this, roughly a million kilograms are in Russia, inadequately guarded, in establishments where the technicians are poorly paid and vulnerable to the temptations of bribery. There is a continuing danger that these fissile materials will fall into the hands of terrorists, or organized criminals, or irresponsible governments. Also, an extensive black market for fissile materials, nuclear weapons components etc. has recently been revealed in connection with the confessions of Pakistan's bomb-maker, Dr. A.Q. Khan. Furthermore, if Pakistan's less-than-stable government should be overthrown, complete nuclear weapons could fall into the hands of terrorists.

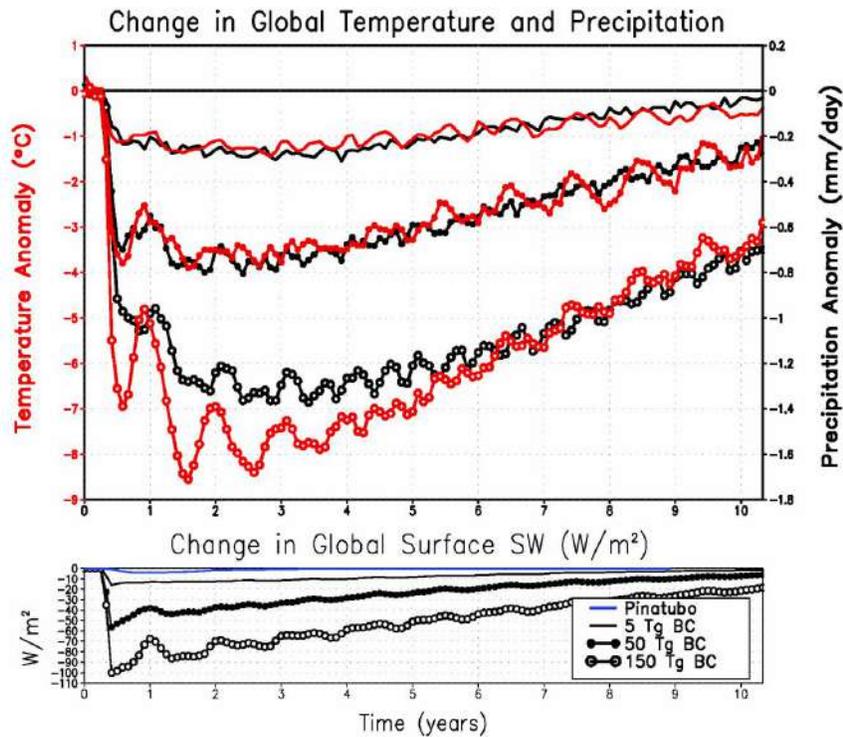


Figure 4.15: *Recent studies by atmospheric scientists have shown that the smoke from burning cities produced by even a limited nuclear war would have a devastating effect on global agriculture. The studies show that the smoke would rise to the stratosphere, where it would spread globally and remain for a decade, blocking sunlight and destroying the ozone layer. Because of the devastating effect on global agriculture, darkness from even a small nuclear war (e.g. between India and Pakistan) would result in an estimated billion deaths from famine. (O. Toon, A. Robock and R. Turco, “The Environmental Consequences of Nuclear War”, Physics Today, vol. 61, No. 12, 2008, p. 37-42)*

On November 3, 2003, Mohamed ElBaradei, Director General of the International Atomic Energy Agency, made a speech to the United Nations in which he called for “limiting the processing of weapons-usable material (separated plutonium and high enriched uranium) in civilian nuclear programmes - as well as the production of new material through reprocessing and enrichment - by agreeing to restrict these operations to facilities exclusively under international control.” It is almost incredible, considering the dangers of nuclear proliferation and nuclear terrorism, that such restrictions were not imposed long ago. Nuclear reactors used for “peaceful” purposes unfortunately also generate fissionable isotopes of plutonium, neptunium and americium. Thus all nuclear reactors must be regarded as ambiguous in function, and all must be put under strict international control. One might ask, in fact, whether globally widespread use of nuclear energy is worth the danger that it entails.

The Italian nuclear physicist Francesco Calogero, who has studied the matter closely, believes that terrorists could easily construct a simple gun-type nuclear bomb if they were in possession of a critical mass of highly enriched uranium. In such a simple atomic bomb, two grapefruit-sized subcritical portions of HEU are placed at opposite ends of the barrel of an artillery piece and are driven together by means of a conventional explosive. Prof. Calogero estimates that the fatalities produced by the explosion of such a device in the center of a large city could exceed 100,000.

We must remember the remark of U.N. Secretary General Kofi Annan after the 9/11/2001 attacks on the World Trade Center. He said, “*This time* it was not a nuclear explosion”. The meaning of his remark is clear: If the world does not take strong steps to eliminate fissionable materials and nuclear weapons, it will only be a matter of time before they will be used in terrorist attacks on major cities. Neither terrorists nor organized criminals can be deterred by the threat of nuclear retaliation, since they have no territory against which such retaliation could be directed. They blend invisibly into the general population. Nor can a “missile defense system” prevent terrorists from using nuclear weapons, since the weapons can be brought into a port in any one of the hundreds of thousands of containers that enter on ships each year, a number far too large to be checked exhaustively.

In this dangerous situation, the only logical thing for the world to do is to get rid of both fissile materials and nuclear weapons as rapidly as possible. We must acknowledge that the idea of nuclear deterrence is a dangerous fallacy, and acknowledge that the development of military systems based on nuclear weapons has been a terrible mistake, a false step that needs to be reversed. If the most prestigious of the nuclear weapons states can sincerely acknowledge their mistakes and begin to reverse them, nuclear weapons will seem less glamorous to countries like India, Pakistan, North Korea and Iran, where they now are symbols of national pride and modernism.

Civilians have for too long played the role of passive targets, hostages in the power struggles of politicians. It is time for civil society to make its will felt. If our leaders continue to enthusiastically support the institution of war, if they will not abolish nuclear weapons, then let us have new leaders.

4.15 Nuclear weapons are criminal! Every war is a crime!

War was always madness, always immoral, always the cause of unspeakable suffering, economic waste and widespread destruction, and always a source of poverty, hate, barbarism and endless cycles of revenge and counter-revenge. It has always been a crime for soldiers to kill people, just as it is a crime for murderers in civil society to kill people. No flag has ever been wide enough to cover up atrocities.

But today, the development of all-destroying modern weapons has put war completely beyond the bounds of sanity and elementary humanity.

Can we not rid ourselves of both nuclear weapons and the institution of war itself? We must act quickly and resolutely before our beautiful world and everything that we love are reduced to radioactive ashes.

Suggestions for further reading

1. A. Robock, L. Oman, G. L. Stenchikov, O. B. Toon, C. Bardeen, and R. Turco, *Climatic consequences of regional nuclear conflicts*, Atmospheric Chemistry and Physics, Vol. 7, p. 2003-2012, (2007).
2. M. Mills, O. Toon, R. Turco, D. Kinnison, R. Garcia, *Massive global ozone loss predicted following regional nuclear conflict*, Proceedings of the National Academy of Sciences (USA), vol. 105(14), pp. 5307-12, Apr 8, (2008).
3. O. Toon, A. Robock, and R. Turco, *The Environmental Consequences of Nuclear War*, Physics Today, vol. 61, No. 12, p. 37-42, (2008).
4. R. Turco, O. Toon, T. Ackermann, J. Pollack, and C. Sagan, *Nuclear Winter: Global consequences of multiple nuclear explosions*, Science, Vol. 222, No. 4630, pp. 1283-1292, December (1983).
5. A. Robock, L. Oman, G. Stenchikov, *Nuclear winter revisited with a modern climate model and current nuclear arsenals: Still catastrophic consequences*, Journal of Geophysical Research - Atmospheres, Vol. 112, No. D13, p. 4 of 14, (2007).
6. I. Helfand, *An Assessment of the Extent of Projected Global Famine Resulting From Limited, Regional Nuclear War*, International Physicians for the Prevention of Nuclear War, Physicians for Social Responsibility, Leeds, MA, (2007).
7. George P. Schultz, William J. Perry, Henry A. Kissinger and Sam Nunn, *A World Free of Nuclear Weapons*, The Wall Street Journal, January 4, 2007, page A15 and January 15, (2008), page A15.
8. Mikhail Gorbachev, *The Nuclear Threat*, The Wall Street Journal, January 30, (2007), page A15.
9. Massimo D'Alema, Gianfranco Fini, Giorgio La Malfa, Arturo Parisi and Francesco Calogero, *For a World Free of Nuclear Weapons*, Corriere Della Sera, July 24, (2008).
10. Hoover Institution, *Reykjavik Revisited; Steps Towards a World Free of Nuclear Weapons*, October, (2007).

11. Douglas Hurd, Malcolm Rifkind, David Owen and George Robertson, *Start Worrying and Learn to Ditch the Bomb*, The Times, June 30, (2008).
12. Des Brown, Secretary of State for Defense, UK, *Laying the Foundations for Multilateral Disarmament*, Geneva Conference on Disarmament, February 5, (2008).
13. Government of Norway, International Conference on *Achieving the Vision of a World Free of Nuclear Weapons*, Oslo, Norway, February 26-27, (2008).
14. Jonas Gahr Støre, Foreign Minister, Norway, *Statement at the Conference on Disarmament*, Geneva, March 4, (2008).
15. Anne-Grete Strøm-Erichsen, Defense Minister, Norway, *Emerging Opportunities for Nuclear Disarmament*, Pugwash Conference, Canada, July 11, (2008).
16. Kevin Rudd, Prime Minister, Australia, *International Commission on Nuclear Non-Proliferation and Disarmament*, Media Release, July 9, (2008).
17. Helmut Schmidt, Richard von Weizsäcker, Egon Bahr and Hans-Dietrich Genscher, *Towards a Nuclear-Free World: a German View*, International Herald Tribune, January 9, (2009).
18. Hans M. Kristensen and Elliot Negin, *Support Growing for Removal of U.S. Nuclear Weapons from Europe*, Common Dreams Newscenter, first posted May 6, (2005).
19. David Krieger, *President-elect Obama and a World Free of Nuclear Weapons*, Nuclear Age Peace Foundation Website, (2008).
20. J.L. Henderson, *Hiroshima*, Longmans (1974).
21. A. Osada, *Children of the A-Bomb, The Testament of Boys and Girls of Hiroshima*, Putnam, New York (1963).
22. M. Hachiya, M.D., *Hiroshima Diary*, The University of North Carolina Press, Chapel Hill, N.C. (1955).
23. M. Yass, *Hiroshima*, G.P. Putnam's Sons, New York (1972).
24. R. Jungk, *Children of the Ashes*, Harcourt, Brace and World (1961).
25. B. Hirschfield, *A Cloud Over Hiroshima*, Baily Brothers and Swinfin Ltd. (1974).
26. J. Hersey, *Hiroshima*, Penguin Books Ltd. (1975).
27. R. Rhodes, *Dark Sun: The Making of the Hydrogen Bomb*, Simon and Schuster, New York, (1995)
28. R. Rhodes, *The Making of the Atomic Bomb*, Simon and Schuster, New York, (1988).
29. D.V. Babst et al., *Accidental Nuclear War: The Growing Peril*, Peace Research Institute, Dundas, Ontario, (1984).
30. S. Britten, *The Invisible Event: An Assessment of the Risk of Accidental or Unauthorized Detonation of Nuclear Weapons and of War by Miscalculation*, Menard Press, London, (1983).
31. M. Dando and P. Rogers, *The Death of Deterrence*, CND Publications, London, (1984).
32. N.F. Dixon, *On the Psychology of Military Incompetence*, Futura, London, (1976).
33. D. Frei and C. Catrina, *Risks of Unintentional Nuclear War*, United Nations, Geneva, (1982).
34. H. L'Etang, *Fit to Lead?*, Heinemann Medical, London, (1980).

35. SPANW, *Nuclear War by Mistake - Inevitable or Preventable?*, Swedish Physicians Against Nuclear War, Lulea, (1985).
36. J. Goldblat, *Nuclear Non-proliferation: The Why and the Wherefore*, (SIPRI Publications), Taylor and Francis, (1985).
37. J. Schear, ed., *Nuclear Weapons Proliferation and Nuclear Risk*, Gower, London, (1984).
38. D.P. Barash and J.E. Lipton, *Stop Nuclear War! A Handbook*, Grove Press, New York, (1982).
39. C.F. Barnaby and G.P. Thomas, eds., *The Nuclear Arms Race: Control or Catastrophe*, Francis Pinter, London, (1982).
40. L.R. Beres, *Apocalypse: Nuclear Catastrophe in World Politics*, Chicago University press, Chicago, IL, (1980).
41. F. Blackaby et al., eds., *No-first-use*, Taylor and Francis, London, (1984).
42. NS, ed., *New Statesman Papers on Destruction and Disarmament* (NS Report No. 3), New Statesman, London, (1981).
43. H. Caldicot, *Missile Envy: The Arms Race and Nuclear War*, William Morrow, New York, (1984).
44. R. Ehrlich, *Waging the Peace: The Technology and Politics of Nuclear Weapons*, State University of New York Press, Albany, NY, (1985).
45. W. Epstein, *The Prevention of Nuclear War: A United Nations Perspective*, Gunn and Hain, Cambridge, MA, (1984).
46. W. Epstein and T. Toyoda, eds., *A New Design for Nuclear Disarmament*, Spokesman, Nottingham, (1975).
47. G.F. Kennan, *The Nuclear Delusion*, Pantheon, New York, (1983).
48. R.J. Lifton and R. Falk, *Indefensible Weapons: The Political and Psychological Case Against Nuclearism*, Basic Books, New York, (1982).
49. J.R. Macy, *Despair and Personal Power in the Nuclear Age*, New Society Publishers, Philadelphia, PA, (1983).
50. A.S. Miller et al., eds., *Nuclear Weapons and Law*, Greenwood Press, Westport, CT, (1984).
51. MIT Coalition on Disarmament, eds., *The Nuclear Almanac: Confronting the Atom in War and Peace*, Addison-Wesley, Reading, MA, (1984).
52. UN, *Nuclear Weapons: Report of the Secretary-General of the United Nations*, United Nations, New York, (1980).
53. IC, *Proceedings of the Conference on Understanding Nuclear War*, Imperial College, London, (1980).
54. B. Russell, *Common Sense and Nuclear Warfare*, Allen and Unwin, London, (1959).
55. F. Barnaby, *The Nuclear Age*, Almqvist and Wiksell, Stockholm, (1974).
56. D. Albright, F. Berkhout and W. Walker, *Plutonium and Highly Enriched Uranium 1996: World Inventories, Capabilities and Policies*, Oxford University Press, Oxford, (1997).
57. G.T. Allison et al., *Avoiding Nuclear Anarchy: Containing the Threat of Loose Russian Nuclear Weapons and Fissile Material*, MIT Press, Cambridge MA, (1996).

58. B. Bailin, *The Making of the Indian Atomic Bomb: Science, Secrecy, and the Post-colonial State*, Zed Books, London, (1998).
59. P. Bidawi and A. Vanaik, *South Asia on a Short Fuse: Nuclear Politics and the Future of Global Disarmament*, Oxford University Press, Oxford, (2001).
60. F.A. Boyle, *The Criminality of Nuclear Deterrence: Could the U.S. War on Terrorism Go Nuclear?*, Clarity Press, Atlanta GA, (2002).
61. G. Burns, *The Atomic Papers: A Citizen's Guide to Selected Books and Articles on the Bomb, the Arms Race, Nuclear Power, the Peace Movement, and Related Issues*, Scarecrow Press, Metuchen NJ, (1984).
62. L. Butler, *A Voice of Reason*, The Bulletin of Atomic Scientists, **54**, 58-61, (1998).
63. R. Butler, *Fatal Choice: Nuclear Weapons and the Illusion of Missile Defense*, Westview Press, Boulder CO, (2001).
64. R.P. Carlisle (Ed.), *Encyclopedia of the Atomic Age*, Facts on File, New York, (2001).
65. G.A. Cheney, *Nuclear Proliferation: The Problems and Possibilities*, Franklin Watts, New York, (1999).
66. A. Cohen, *Israel and the Bomb*, Columbia University Press, New York, (1998).
67. S.J. Diehl and J.C. Moltz, *Nuclear Weapons and Nonproliferation: A Reference Handbook*, ABC-Clio Information Services, Santa Barbara CA, (2002).
68. H.A. Feiveson (Ed.), *The Nuclear Turning Point: A Blueprint for Deep Cuts and De-Alerting of Nuclear Weapons*, Brookings Institution Press, Washington D.C., (1999).
69. R. Hilsman, *From Nuclear Military Strategy to a World Without War: A History and a Proposal*, Praeger Publishers, Westport, (1999).
70. International Physicians for the Prevention of Nuclear War and The Institute for Energy and Environmental Research *Plutonium: Deadly Gold of the Nuclear Age*, International Physicians Press, Cambridge MA, (1992).
71. R.W. Jones and M.G. McDonough, *Tracking Nuclear Proliferation: A Guide in Maps and Charts, 1998*, The Carnegie Endowment for International Peace, Washington D.C., (1998).
72. R.J. Lifton and R. Falk, *Indefensible Weapons: The Political and Psychological Case Against Nuclearism*, Basic Books, New York, (1982).
73. R.E. Powaski, *March to Armageddon: The United States and the Nuclear Arms Race, 1939 to the Present*, Oxford University Press, (1987).
74. J. Rotblat, J. Steinberger and B. Udgaonkar (Eds.), *A Nuclear-Weapon-Free World: Desirable? Feasible?*, Westview Press, (1993).
75. The United Methodist Council of Bishops, *In Defense of Creation: The Nuclear Crisis and a Just Peace*, Graded Press, Nashville, (1986).
76. U.S. Congress Office of Technology Assessment (Ed.), *Dismantling the Bomb and Managing the Nuclear Materials*, U.S. Government Printing Office, Washington D.C., (1993).
77. S.R. Weart, *Nuclear Fear: A History of Images*, Harvard University Press, (1988).
78. P. Boyer, *By the Bomb's Early Light: American Thought and Culture at the Dawn of the Atomic Age*, University of North Carolina Press, (1985).

79. C. Perrow, *Normal Accidents: Living With High-Risk Technologies*, Basic Books, (1984).
80. P. Rogers, *The Risk of Nuclear Terrorism in Britain*, Oxford Research Group, Oxford, (2006).
81. MIT, *The Future of Nuclear Power: An Interdisciplinary MIT Study*, <http://web.mit.edu/nuclearpow> (2003).
82. Z. Mian and A. Glaser, *Life in a Nuclear Powered Crowd*, INES Newsletter No. 52, 9-13, April, (2006).
83. K. Bergeron, *Nuclear Weapons: The Death of No Dual-use*, Bulletin of the Atomic Scientists, 15-17, January, (2004).
84. E. Chivian, and others (eds.), *Last Aid: The Medical Dimensions of Nuclear War*, W.H. Freeman, San Fransisco, (1982).
85. Medical Association's Board of Science and Education, *The Medical Effects of Nuclear War*, Wiley, (1983).
86. Kevin Rudd, Prime Minister, Australia, "International Commission on Nuclear Non-Proliferation and Disarmament", Media Release, July 9, 2008.
87. Global Zero, www.globalzero.org/paris-conference
88. Helmut Schmidt, Richard von Weizäcker, Egon Bahr and Hans-Dietrich Genscher, "Towards a Nuclear-Free World: a German View", International Herald Tribune, January 9, 2009.
89. Hans M. Kristensen and Elliot Negin, "Support Growing for Removal of U.S. Nuclear Weapons from Europe", Common Dreams Newscenter, first posted May 6, 2005.
90. David Krieger, "President-elect Obama and a World Free of Nuclear Weapons", Nuclear Age Peace Foundation Website, 2008.
91. J.L. Henderson, *Hiroshima*, Longmans (1974).
92. A. Osada, *Children of the A-Bomb, The Testament of Boys and Girls of Hiroshima*, Putnam, New York (1963).
93. M. Hachiya, M.D., *Hiroshima Diary*, The University of North Carolina Press, Chapel Hill, N.C. (1955).
94. M. Yass, *Hiroshima*, G.P. Putnam's Sons, New York (1972).
95. R. Jungk, *Children of the Ashes*, Harcourt, Brace and World (1961).
96. B. Hirschfield, *A Cloud Over Hiroshima*, Baily Brothers and Swinfin Ltd. (1974).
97. J. Hersey, *Hiroshima*, Penguin Books Ltd. (1975).
98. R. Rhodes, *Dark Sun: The Making of the Hydrogen Bomb*, Simon and Schuster, New York, (1995)
99. R. Rhodes, *The Making of the Atomic Bomb*, Simon and Schuster, New York, (1988).
100. D.V. Babst et al., *Accidental Nuclear War: The Growing Peril*, Peace Research Institute, Dundas, Ontario, (1984).
101. S. Britten, *The Invisible Event: An Assessment of the Risk of Accidental or Unauthorized Detonation of Nuclear Weapons and of War by Miscalculation*, Menard Press, London, (1983).
102. M. Dando and P. Rogers, *The Death of Deterrence*, CND Publications, London, (1984).

103. N.F. Dixon, *On the Psychology of Military Incompetence*, Futura, London, (1976).
104. D. Frei and C. Catrina, *Risks of Unintentional Nuclear War*, United Nations, Geneva, (1982).
105. H. L'Etang, *Fit to Lead?*, Heinemann Medical, London, (1980).
106. SPANW, *Nuclear War by Mistake - Inevitable or Preventable?*, Swedish Physicians Against Nuclear War, Lulea, (1985).
107. J. Goldblat, *Nuclear Non-proliferation: The Why and the Wherefore*, (SIPRI Publications), Taylor and Francis, (1985).
108. IAEA, *International Safeguards and the Non-proliferation of Nuclear Weapons*, International Atomic Energy Agency, Vienna, (1985).
109. J. Schear, ed., *Nuclear Weapons Proliferation and Nuclear Risk*, Gower, London, (1984).
110. D.P. Barash and J.E. Lipton, *Stop Nuclear War! A Handbook*, Grove Press, New York, (1982).
111. C.F. Barnaby and G.P. Thomas, eds., *The Nuclear Arms Race: Control or Catastrophe*, Francis Pinter, London, (1982).
112. L.R. Beres, *Apocalypse: Nuclear Catastrophe in World Politics*, Chicago University press, Chicago, IL, (1980).
113. F. Blackaby et al., eds., *No-first-use*, Taylor and Francis, London, (1984).
114. NS, ed., *New Statesman Papers on Destruction and Disarmament* (NS Report No. 3), New Statesman, London, (1981).
115. H. Caldicot, *Missile Envy: The Arms Race and Nuclear War*, William Morrow, New York, (1984).
116. R. Ehrlich, *Waging the Peace: The Technology and Politics of Nuclear Weapons*, State University of New York Press, Albany, NY, (1985).
117. W. Epstein, *The Prevention of Nuclear War: A United Nations Perspective*, Gunn and Hain, Cambridge, MA, (1984).
118. W. Epstein and T. Toyoda, eds., *A New Design for Nuclear Disarmament*, Spokesman, Nottingham, (1975).
119. G.F. Kennan, *The Nuclear Delusion*, Pantheon, New York, (1983).
120. R.J. Lifton and R. Falk, *Indefensible Weapons: The Political and Psychological Case Against Nuclearism*, Basic Books, New York, (1982).
121. J.R. Macy, *Despair and Personal Power in the Nuclear Age*, New Society Publishers, Philadelphia, PA, (1983).
122. A.S. Miller et al., eds., *Nuclear Weapons and Law*, Greenwood Press, Westport, CT, (1984).
123. MIT Coalition on Disarmament, eds., *The Nuclear Almanac: Confronting the Atom in War and Peace*, Addison-Wesley, Reading, MA, (1984).
124. UN, *Nuclear Weapons: Report of the Secretary-General of the United Nations*, United Nations, New York, (1980).
125. IC, *Proceedings of the Conference on Understanding Nuclear War*, Imperial College, London, (1980).
126. B. Russell, *Common Sense and Nuclear Warfare*, Allen and Unwin, London, (1959).

127. F. Barnaby, *The Nuclear Age*, Almqvist and Wiksell, Stockholm, (1974).
128. D. Albright, F. Berkhout and W. Walker, *Plutonium and Highly Enriched Uranium 1996: World Inventories, Capabilities and Policies*, Oxford University Press, Oxford, (1997).
129. G.T. Allison et al., *Avoiding Nuclear Anarchy: Containing the Threat of Loose Russian Nuclear Weapons and Fissile Material*, MIT Press, Cambridge MA, (1996).
130. B. Bailin, *The Making of the Indian Atomic Bomb: Science, Secrecy, and the Post-colonial State*, Zed Books, London, (1998).
131. G.K. Bertsch and S.R. Grillot, (Eds.), *Arms on the Market: Reducing the Risks of Proliferation in the Former Soviet Union*, Routledge, New York, (1998).
132. P. Bidawi and A. Vanaik, *South Asia on a Short Fuse: Nuclear Politics and the Future of Global Disarmament*, Oxford University Press, Oxford, (2001).
133. F.A. Boyle, *The Criminality of Nuclear Deterrence: Could the U.S. War on Terrorism Go Nuclear?*, Clarity Press, Atlanta GA, (2002).
134. G. Burns, *The Atomic Papers: A Citizen's Guide to Selected Books and Articles on the Bomb, the Arms Race, Nuclear Power, the Peace Movement, and Related Issues*, Scarecrow Press, Metuchen NJ, (1984).
135. L. Butler, *A Voice of Reason*, The Bulletin of Atomic Scientists, **54**, 58-61, (1998).
136. R. Butler, *Fatal Choice: Nuclear Weapons and the Illusion of Missile Defense*, Westview Press, Boulder CO, (2001).
137. R.P. Carlisle (Ed.), *Encyclopedia of the Atomic Age*, Facts on File, New York, (2001).
138. G.A. Cheney, *Nuclear Proliferation: The Problems and Possibilities*, Franklin Watts, New York, (1999).
139. A. Cohen, *Israel and the Bomb*, Columbia University Press, New York, (1998).
140. S.J. Diehl and J.C. Moltz, *Nuclear Weapons and Nonproliferation: A Reference Handbook*, ABC-Clio Information Services, Santa Barbara CA, (2002).
141. H.A. Feiveson (Ed.), *The Nuclear Turning Point: A Blueprint for Deep Cuts and De-alerting of Nuclear Weapons*, Brookings Institution Press, Washington D.C., (1999).
142. R. Hilsman, *From Nuclear Military Strategy to a World Without War: A History and a Proposal*, Praeger Publishers, Westport, (1999).
143. International Physicians for the Prevention of Nuclear War and The Institute for Energy and Environmental Research *Plutonium: Deadly Gold of the Nuclear Age*, International Physicians Press, Cambridge MA, (1992).
144. R.W. Jones and M.G. McDonough, *Tracking Nuclear Proliferation: A Guide in Maps and Charts, 1998*, The Carnegie Endowment for International Peace, Washington D.C., (1998).
145. R.J. Lifton and R. Falk, *Indefensible Weapons: The Political and Psychological Case Against Nuclearism*, Basic Books, New York, (1982).
146. J. Rotblat, J. Steinberger and B. Udgaonkar (Eds.), *A Nuclear-Weapon-Free World: Desirable? Feasible?*, Westview Press, (1993).
147. The United Methodist Council of Bishops, *In Defense of Creation: The Nuclear Crisis and a Just Peace*, Graded Press, Nashville, (1986).

148. U.S. Congress Office of Technology Assessment (Ed.), *Dismantling the Bomb and Managing the Nuclear Materials*, U.S. Government Printing Office, Washington D.C., (1993).
149. S.R. Weart, *Nuclear Fear: A History of Images*, Harvard University Press, (1988).
150. P. Boyer, *By the Bomb's Early Light: American Thought and Culture at the Dawn of the Atomic Age*, University of North Carolina Press, (1985).
151. A. Makhijani and S. Saleska, *The Nuclear Power Deception: Nuclear Mythology From Electricity 'Too Cheap to Meter' to 'Inherently Safe' Reactors*, Apex Press, (1999).
152. C. Perrow, *Normal Accidents: Living With High-Risk Technologies*, Basic Books, (1984).
153. P. Rogers, *The Risk of Nuclear Terrorism in Britain*, Oxford Research Group, Oxford, (2006).
154. MIT, *The Future of Nuclear Power: An Interdisciplinary MIT Study*, <http://web.mit.edu/nuclearpow> (2003).
155. Z. Mian and A. Glaser, *Life in a Nuclear Powered Crowd*, INES Newsletter No. 52, 9-13, April, (2006).
156. E. Chivian, and others (eds.), *Last Aid: The Medical Dimensions of Nuclear War*, W.H. Freeman, San Fransisco, (1982).
157. G. Kolko, "Another Century of War", New Press, (2002).
158. G. Kolko, "Confronting the Third World: United States Foreign Policy, 1945-1980", Pantheon Books, (1988).
159. John A. Hobson, "Imperialism; A Study", (1902).
160. M.T. Klare, "Resource Wars: The New Landscape of Global Conflict", Owl Books reprint edition, New York, (2002).

Chapter 5

GREED DRIVES THE INSANITY OF WAR

5.1 Militarism and money

Military-industrial complexes throughout the world involve a circular flow of money. The vast profits from arms industries are used to buy the votes of politicians, who then vote for obscenely bloated “defense” budgets. Military-industrial complexes need enemies. Without them they would wither. Thus, tensions are manufactured by corrupt politicians in the pay of arms industries. As Arundhati Roy famously observed, “Once weapons were manufactured to fight wars. Now wars are manufactured to sell weapons.” Donald Trump has recently threatened to attack both Iran and North Korea with nuclear weapons. The United States, under Trump, is also threatening both Russia and China. Any such conflict could escalate uncontrollably into an all-destroying global thermonuclear war.

5.2 The arms race prior to World War 1

The inherited tendency towards tribalism in human nature makes war possible. Humans are willing to kill and to be killed to defend their own group against perceived enemies. However, there is another element that drives and perpetuates the institution of war - the enormous amounts of money earned by arms manufacturers - the military-industrial complex against which Dwight D. Eisenhower warned in his famous farewell address.

In an article entitled *Arms Race Prior to 1914, Armament Policy*¹, Eric Brose writes: “New weapons produced during the Industrial Revolution in the late 1800s heightened existing tensions among European nations as countries strove to outpace their enemies technologically. This armaments race accelerated in the decade before 1914 as the Triple Alliance of Germany, Austria-Hungary, and Italy squared off against the Triple Entente of France, Russia, and Britain. Germany’s fears of increases in Russian armaments, and

¹International Encyclopedia of the First World War

British fears of the German naval buildup, contributed heavily to the outbreak and spread of the First World War in 1914.”

The Wikipedia article on *Arms race* states that “From 1897 to 1914, a naval arms race between the United Kingdom and Germany took place. British concern about rapid increase in German naval power resulted in a costly building competition of Dreadnought-class ships. This tense arms race lasted until 1914, when the war broke out. After the war, a new arms race developed among the victorious Allies, which was temporarily ended by the Washington Naval Treaty.

“In addition to the British and Germans, contemporaneous but smaller naval arms races also broke out between Russia and the Ottoman Empire; the Ottomans and Greece; France and Italy; the United States and Japan; and Brazil, Argentina, and Chile.

“The United Kingdom had the largest navy in the world. In accord with Wilhelm II’s enthusiasm for an expanded German navy and the strong desires of Grand Admiral Alfred von Tirpitz, Secretary of State of the German Imperial Naval Office, four Fleet Acts from 1898 and 1912 greatly expanded the German High Seas Fleet. The German aim was to build a fleet that would be two thirds the size of the British navy. The plan was sparked by the threat of the British Foreign Office in March 1897, after the British invasion of Transvaal that started the Boer War, of blockading the German coast and thereby crippling the German economy if Germany intervened in the conflict in Transvaal. From 1905 onward, the British navy developed plans for such a blockade, which was a central part of British strategy.

“In reaction to the challenge to its naval supremacy, from 1902 to 1910, the British Royal Navy embarked on a massive expansion to keep ahead of the Germans. The competition came to focus on the revolutionary new ships based on HMS Dreadnought, which was launched in 1906.”

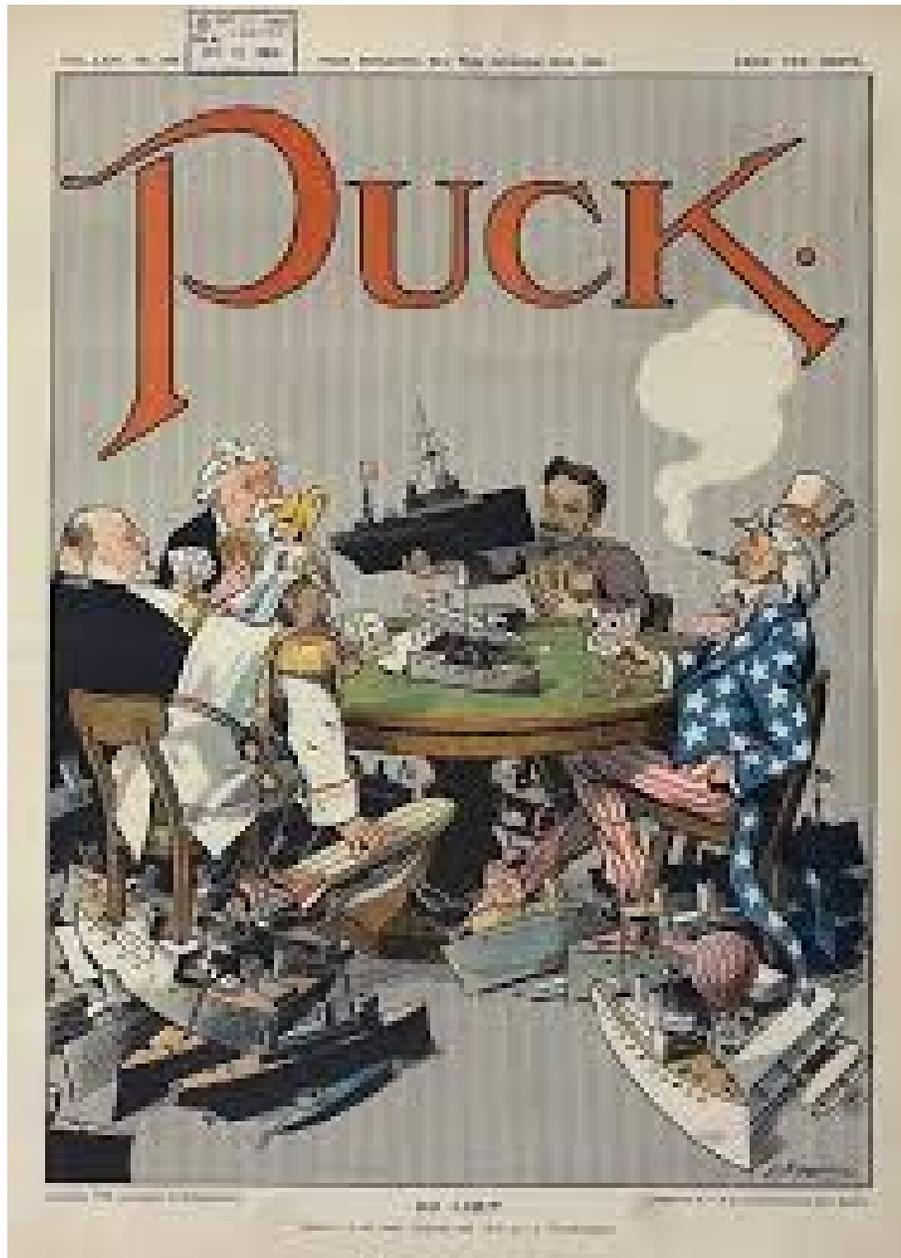


Figure 5.1: Left to right, US, Britain, Germany, France and Japan, engage in a “no limits” game for naval supremacy.

5.3 Krupp, Thyssen and Germany's steel industry

The Krupp family business, known as Friedrich Krupp AG, was the largest company in Europe at the beginning of the 20th century. It was important to weapons development and production in both world wars. One of the most powerful dynasties in European history, for 400 years Krupp flourished as the premier weapons manufacturer for Germany. From the Thirty Years' War until the end of the Second World War, they produced everything from battleships, U-boats, tanks, howitzers, guns, utilities, and hundreds of other commodities.

The Thyssen family similarly profited from the arms races prior to World War I and World War II. August Thyssen (1842-1925) founded a large iron and steel company in the Ruhr district of Germany, and was succeeded by his son Fritz Thyssen, who greatly aided Hitler's rise to power.

5.4 Colonialism and the outbreak of the First World War

The First World War broke out approximately 100 years ago, and much thought has been given to the causes of this tragic event, whose consequences continue to cast a dark shadow over the human future. When the war ended four years later, ten million young men had been killed and twenty million wounded, of whom six million were crippled for life. The war had cost 350,000,000,000 1919 dollars. This was a calculable cost; but the cost in human suffering and brutalization of values was incalculable.

It hardly mattered whose fault the catastrophe had been. Perhaps the Austrian government had been more to blame than any other. But blame for the war certainly did not rest with the Austrian people nor with the young Austrians who had been forced to fight. However, the tragedy of the First World War was that it created long-lasting hatred between the nations involved; and in this way it led, only twenty years later, to an even more catastrophic global war, during the course of which nuclear weapons were developed.

Most scholars believe that competing colonial ambitions played an important role in setting the stage for the First World War. A second factor was an armaments race between European countries, and the huge profits gained by arms manufacturers. Even at that time, the Military-industrial complex was firmly established; and today it continues to be the greatest source of war, together with neocolonialism.²

²<http://alphahistory.com/worldwar1/imperialism/>
<http://www.flowofhistory.com/units/etc/19/26>
<http://alphahistory.com/worldwar1/militarism/>

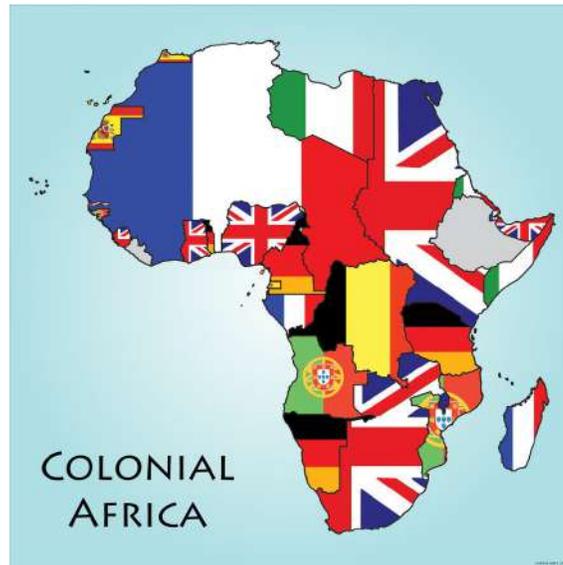


Figure 5.2: Map of European colonies in Africa in 1914, just before the First World War. Source: www.createdebate.com

5.5 Prescott Bush and Hitler

Prescott Sheldon Bush (1895-1972), the father of George H.W. Bush and grandfather of George W. Bush, actively supported the revival of Germany's armament's industry in the 1930's, as well as supplying large amounts of money to Adolf Hitler's Nazi Party.³

An article in *The Guardian*⁴, Ben Aris and Dubcab Campbell write that "George Bush's grandfather, the late US senator Prescott Bush, was a director and shareholder of companies that profited from their involvement with the financial backers of Nazi Germany.

"The Guardian has obtained confirmation from newly discovered files in the US National Archives that a firm of which Prescott Bush was a director was involved with the financial architects of Nazism.

"His business dealings, which continued until his company's assets were seized in 1942 under the Trading with the Enemy Act, has led more than 60 years later to a civil action for damages being brought in Germany against the Bush family by two former slave laborers at Auschwitz and to a hum of pre-election controversy.

"The debate over Prescott Bush's behavior has been bubbling under the surface for some time. There has been a steady Internet chatter about the "Bush-Nazi" connection,

³<https://www.youtube.com/watch?v=TnHnjmCYjy4>
<https://www.youtube.com/watch?v=7BZCfbrXKs4>
<https://www.youtube.com/watch?v=7BZCfbrXKs4>
<http://www.georgewalkerbush.net/bushfamilyfundedhitler.htm>
<http://www.theguardian.com/world/2004/sep/25/usa.secondworldwar>
⁴September 25, 2004



Figure 5.3: Prescott Bush, the father of George H.W. Bush and grandfather of George W. Bush, supported Hitler's rise to power with large financial contributions to the Nazi Party. The photo shows them together. Source: topinfo-post.com

much of it inaccurate and unfair. But the new documents, many of which were only declassified last year, show that even after America had entered the war and when there was already significant information about the Nazis' plans and policies, he worked for and profited from companies closely involved with the very German businesses that financed Hitler's rise to power. It has also been suggested that the money he made from these dealings helped to establish the Bush family fortune and set up its political dynasty.

"Bush was also on the board of at least one of the companies that formed part of a multinational network of front companies to allow [Fritz] Thyssen to move assets around the world.

"Thyssen owned the largest steel and coal company in Germany and grew rich from Hitler's efforts to re-arm between the two world wars. One of the pillars in Thyssen's international corporate web, UBC, worked exclusively for, and was owned by, a Thyssen-controlled bank in the Netherlands. More tantalizing are Bush's links to the Consolidated Silesian Steel Company (CSSC), based in mineral rich Silesia on the German-Polish border. During the war, the company made use of Nazi slave labor from the concentration camps, including Auschwitz. The ownership of CSSC changed hands several times in the 1930s, but documents from the US National Archive declassified last year link Bush to CSSC, although it is not clear if he and UBC were still involved in the company when Thyssen's American assets were seized in 1942."

5.6 Fritz Thyssen supports Hitler's rise to power

“In 1923, Thyssen met former General Erich Ludendorff, who advised him to attend a speech given by Adolf Hitler, leader of the Nazi Party. Thyssen was impressed by Hitler and his bitter opposition to the Treaty of Versailles, and began to make large donations to the party, including 100,000 gold marks in 1923 to Ludendorff. In this he was unusual among German business leaders, as most were traditional conservatives who regarded the Nazis with suspicion. Thyssen's principal motive in supporting the National Socialists was his great fear of communism; he had little confidence that the various German anticommunist factions would prevent a Soviet-style revolution in Germany unless the popular appeal of communism among the lower classes was co-opted by an anticommunist alternative. Postwar investigators found that he had donated 650,000 Reichsmarks to right-wing parties, mostly to the Nazis, although Thyssen himself claimed to have donated 1 million marks to the Nazi Party. Thyssen remained a member of the German National People's Party until 1932, and did not join the Nazi Party (National Socialist German Workers' Party) until 1933.

“In November, 1932, Thyssen and Hjalmar Schacht were the main organizers of a letter to President Paul von Hindenburg urging him to appoint Hitler as Chancellor. Thyssen also persuaded the Association of German Industrialists to donate 3 million Reichsmarks to the Nazi Party (National Socialist German Workers' Party) for the March, 1933 Reichstag election. As a reward, he was elected a Nazi member of the Reichstag and appointed to the Council of State of Prussia, the largest German state (both purely honorary positions).

“Thyssen welcomed the suppression of the Communist Party, the Social Democrats and the trade unions. In 1934 he was one of the business leaders who persuaded Hitler to suppress the SA, leading to the “Night of the Long Knives”. Thyssen accepted the exclusion of Jews from German business and professional life by the Nazis, and dismissed his own Jewish employees. But as a Catholic, he objected to the increasing repression of the Roman Catholic Church, which gathered pace after 1935: in 1937 he sent a letter to Hitler, protesting the persecution of Christians in Germany.[4] The breaking point for Thyssen was the violent pogrom against the Jews in November 1938, known as Kristallnacht, which caused him to resign from the Council of State. By 1939 he was also bitterly criticizing the regime's economic policies, which were subordinating everything to rearmament in preparation for war.”



Figure 5.4: An arms race between the major European powers contributed to the start of World War I.



Figure 5.5: World War I was called “The War to End All Wars”. Today it seems more like The War that Began All Wars.



Figure 5.6: The naval arms race, which contributed to the start of World War I, enriched steel manufacturers and military shipbuilders.



Figure 5.7: Who is the leader, and who the follower?

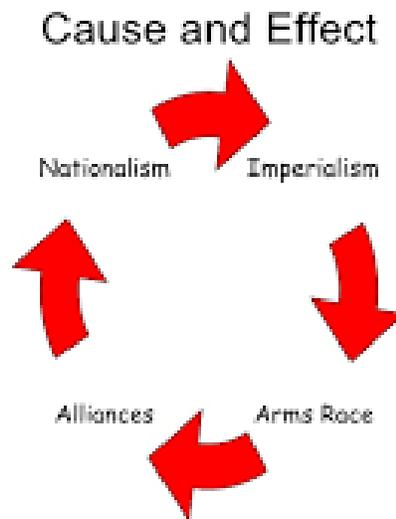


Figure 5.8: A vicious circle.



Figure 5.9: Ready, set, go!

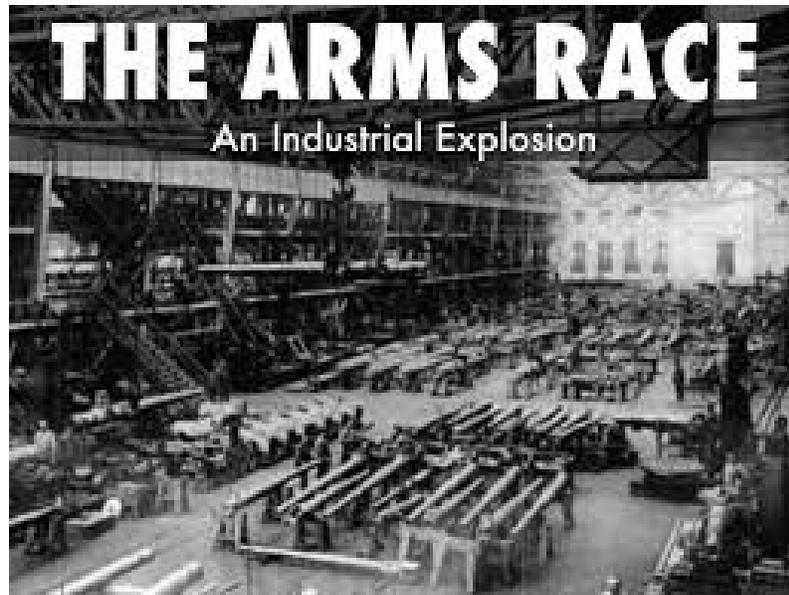


Figure 5.10: If our economies depend on armaments industries, it is an unhealthy dependence, analogous to drug addiction.



Figure 5.11: The nuclear arms race casts a dark shadow over the future of human civilization and the biosphere.

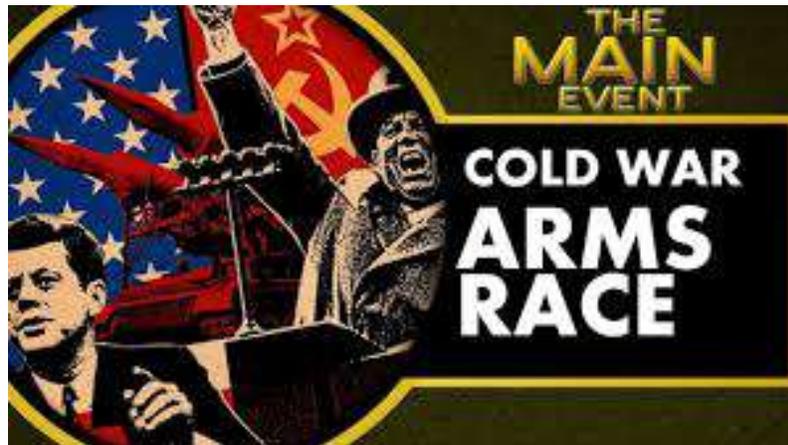


Figure 5.12: During the Cuban Missile Crisis, the world came close to a catastrophic thermonuclear war.

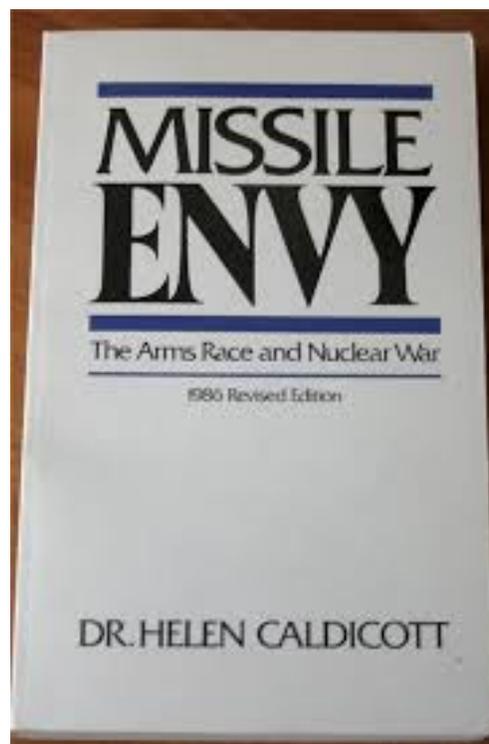


Figure 5.13: Dr. Helen Caldecott has worked to document the dangers of both nuclear weapons and nuclear power generation.



Figure 5.14: We must listen to the wise words of Dr. Martin Luther King, Jr.

5.7 Eisenhower's farewell address

In his famous farewell address, US President Dwight Eisenhower eloquently described the terrible effects of an overgrown Military-industrial complex. Here are his words:

“We have been compelled to create a permanent armaments industry of vast proportions.... This conjunction of an immense military establishment and a large arms industry is new in the American experience. The total influence, economic, political, even spiritual, is felt in every city, every State house, every office of the Federal government...[and] we must not fail to comprehend its grave implications. Our toil, resources and livelihood are all involved; so is the very structure of our society.

“In the councils of government, we must guard against the acquisition of unwarranted influence, whether sought or unsought, by the Military-industrial complex. The potential for the disastrous rise of misplaced power exists and will persist.”

In another speech, he said: “Every gun that is made, every warship launched, every rocket fired signifies, in the final sense, a theft from those who hunger and are not fed, those who are cold and are not clothed. This world in arms is not spending money alone. It is spending the sweat of its laborers, the genius of its scientists, the hopes of its children.”

Today the world spends more than 1.7 trillion dollars (\$ 1,700,000,000,000) every year on armaments. This vast river of money, almost too large to be imagined, is the “devil's dynamo” driving the institution of war. Politicians notoriously can be bought with a tiny fraction of this enormous amount; hence the decay of democracy. It is also plain that if the almost unbelievable sums now wasted on armaments were used constructively, most of the pressing problems now facing humanity could be solved.

Because the world spends almost two thousand billion dollars each year on armaments, it follows that very many people make their living from war. This is the reason why it is correct to speak of war as an institution, and why it persists, although we know that it is the cause of much of the suffering that inflicts humanity.

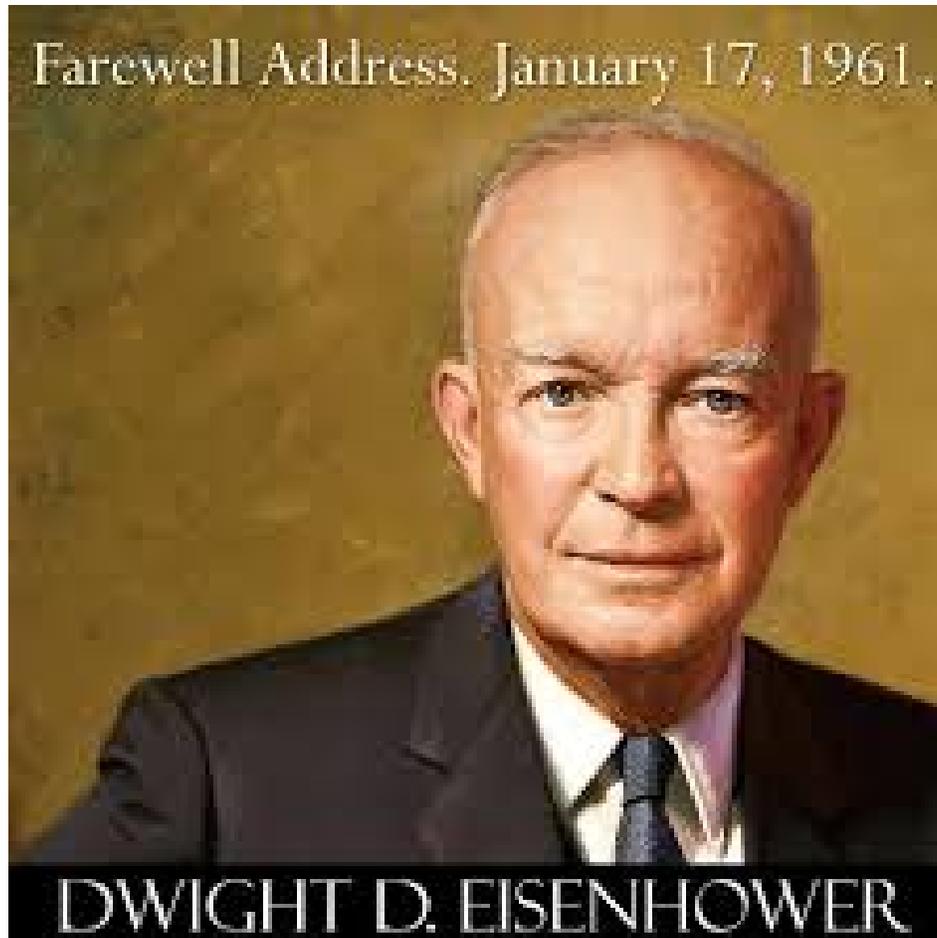


Figure 5.15: “In the councils of government, we must guard against the acquisition of unwarranted influence, whether sought or unsought, by the Military-industrial complex. The potential for the disastrous rise of misplaced power exists and will persist.”

5.8 Military-industrial complexes today

“We’re going to take out seven countries in five years”

In an interview with Amy Goodman⁵, retired 4-star General Wesley Clark said: “About ten days after 9/11, I went through the Pentagon and I saw Secretary Rumsfeld and Deputy Secretary Wolfowitz. I went downstairs just to say hello to some of the people on the Joint Staff who used to work for me, any one of the generals called me in. He said, “Sir, you’ve got to come in and talk to me a second.” I said, “Well, you’re too busy.” He said, “No, no.” He says, “We’ve made the decision we’re going to war with Iraq.” This was on or about the 20th of September. I said, “We’re going to war with Iraq? Why?” He said, “I don’t know.” He said, “I guess they don’t know what else to do.” So I said, “Well, did they find some information connecting Saddam to al-Qaeda?” He said, “No, no.” He says, “There’s nothing new that way. They just made the decision to go to war with Iraq.” He said, “I guess it’s like we don’t know what to do about terrorists, but we’ve got a good military and we can take down governments.” And he said, “I guess if the only tool you have is a hammer, every problem has to look like a nail.

So I came back to see him a few weeks later, and by that time we were bombing in Afghanistan. I said, “Are we still going to war with Iraq?” And he said, “Oh, it’s worse than that.” He reached over on his desk. He picked up a piece of paper. And he said, “I just got this down from upstairs” - meaning the Secretary of Defense’s office - “today.” And he said, “This is a memo that describes how we’re going to take out seven countries in five years, starting with Iraq, and then Syria, Lebanon, Libya, Somalia, Sudan and, finishing off, Iran.” I said, “Is it classified?” He said, “Yes, sir.” I said, “Well, don’t show it to me.” And I saw him a year or so ago, and I said, “You remember that?” He said, “Sir, I didn’t show you that memo! I didn’t show it to you!”

The global trade in light arms

An important poverty-generating factor in the developing countries is war - often civil war. The five permanent members of the U.N. Security Council are, ironically, the five largest exporters of small arms. Small arms have a long life. The weapons poured into Africa by both sides during the Cold War are still there, and they contribute to political chaos and civil wars that block development and cause enormous human suffering.

The United Nations website on Peace and Security through Disarmament states that “Small arms and light weapons destabilize regions; spark, fuel and prolong conflicts; obstruct relief programmes; undermine peace initiatives; exacerbate human rights abuses; hamper development; and foster a ‘culture of violence’.”

An estimated 639 million small arms and light weapons are in circulation worldwide, one for every ten people. Approximately 300,000 people are killed every year by these weapons, many of them women and children.

⁵<https://genius.com/General-wesley-clark-seven-countries-in-five-years-annotated>

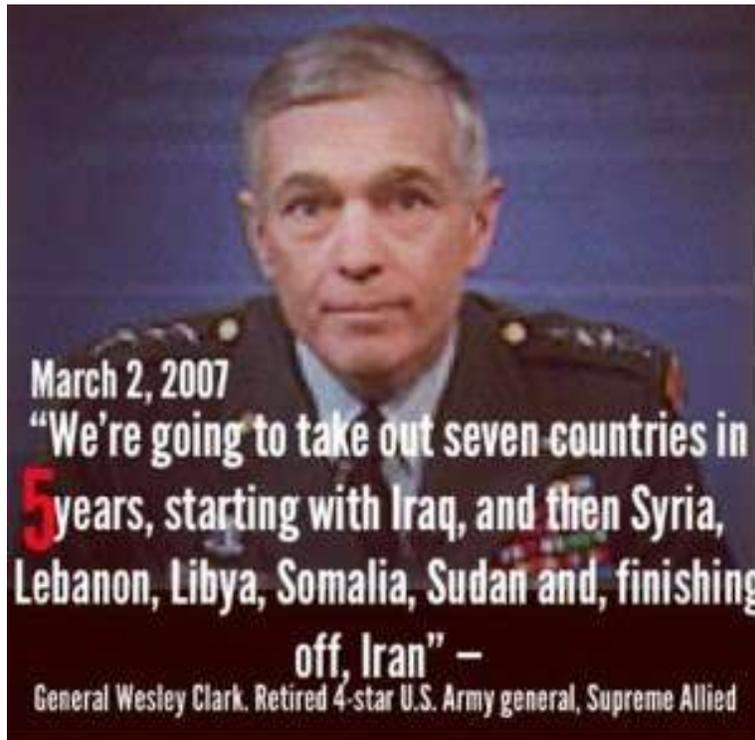


Figure 5.16: General Wesley Clark

Examples of endemic conflict

In several regions of Africa, long-lasting conflicts have prevented development and caused enormous human misery. These regions include Ethiopia, Eritiria, Somalia (Darfur), Chad, Zimbabwe and the Democratic Republic of Congo. In the Congo, the death toll reached 5.4 million in 2008, with most of the victims dying of disease and starvation, but with war as the root cause. In view of these statistics, the international community can be seen to have a strong responsibility to stop supplying small arms and ammunition to regions of conflict. There is absolutely no excuse for the large-scale manufacture and international sale of small arms that exists today.

The Wolfowitz Doctrine

The Wolfowitz Doctrine is the unofficial name given to the early version of the Defense Strategy for the 1990s: The Regional Defense Strategy report for the 1994-99 fiscal years. It was later released by then Secretary of Defense Dick Cheney in 1993. It brazenly advocates that America do everything in its power to retain its global hegemony and superpower status, including ensuring that Russia, China, Iran and other regional powers - but especially Russia - be prevented from attaining enough power to seriously challenge the US. In short, it's another US blueprint for total global supremacy.

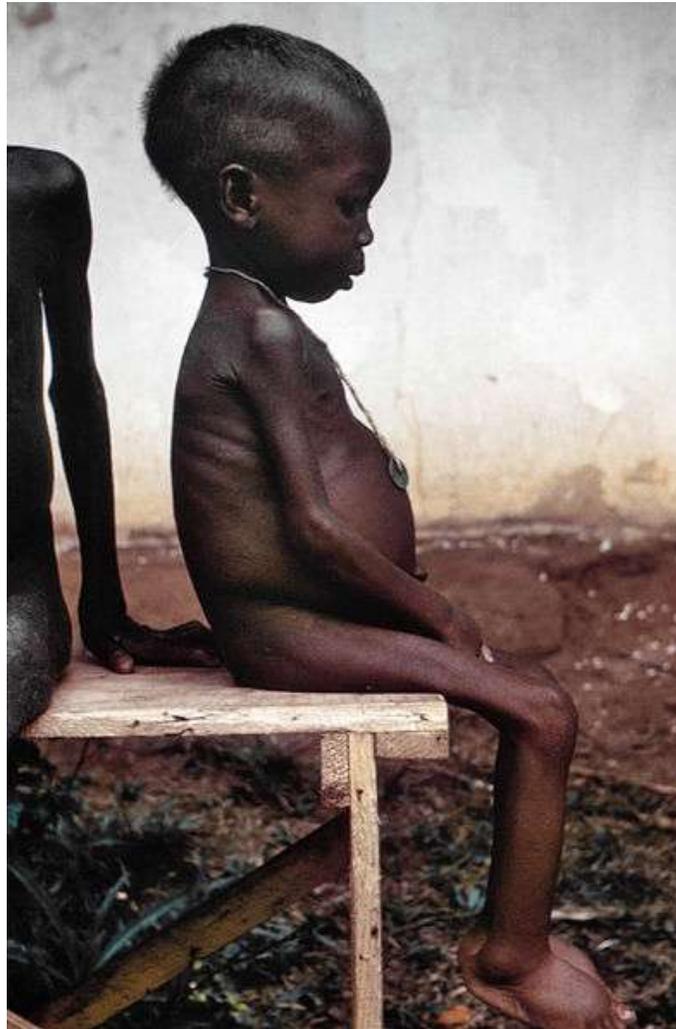


Figure 5.17: 40,000 children die each day from starvation or from poverty-related diseases. Meanwhile, the world spends more than \$1,700,000,000,000 each year on armaments.

There are many quotable passages from the Wolfowitz Doctrine. Here's one which sums up its aims:

“Our first objective is to prevent the re-emergence of a new rival, either on the territory of the former Soviet Union or elsewhere that poses a threat on the order of that posed formerly by the Soviet Union. This is a dominant consideration underlying the new regional defense strategy and requires that we endeavor to prevent any hostile power from dominating a region whose resources would, under consolidated control, be sufficient to generate global power. These regions include Western Europe, East Asia, the territory of the former Soviet Union, and Southwest Asia.”

Similar motives guide US policy today. In February, 2018, US Secretary of Defense James Mattis said: “We will continue to prosecute the campaign against terrorists, but great-power competition - not terrorism - is now the primary focus of US national security.”

Militarism in North Korea

The following states are now believed to currently possess nuclear weapons: The United states, Russia, The United Kingdom, France, China, India, Pakistan, North Korea and Israel. The way in which North Korea obtained its nuclear weapons is described by Wikipedia in the following paragraphs:

“The nuclear program can be traced back to about 1962, when North Korea committed itself to what it called ‘all-fortressization’, which was the beginning of the hyper-militarized North Korea of today. In 1963, North Korea asked the Soviet Union for help in developing nuclear weapons, but was refused. The Soviet Union agreed to help North Korea develop a peaceful nuclear energy program, including the training of nuclear scientists. Later, China, after its nuclear tests, similarly rejected North Korean requests for help with developing nuclear weapons.

“Soviet engineers took part in the construction of the Yongbyon Nuclear Scientific Research Center and began construction of an IRT-2000 research reactor in 1963, which became operational in 1965 and was upgraded to 8 MW in 1974. In 1979 North Korea indigenously began to build in Yongbyon a second research reactor, an ore processing plant and a fuel rod fabrication plant. Soviet engineers took part in the construction of the Yongbyon Nuclear Scientific Research Center, and began construction of an IRT-2000 research reactor in 1963, which became operational in 1965 and was upgraded to 8 MW in 1974. In 1979 North Korea indigenously began to build in Yongbyon a second research reactor, an ore processing plant and a fuel rod fabrication plant. ”

Thus like other new nuclear weapons states, North Korea obtained nuclear weapons by misuse of nuclear power generation facilities donated by other countries. In addition, North Korea spend a large fraction of its GDP on conventional armaments. Under the Songun policy, the Korean Peoples Army is the central institution of North Korean society. As of 2016, the Korean Peoples Army had 5,889,000 paramilitary personelle (25% of the population of North Korea) making it the largest paramilitary organization on earth.

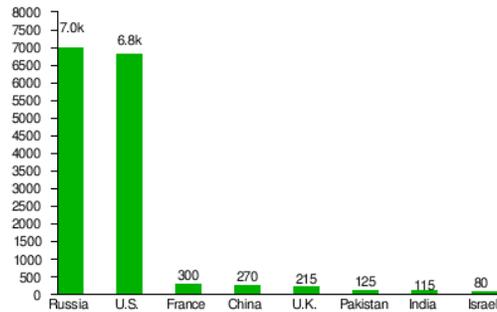


Figure 5.18: Countries by estimated nuclear warhead stockpiles according to the Federation of American scientists.



Figure 5.19: North Korea's dictator, Kim Jong-un. The doctrine of nuclear deterrence rests on the assumption that political leaders will always act rationally, an assumption that seems very uncertain in the case of the U.S.-North Korean conflict.

Table 5.1: SIPRI Military Expenditure Database, 2016

Rank	Country	Annual Spending \$ Bn.	% of GDP
1	United State	611.2	3.3
2	China	215.7	1.9
3	Russia	69.2	5.3
4	Saudi Arabia	63.7	10
5	India	55.9	2.5
6	France	55.7	2.3
7	United Kingdom	48.3	1.9
8	Japan	46.1	1.0
9	Germany	41.1	1.2
10	South Korea	36.8	2.7
11	Italy	27.9	1.5
12	Australia	24.3	2.0

Table 5.2: SIPRI List of arms manufacturers, 2016

Rank	Company	Country	Annual Arms Sales \$ Mn.
1	Lockheed Martin	United States	40,830
2	Boeing	United States	29,510
3	Raytheon	United States	22,910
4	BAE Systems	United Kingdom	22,700
5	Northrop Grumman	United States	21,400
6	General Dynamics	United States	19,230
7	Airbus	European Union	12,520
8	L-3 Communications	United States	8,890
9	Leonardo-Finmeccanica	Italy	8,500
10	Thales Group	France	8,170
11	United Technologies Corporation	United States	6,870
12	Huntington Ingalls Industries	United States	6,720

The SIPRI Yearbook, 2017

Dan Smith of the Stockholm International Peace Research Institute (SIPRI) wrote the following Introduction to the organization's yearbook for 2017:

“An overall perspective on 2016 finds a balance between negative developments and the continued functioning of the international system. However, the year ended with clear grounds for concern that the balance sheet seemed to be tipping towards the negative amid growing unease about the durability of key parts of the international security architecture.

“Conflicts in the Middle East continued to generate humanitarian tragedies and large-scale movement of refugees, and violent conflict continued in several other parts of the world, most notably Africa, Asia and to a lesser extent Eastern Europe. Developments in North Korea's nuclear programme contributed to international political instability with potentially serious knock-on effects. On the positive side, the 2015 Paris Climate Agreement entered into force in November 2016, the 2015 Iran nuclear deal began implementation on time in early 2016 and the United Nations General Assembly adopted a resolution to start negotiations in 2017 on eliminating nuclear weapons. Progress was also made on work to monitor the unfolding implementation of the UN's Agenda 2030 for international social and economic development. A major contribution to the positive side of the balance sheet in 2016 was the peace agreement in Colombia.

“Nonetheless, virtually all the major global indicators for peace and security have moved in a negative direction: more military spending, increased arms trading, more violent conflicts and the continuing forward march of military technology.

“Existing multilateral and bilateral arms control agreements and processes are also under challenge-not least due to the deteriorating relationship between Russia and the United States-raising questions of global concern and potentially epochal scope. Were the great gains in peaceful relations since the end of the cold war now being reversed? Would the return of strategic competition between the major powers have negative implications for managing increased conflict risk? These uncertainties, combined with political developments in Europe and the USA- especially the vote by the United Kingdom to leave the European Union and the election of Donald J. Trump as US President-seemed to reveal a much decreased commitment to international institutions and a renewed emphasis in several key states on a narrowly defined national interest.

“The scale of the challenges facing humanity has been summed up in the proposal to adopt the label of ‘the Anthropocene’ for the current era, thus designating it as one in which human activity is the dominant influence on climate and the environment. It is disconcerting to note that such cooperation risks becoming more elusive than it has seemed for most of the time since the end of the cold war, at a time when it is more needed than ever. Experience has shown that international cooperation can work. But is the international cooperative urge as persistent as the problems it needs to address?”



Figure 5.20: Tom Cruise in “Top Gun”.



Figure 5.21: A culture of violence supports the Devil’s Dynamo.

5.9 A culture of violence

Links with the entertainment industry

Here are a few films that glorify war:

- Black Hawk Down
- Top Gun
- Behind Enemy Lines
- Red Dawn (1984)
- American Sniper
- Iron Eagle
- Pearl Harbor

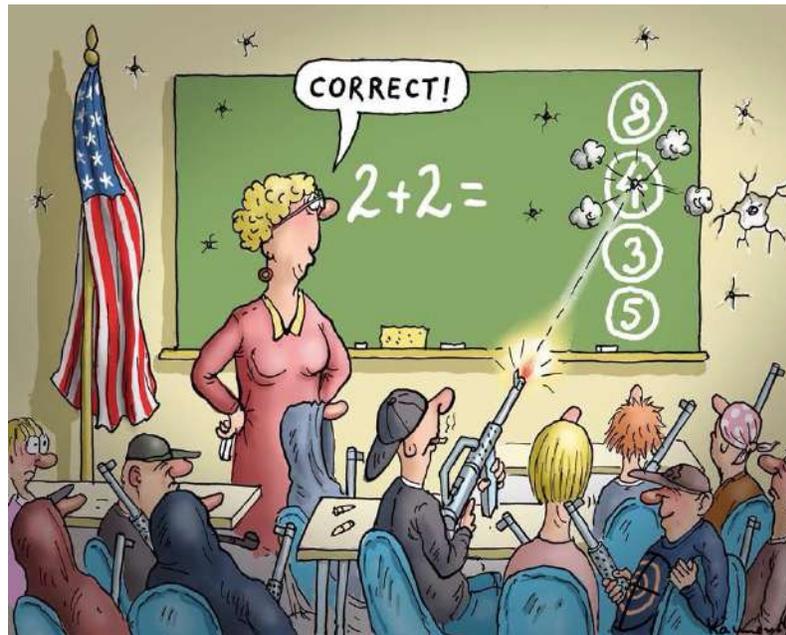


Figure 5.22: **A culture of violence:** In the United States the National Rifle Association has proposed guns in schools as the answer to the epidemic of school shootings.

- Act of Valor
- We Were Soldiers
- The Green Berets

Making a game of killing

The mass media are an important part of our educational system. Perhaps it is time to look more closely at the values that they are transmitting. In particular, we should perhaps look at computer games designed for young boys. They often give the strongest imaginable support to a culture of violence.

For example, a game entitled “Full Spectrum Warrior” was recently reviewed in a Danish newspaper. According to the reviewer, “...An almost perfect combination of graphics, sound, band design, and gameplay makes it seem exactly like the film *Black Hawk Down* - with the player as the main character. This is not just a coincidence, because the game is based on an army training program... Full Spectrum Warrior is an extremely intense experience, and despite the advanced possibilities, the controls are simple enough so that young children can play it... The player is completely drawn into the screen, and remains there until the end of the mission.” The reviewer gave the game six stars (the maximum).

Another genre of computer games has to do with building empires, ignoring the fact that imperialism is morally indefensible. For example, “Forge of Empires” is a browser-based strategy game. It is described as follows: “The game offers a single-player campaign

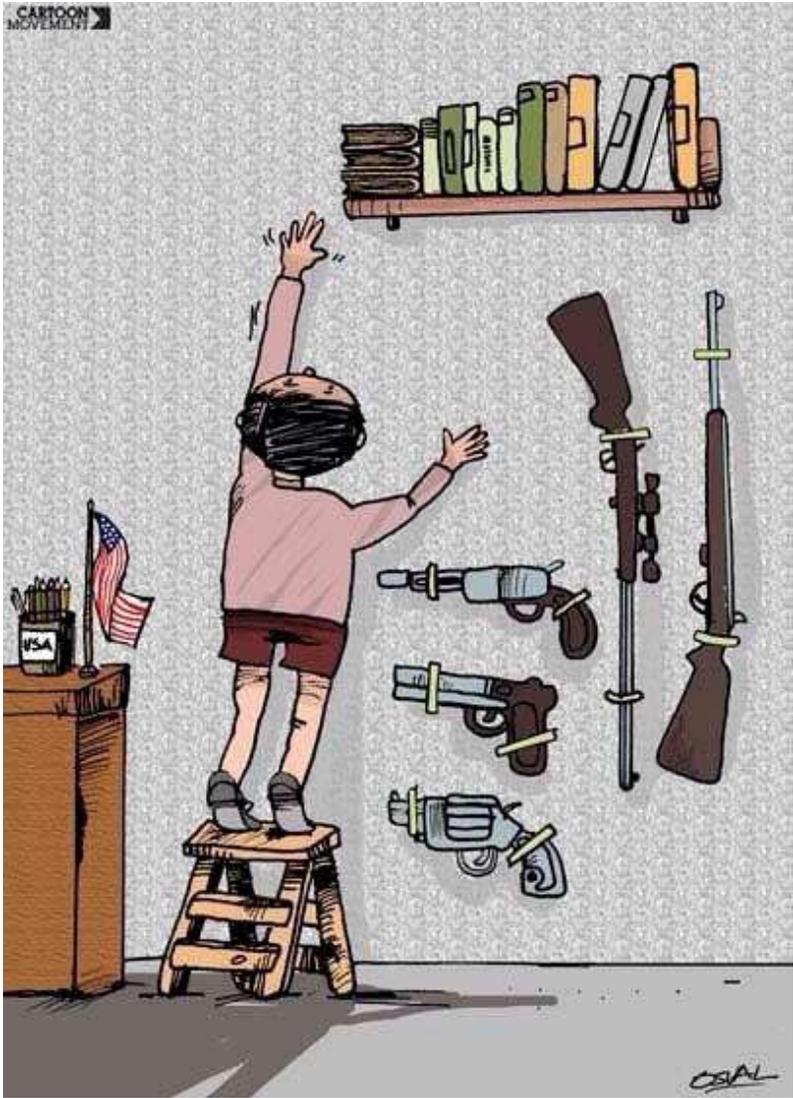


Figure 5.23: A culture of violence. Guns in schools?

for players to explore and conquer several provinces, gaining resources and new technology as they progress.” Conquering countries for the sake of gaining their resources is an all-too-familiar feature of the modern world. In the game “Forge of Empires”, our young people are indoctrinated with the ethos of resource wars.

During his trial, the Norwegian mass-murderer Anders Behring Breivik described how he trained for his attack on young people on the Island of Utöya using the computer game “Call of Duty: Modern Warfare”. The court also heard how he took what he called a “sabbatical” for a year between the summers of 2006 and 2007. During this year, he played a game called “World of Warcraft” full-time, in the bedroom of his mother’s Oslo flat, spending up to 16 hours a day using the game to distance himself from the human and moral significance of killing.

Is this not similar to the frame of mind of drone operators, sitting in comfort in their Nevada bunkers, distanced from the reality of killing? They are playing a computer game that kills targeted individuals and their families, in remote countries, by remote control. There is no need to look into the eyes of the victims. They are just abstract symbols in a computer game.

5.10 The threats and costs of war

In the long run, because of the enormously destructive weapons, which have been produced through the misuse of science, the survival of civilization can only be insured if we are able to abolish the institution of war.

Modern warfare has become prohibitively dangerous and destructive because of the enormously powerful weapons that scientists and engineers have developed. The institution of war could not continue without their cooperation. Thus, scientists and engineers throughout the world have a special responsibility.

Wars are driven by the collective paranoia of voters, who are willing to allow colossal sums to be spent by ‘Defense Departments’. But are civilians really defended? Absolutely not!

We can see this most clearly if we think of nuclear war. Nations threaten each other with “Mutually Assured Destruction”, which has the very appropriate acronym MAD. What does this mean? Does it mean that civilians are being protected? Not at all. Instead they are threatened with complete destruction. Civilians here play the role of hostages in the power games of their leaders. Those leaders’ goal is not protection of ordinary people, but rather protection of the gargantuan profits of the military-industrial complex. As the Indian writer Arundhati Roy put it, “Once weapons were manufactured to fight wars. Now wars are manufactured to sell weapons.”

If a thermonuclear war occurs, it will be the end of human civilization and much of the biosphere. This will definitely happen in the future unless the world rids itself of nuclear weapons, since, in the long run, the finite chance of accidental nuclear war happening due to a technical or human failure during a given year will gradually build up into a certainty of disaster. Scientists and engineers must not sell their knowledge and talents to this march



Figure 5.24: **Children born with birth defects due to the US use of Agent Orange during the Vietnam War. Source: stopwarcoalition.org**

towards the precipice.

The direct and indirect costs of war

The costs of war, both direct and indirect, are so enormous that they are almost beyond comprehension. We face a direct threat because a thermonuclear war may destroy human civilization and much of the biosphere, and an indirect threat because the institution of war interferes seriously with the use of tax money for constructive and peaceful purposes.

Today, despite the end of the Cold War, the world spends roughly 1.7 trillion (i.e. 1.7 million million) US dollars each year on armaments. This colossal flood of money could have been used instead for education, famine relief, development of infrastructure, or on urgently needed public health measures.

The World Health Organization lacks funds to carry through an antimalarial program on as large a scale as would be desirable, but the entire program could be financed for less than our military establishments spend in a single day. Five hours of world arms spending is equivalent to the total cost of the 20-year WHO campaign that resulted in the eradication of smallpox. For every 100,000 people in the world, there are 556 soldiers, but only 85 doctors. Every soldier costs an average of \$20,000 per year, while the average spent on education is only \$380 per school-aged child. With a diversion of funds consumed by three weeks of military spending, the world could create a sanitary water supply for all its people, thus eliminating the cause of almost half of all human illness.

A new drug-resistant form of tuberculosis has recently become widespread in Asia and in the former Soviet Union. In order to combat this new and highly dangerous form of tuberculosis and to prevent its spread, WHO needs \$500 million, an amount equivalent to 1.2 hours of world arms spending.

Today's world is one in which roughly ten million children die every year from starvation or from diseases related to poverty. Besides this enormous waste of young lives through malnutrition and preventable disease, there is a huge waste of opportunities through inadequate education. The rate of illiteracy in the 25 least developed countries is 80%, and the total number of illiterates in the world is estimated to be 800 million. Meanwhile every 60 seconds the world spends \$6.5 million on armaments.



Figure 5.25: A little girl cries as medics attend to her injuries at al-Shifa hospital in Gaza in 2014, during the conflict. Photo: UNICEF/Eyad El Baba

It is plain that if the almost unbelievable sums now wasted on the institution of war were used constructively, most of the pressing problems of humanity could be solved, but today the world spends more than 20 times as much on war as it does on development.

Medical and psychological consequences; loss of life

While in earlier epochs it may have been possible to confine the effects of war mainly to combatants, in the 20th century the victims of war were increasingly civilians, and especially children. For example, according to Quincy Wright's statistics, the First and Second World Wars cost the lives of 26 million soldiers, but the toll in civilian lives was much larger: 64 million.

Since the Second World War, despite the best efforts of the UN, there have been over 150 armed conflicts; and, if civil wars are included, there are on any given day an average of 12 wars somewhere in the world. In the conflicts in Indo-China, the proportion of civilian victims was between 80% and 90%, while in the Lebanese civil war some sources state that the proportion of civilian casualties was as high as 97%.

Civilian casualties often occur through malnutrition and through diseases that would be preventable in normal circumstances. Because of the social disruption caused by war, normal supplies of food, safe water and medicine are interrupted, so that populations become vulnerable to famine and epidemics.⁶

⁶<http://www.cadmusjournal.org/article/volume-2/issue-2-part-3/lessons-world-war-i>
<http://www.truth-out.org/opinion/item/27201-the-leading-terrorist-state>



Figure 5.26: Asylum-seekers in a holding centre on Greece's Samos Island.

Effects of war on children

According to UNICEF figures, 90% of the casualties of recent wars have been civilians, and 50% children. The organization estimates that in recent years, violent conflicts have driven 20 million children from their homes. They have become refugees or internally displaced persons within their own countries.

During the last decade 2 million children have been killed and 6 million seriously injured or permanently disabled as the result of armed conflicts, while 1 million children have been orphaned or separated from their families. Of the ten countries with the highest rates of death of children under five years of age, seven are affected by armed conflicts. UNICEF estimates that 300,000 child soldiers are currently forced to fight in 30 armed conflicts throughout the world. Many of these have been forcibly recruited or abducted.

Even when they are not killed or wounded by conflicts, children often experience painful psychological traumas: the violent death of parents or close relatives, separation from their families, seeing family members tortured, displacement from home, disruption of ordinary life, exposure to shelling and other forms of combat, starvation and anxiety about the future.⁷

Refugees

Human Rights Watch estimates that in 2001 there were 15 million refugees in the world, forced from their countries by war, civil and political conflict, or by gross violations of human rights. In addition, there were an estimated 22 million internally displaced persons, violently forced from their homes but still within the borders of their countries.

In 2001, 78% of all refugees came from ten areas: Afghanistan, Angola, Burma, Burundi, Congo-Kinshasa, Eritrea, Iraq, the Palestinian territories, Somalia and Sudan. A

⁷<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2080482/>

quarter of all refugees are Palestinians, who make up the world's oldest and largest refugee population. 45% of the world's refugees have found sanctuaries in Asia, 30% in Africa, 19% in Europe and 5% in North America.

Refugees who have crossed an international border are in principle protected by Article 14 of the Universal Declaration of Human Rights, which affirms their right "to seek and to enjoy in other countries asylum from persecution". In 1950 the Office of the High Commissioner for Refugees was created to implement Article 14, and in 1951 the Convention Relating to the Status of Refugees was adopted by the UN. By 2002 this legally binding treaty had been signed by 140 nations. However the industrialized countries have recently adopted a very hostile and restrictive attitude towards refugees, subjecting them to arbitrary arrests, denial of social and economic rights, and even forcible return to countries in which they face persecution.

The status of internally displaced persons is even worse than that of refugees who have crossed international borders. In many cases the international community simply ignores their suffering, reluctant to interfere in the internal affairs of sovereign states. In fact, the United Nations Charter is self-contradictory in this respect, since on the one hand it calls for non-interference in the internal affairs of sovereign states, but on the other hand, people everywhere are guaranteed freedom from persecution by the Charter's Universal Declaration of Human Rights.⁸

Damage to infrastructure

Most insurance policies have clauses written in fine print exempting companies from payment of damage caused by war. The reason for this is simple. The damage caused by war is so enormous that insurance companies could never come near to paying for it without going bankrupt.

We mentioned above that the world spends 1.7 trillion dollars each year on preparations for war. A similarly colossal amount is needed to repair the damage to infrastructure caused by war. Sometimes this damage is unintended, but sometimes it is intentional.

During World War II, one of the main aims of air attacks by both sides was to destroy the industrial infrastructure of the opponent. This made some sense in a war expected to last several years, because the aim was to prevent the enemy from producing more munitions. However, during the Gulf War of 1990, the infrastructure of Iraq was attacked, even though the war was expected to be short. Electrical generating plants and water purification facilities were deliberately destroyed with the apparent aim of obtaining leverage over Iraq after the war.

In general, because war has such a catastrophic effect on infrastructure, it can be thought of as the opposite of development. War is the greatest generator of poverty.⁹

⁸<https://www.hrw.org/topic/refugees>

⁹<https://www.wsws.org/en/articles/2002/11/iraq-n04.html>

<http://www.globalresearch.ca/crimes-against-humanity-the-destruction-of-iraqs-electricity-infrastructure-the-social-economic-and-environmental-impacts/5355665>

<http://www.afdb.org/fileadmin/uploads/afdb/Documents/Publications/00157630-EN-ERP-48.PDF>



Figure 5.27: Image source: Greenpeace

Ecological damage

Warfare during the 20th century has not only caused the loss of 175 million lives (primarily civilians) - it has also caused the greatest ecological catastrophes in human history. The damage takes place even in times of peace. Studies by Joni Seager, a geographer at the University of Vermont, conclude that “a military presence anywhere in the world is the single most reliable predictor of ecological damage”.

Modern warfare destroys environments to such a degree that it has been described as an “environmental holocaust.” For example, herbicides use in the Vietnam War killed an estimated 6.2 billion board-feet of hardwood trees in the forests north and west of Saigon, according to the American Association for the Advancement of Science. Herbicides such as Agent Orange also made enormous areas of previously fertile land unsuitable for agriculture for many years to come. In Vietnam and elsewhere in the world, valuable agricultural land has also been lost because land mines or the remains of cluster bombs make it too dangerous for farming.

During the Gulf War of 1990, the oil spills amounted to 150 million barrels, 650 times the amount released into the environment by the notorious Exxon Valdez disaster. During the Gulf War an enormous number of shells made of depleted uranium were fired. When the dust produced by exploded shells is inhaled it often produces cancer, and it will remain in the environment of Iraq for decades.

Radioactive fallout from nuclear tests pollutes the global environment and causes many thousands of cases of cancer, as well as birth abnormalities. Most nuclear tests have been carried out on lands belonging to indigenous peoples. Agent Orange also produced cancer, birth abnormalities and other serious forms of illness both in the Vietnamese population and among the foreign soldiers fighting in Vietnam¹⁰

¹⁰<http://www.dailymail.co.uk/news/article-2401378/Agent-Orange-Vietnamese-children-suffering-effects-herbicide-sprayed-US-Army-40-years-ago.html>

5.11 Militarism is the US national religion

Here are some quotations from an article by William Astore entitled *Military Might Is Our National Religion*¹¹. He lists the following facts to support his thesis:

- We believe in wars. We may no longer believe in formal declarations of war (not since December 1941 has Congress made one in our name), but that sure hasn't stopped us from waging them. From Korea to Vietnam, Afghanistan to Iraq, the Cold War to the War on Terror, and so many military interventions in between, including Grenada, Panama, and Somalia, Americans are always fighting somewhere as if we saw great utility in thumbing our noses at the Prince of Peace. (That's Jesus Christ, if I remember my Catholic catechism correctly.)
- We believe in weaponry, the more expensive the better. The underperforming F-35 stealth fighter may cost \$1.45 trillion over its lifetime. An updated nuclear triad (land-based missiles, nuclear submarines, and strategic bombers) may cost that already mentioned \$1.7 trillion. New (and malfunctioning) aircraft carriers cost us more than \$10 billion each. And all such weaponry requests get funded, with few questions asked, despite a history of their redundancy, ridiculously high price, regular cost overruns, and mediocre performance. Meanwhile, Americans squabble bitterly over a few hundred million dollars for the arts and humanities.
- We believe in weapons of mass destruction. We believe in them so strongly that we're jealous of anyone nibbling at our near monopoly. As a result, we work overtime to ensure that "infidels" and atheists (that is, the Iranians and North Koreans, among others) don't get them. In historical terms, no country has devoted more research or money to deadly nuclear, biological, and chemical weaponry than the United States. In that sense, we've truly put our money where our mouths are (and where a devastating future might be).
- We believe with missionary zeal in our military and seek to establish our "faith" everywhere. Hence, our global network of perhaps 800 overseas military bases. We don't hesitate to deploy our elite missionaries, our equivalent to the Jesuits, the Special Operations forces to more than 130 countries annually. Similarly, the foundation for what we like to call foreign assistance is often military training and foreign military sales. Our present supreme leader, Pope Trump I, boasts of military sales across the globe, most notably to the "infidel" Saudis. Even when Congress makes what, until recently, was the rarest of attempts to rein in this deadly trade

¹¹Truthout, August 13, 2019

in arms, Pope Trump vetoes it. His rationale: weapons and profits should rule all.

- We believe in our college of cardinals, otherwise known as America's generals and admirals. We sometimes appoint them (or anoint them?) to the highest positions in the land. While Trump's generals - Michael Flynn, James Mattis, H.R. McMaster, and John Kelly - have fallen from grace at the White House, America's generals and admirals continue to rule globally. They inhabit proconsul-like positions in sweeping geographical commands that (at least theoretically) cover the planet and similarly lead commands aimed at dominating the digital-computer realm and special operations. One of them will head a new force meant to dominate space through time eternal. A "strategic" command (the successor to the Strategic Air Command, or SAC, so memorably satirized in Stanley Kubrick's *Dr. Strangelove*) continues to ensure that, at some future moment, the U.S. will be able to commit mass genocide by quite literally destroying the world with nuclear weapons. Indeed, Pope Trump recently boasted that he could end America's Afghan War in a week, apparently through the mass nuclear genocide of (his figure) 10 million Afghans. Even as he then blandly dismissed the idea of wiping that country "off the face of the earth," he openly reflected the more private megalomania of those military professionals funded by the rest of us to think about "the unthinkable". In sum, everything is - theoretically at least - under the thumbs of our unelected college of cardinals. Their overblown term for it is "full-spectrum dominance," which, in translation, means they grant themselves god-like powers over our lives and that of our planet (though the largely undefeated enemies in their various wars don't seem to have acknowledged this reality).
- We believe that freedom comes through obedience. Those who break ranks from our militarized church and protest, like Chelsea Manning, are treated as heretics and literally tortured.
- We believe military spending brings wealth and jobs galore, even when it measurably doesn't. Military production is both increasingly automated and increasingly outsourced, leading to far fewer good-paying American jobs compared to spending on education, infrastructure repairs of and improvements in roads, bridges, levees, and the like, or just about anything else for that matter.
- We believe, and our most senior leaders profess to believe, that our military represents the very best of us, that we have the "finest" one in human history.



Figure 5.28: The peoples of the world must revolt against the endless wars of their governments. All-destroying modern weapons have made the institution of war prohibitively dangerous.

- We believe in planning for a future marked by endless wars, whether against terrorism or “godless” states like China and Russia, which means our military church must be forever strengthened in the cause of winning ultimate victory.

Suggestions for further reading

1. P.J. Bowler, *Evolution: The History of an Idea*, University of California Press, (1989).
2. D.J. Futuyma, *Evolutionary Biology*, Sinauer Associates, Sunderland Mass., (1986).
3. B. Glass, O. Temkin, and W.L. Strauss, eds., *Forerunners of Darwin: 1745-1859*, Johns Hopkins Press, Baltimore, (1959).
4. R. Milner, *The Encyclopedia of Evolution*, an Owl Book, Henry Holt and Company, New York, (1990).
5. T.A. Appel, *The Cuvier-Geoffroy Debate: French Biology in the Decades before Darwin*, Oxford University Press, (1987).
6. P.J. Bowler, *Fossils and Progress: Paleontology and the Idea of Progressive Evolution in the Nineteenth Century*, Science History Publications, New York, (1976).
7. P. Corsi, *The Age of Lamarck: Evolutionary Theories in France, 1790-1834*, University of California Press, Berkeley, (1988).
8. M. McNeil, *Under the Banner of Science: Erasmus Darwin and his Age*, Manchester University Press, Manchester, (1987).
9. L.G. Wilson, *Sir Charles Lyell's Scientific Journals on the Species Question*, Yale University Press, New Haven, (1970).
10. A.B. Adams, *Eternal Quest: The Story of the Great Naturalists*, G.P. Putnam's Sons, New York, (1969).
11. A.S. Packard, *Lamarck, the Founder of Evolution: His Life and Work*, Longmans, Green, and Co., New York, (1901).
12. C. Darwin, *An historical sketch of the progress of opinion on the Origin of Species, previously to the publication of this work*, Appended to third and later editions of *On the Origin of Species*, (1861).
13. L. Eiseley, *Darwin's Century: Evolution and the Men who Discovered It*, Doubleday, New York, (1958).
14. H.F. Osborne, *From the Greeks to Darwin: The Development of the Evolution Idea Through Twenty-Four Centuries*, Charles Scribner and Sons, New York, (1929).
15. Sir Julian Huxley and H.B.D. Kettlewell, *Charles Darwin and his World*, Thames and Hudson, London (1965).
16. Allan Moorehead, *Darwin and the Beagle*, Penguin Books Ltd. (1971).
17. Francis Darwin (editor), *The Autobiography of Charles Darwin and Selected Letters*, Dover, New York (1958).
18. Charles Darwin, *The Voyage of the Beagle*, J.M. Dent and Sons Ltd., London (1975).
19. Charles Darwin, *The Origin of Species*, Collier MacMillan, London (1974).
20. Charles Darwin, *The Expression of Emotions in Man and Animals*, The University of Chicago Press (1965).
21. Ruth Moore, *Evolution*, Time-Life Books (1962).
22. L. Barber, *The Heyday of Natural History: 1820-1870*, Doubleday and Co., Garden City, New York, (1980).
23. A. Desmond, *Huxley*, Addison Wesley, Reading, Mass., (1994).
24. R. Owen, (P.R. Sloan editor), *The Hunterian Lectures in Comparative Anatomy, May-June, 1837*, University of Chicago Press, (1992).

25. C. Nichols, *Darwinism and the social sciences*, Phil. Soc. Scient. **4**, 255-277 (1974).
26. M. Ruse, *The Darwinian Revolution*, University of Chicago Press, (1979).
27. A. Desmond and J. Moore, *Darwin*, Penguin Books, (1992).
28. R. Dawkins, *The Extended Phenotype*, Oxford University Press, (1982).
29. R. Dawkins, *The Blind Watchmaker*, W.W. Norton, (1987).
30. R. Dawkins, *River out of Eden: A Darwinian View of Life*, Harper Collins, (1995).
31. R. Dawkins, *Climbing Mount Improbable*, W.W. Norton, (1996).
32. S.J. Gould, *Ever Since Darwin*, W.W. Norton, (1977).
33. R.G.B. Reid, *Evolutionary Theory: The Unfinished Synthesis*, Croom Helm, (1985).
34. M. Ho and P.T. Saunders, editors, *Beyond Neo-Darwinism: An Introduction to a New Evolutionary Paradigm*, Academic Press, London, (1984).
35. J. Maynard Smith, *Did Darwin Get it Right? Essays on Games, Sex and Evolution*, Chapman and Hall, (1989).
36. E. Sober, *The Nature of Selection: Evolutionary Theory in Philosophical Focus*, University of Chicago Press, (1984).
37. B.K. Hall, *Evolutionary Developmental Biology*, Chapman and Hall, London, (1992).
38. J. Thompson, *Interaction and Coevolution*, Wiley and Sons, (1982).
39. R.A. Fischer, *The Genetical Theory of Natural Selection*, Clarendon, Oxford, (1930).
40. J.B.S. Haldane, *Population genetics*, New Biology **18**, 34-51, (1955).
41. N. Tinbergen, *The Study of Instinct*, Oxford University Press, (1951).
42. N. Tinbergen, *The Herring Gull's World*, Collins, London, (1953).
43. N. Tinbergen, *Social Behavior in Animals*, Methuen, London, (1953).
44. N. Tinbergen, *Curious Naturalists*, Country Life, London, (1958).
45. N. Tinbergen, *The Animal in its World: Explorations of an Ethologist*, Allan and Unwin, London, (1973).
46. K. Lorenz, *On the evolution of behavior*, Scientific American, December, (1958).
47. K. Lorenz, *Evolution and Modification of Behavior* Harvard University Press, Cambridge, MA, (1961).
48. K. Lorenz, *Studies in Animal and Human Behavior. I and II.*, Harvard University Press, (1970) and (1971).
49. P.H. Klopfer and J.P. Hailman, *An Introduction to Animal Behavior: Ethology's First Century*, Prentice-Hall, New Jersey, (1969).
50. J. Jaynes, *The historical origins of "Ethology" and "Comparative Psychology"*, Anim. Behav. **17**, 601-606 (1969).
51. W.H. Thorpe, *The Origin and Rise of Ethology: The Science of the Natural Behavior of Animals*, Heinemann, London, (1979).
52. R.A. Hinde, *Animal Behavior: A Synthesis of Ethological and Comparative Psychology*, McGraw-Hill, New York, (1970).
53. J.H. Crook, editor, *Social Behavior in Birds and Mammals*, Academic Press, London, (1970).
54. P. Ekman, editor, *Darwin and Facial Expression*, Academic Press, New York, (1973).
55. P. Ekman, W.V. Friesen and P. Ekworth, *Emotions in the Human Face*, Pergamon, New York, (1972).

56. N. Blurton Jones, editor, *Ethological Studies of Child Behavior*, Cambridge University Press, (1975).
57. M. von Cranach, editor, *Methods of Inference from Animals to Human Behavior*, Chicago/Mouton, Haag, (1976); Aldine, Paris, (1976).
58. K. Lorenz, *On Aggression*, Bantem Books, (1977).
59. I. Eibl-Eibesfeldt, *Ethology, The Biology of Behavior*, Holt, Rinehart and Winston, New York, (1975).
60. I. Eibl-Eibesfeldt and F.K. Salter, editors, *Indoctrinability, Ideology, and Warfare: Evolutionary Perspectives*, Berghahn Books, (1998).
61. I. Eibl-Eibesfeldt, *Human Ethology*, Walter De Gruyter Inc., (1989).
62. I. Eibl-Eibesfeldt, *Love and Hate*, Walter De Gruyter Inc., (1996).
63. J. Bowlby, *By ethology out of psychoanalysis: An experiment in interbreeding*, *Animal Behavior*, **28**, 649-656 (1980).
64. B.B. Beck, *Animal Tool Behavior*, Garland STPM Press, New York, (1980).
65. R. Axelrod, *The Evolution of Cooperation*, Basic Books, New York, (1984).
66. J.D. Carthy and F.L. Ebling, *The Natural History of Aggression*, Academic Press, New York, (1964)
67. D.L. Cheney and R.M. Seyfarth, *How Monkeys See the World: Inside the Mind of Another Species*, University of Chicago Press, (1990).
68. F. De Waal, *Chimpanzee Politics*, Cape, London, (1982).
69. M. Edmunds, *Defense in Animals*, Longman, London, (1974).
70. R.D. Estes, *The Behavior Guide to African Mammals*, University of California Press, Los Angeles, (1991).
71. R.F. Ewer, *Ethology of Mammals*, Logos Press, London, (1968).
72. E. Morgan, *The Scars of Evolution*, Oxford University Press, (1990).
73. W.D. Hamilton, *The genetical theory of social behavior. I and II*, *J. Theor. Biol.* **7**, 1-52 (1964).
74. R. Dawkins, *The Selfish Gene*, Oxford University Press, (1989).
75. R.W. Sussman, *The Biological Basis of Human Behavior*, Prentice Hall, Englewood Cliffs, (1997).
76. Irenäus Eibl-Eibesfeldt, *The Biology of Peace and War*, Thames and Hudson, New York (1979).
77. R.A. Hinde, *Biological Bases of Human Social Behavior*, McGraw-Hill, New York (1977).
78. R.A. Hinde, *Towards Understanding Relationships*, Academic Press, London (1979).
79. Albert Szent-Györgyi, *The Crazy Ape*, Philosophical Library, New York (1970).
80. E.O. Wilson, *Sociobiology*, Harvard University Press (1975).
81. C. Zhan-Waxler, *Altruism and Aggression: Biological and Social Origins*, Cambridge University Press (1986).
82. D.R. Griffin, *Animal Mind - Human Mind*, Dahlem Conferenzen 1982, Springer, Berlin, (1982).
83. R. Dart, *The predatory transition from ape to man*, *International Anthropological and Linguistic Review*, **1**, (1953).

84. S. Savage-Rumbaugh, R. Lewin, et al., *Kanzi: The Ape at the Brink of the Human Mind*, John Wiley and Sons, New York, (1996).
85. R. Dunbar, *Grooming, Gossip, and the Evolution of Language*, Harvard University Press, (1998).
86. M.E. Bitterman, *The evolution of intelligence*, Scientific American, January, (1965).
87. R. Fox, *In the beginning: Aspects of hominid behavioral evolution*, Man, **NS 2**, 415-433 (1967).
88. M.S. Gazzaniga, *The split brain in man*, Scientific American, **217**, 24-29 (1967).
89. D. Kimura, *The asymmetry of the human brain*, Scientific American, **228**, 70-78 (1973).
90. R.G. Klein, *Anatomy, behavior, and modern human origins*, Journal of World Prehistory, **9 (2)**, 167-198 (1995).
91. N.G. Jablonski and L.C. Aiello, editors, *The Origin and Diversification of Language*, Wattis Symposium Series in Anthropology. Memoirs of the California Academy of Sciences, No. 24, The California Academy of Sciences, San Francisco, (1998).
92. S. Pinker, *The Language Instinct: How the Mind Creates Language*, Harper-Collins Publishers, New York, (1995).
93. J.H. Barkow, L. Cosmides and J. Tooby, editors, *The Adapted Mind: Evolutionary Psychology and the Generation of Culture*, Oxford University Press, (1995).
94. D.R. Begun, C.V. Ward and M.D. Rose, *Function, Phylogeny and Fossils: Miocene Hominid Evolution and Adaptations*, Plenum Press, New York, (1997).
95. R.W. Byrne and A.W. Whitten, *Machiavellian Intelligence: Social Expertise and the Evolution of Intellect in Monkeys, Apes and Humans*, Cambridge University Press, (1988),
96. V.P. Clark, P.A. Escholz and A.F. Rosa, editors, *Language: Readings in Language and Culture*, St Martin's Press, New York, (1997).
97. T.W. Deacon, *The Symbolic Species: The Co-evolution of Language and the Brain*, W.W. Norton and Company, New York, (1997).
98. C. Gamble, *Timewalkers: The Prehistory of Global Colonization*, Harvard University Press, (1994).
99. K.R. Gibson and T. Ingold, editors, *Tools, Language and Cognition in Human Evolution*, Cambridge University Press, (1993).
100. P. Mellers, *The Emergence of Modern Humans: An Archaeological Perspective*, Edinburgh University Press, (1990).
101. P. Mellers, *The Neanderthal Legacy: An Archaeological Perspective of Western Europe*, Princeton University Press, (1996).
102. S. Mithen, *The Prehistory of the Mind*, Thames and Hudson, London, (1996).
103. D. Haraway, *Signs of dominance: from a physiology to a cybernetics of primate biology*, C.R. Carpenter, 1939-1970, Studies in History of Biology, **6**, 129-219 (1983).
104. D. Johanson and M. Edey, *Lucy: The Beginnings of Humankind*, Simon and Schuster, New York, (1981).
105. B. Kurtén, *Our Earliest Ancestors*, Columbia University Press, New York, (1992).
106. R.E. Leakey and R. Lewin, *Origins Reconsidered*, Doubleday, New York, (1992).

107. P. Lieberman, *The Biology and Evolution of Language*, Harvard University Press, (1984).
108. J.D. Wall and M. Przeworski, *When did the human population size start increasing?*, *Genetics*, **155**, 1865-1874 (2000).
109. L. Aiello and C. Dean, *An Introduction to Human Evolutionary Anatomy*, Academic Press, London, (1990).
110. F. Ikawa-Smith, ed., *Early Paleolithic in South and East Asia*, Mouton, The Hague, (1978).
111. R.R. Baker, *Migration: Paths Through Space and Time*, Hodder and Stoughton, London, (1982).
112. P. Bellwood, *Prehistory of the Indo-Malaysian Archipelago*, Academic Press, Sidney, (1985).
113. P.J. Bowler, *Theories of Human Evolution: A Century of Debate, 1884-1944*, Basil Blackwell, Oxford, (1986).
114. G. Isaac and M. McCown, eds., *Human Origins: Louis Leaky and the East African Evidence*, Benjamin, Menlo Park, (1976).
115. F.J. Brown, R. Leaky, and A. Walker, *Early Homo erectus skeleton from west Lake Turkana, Kenya*, *Nature*, **316**, 788-92, (1985).
116. K.W. Butzer, *Archeology as Human Ecology*, Cambridge University Press, (1982).
117. A.T. Chamberlain and B.A. Wood, *Early hominid phylogeny*, *Journal of Human Evolution*, **16**, 119-33, (1987).
118. P. Mellars and C. Stringer, eds., *The Human Revolution: Behavioural and Biological Perspectives in the Origins of Modern Humans*, Edinburgh University Press, (1989).
119. G.C. Conroy, *Primate Evolution*, W.W. Norton, New York, (1990).
120. R.I.M. Dunbar, *Primate Social Systems*, Croom Helm, London, (1988).
121. B. Fagan, *The Great Journey: The Peopling of Ancient America*, Thames and Hudson, London, (1987).
122. R.A. Foley, ed., *Hominid Evolution and Community Ecology*, Academic Press, New York, (1984).
123. S.R. Binford and L.R. Binford, *Stone tools and human behavior*, *Scientific American*, **220**, 70-84, (1969).
124. G. Klein, *The Human Career, Human Biological and Cultural Origins*, University of Chicago Press, (1989).
125. B.F. Skinner and N. Chomsky, *Verbal behavior*, *Language*, **35** 26-58 (1959).
126. D. Bickerton, *The Roots of Language*, Karoma, Ann Arbor, Mich., (1981).
127. E. Lenneberg in *The Structure of Language: Readings in the Philosophy of Language*, J.A. Fodor and J.A. Katz editors, Prentice-Hall, Englewood Cliffs N.J., (1964).
128. S. Pinker, *Talk of genetics and visa versa*, *Nature*, **413**, 465-466, (2001).
129. S. Pinker, *Words and rules in the human brain*, *Nature*, **387**, 547-548, (1997).
130. M. Ruhelen, *The Origin of Language*, Wiley, New York, (1994).
131. C.B. Stringer and R. McKie, *African Exodus: The Origins of Modern Humanity*, Johnathan Cape, London (1996).

132. R.W. Sussman, *The Biological Basis of Human Behavior*, Prentice Hall, Englewood Cliffs, (1997).
133. D.P. Barash *Sociobiology and Behavior*, Elsevier, New York, (1977).
134. J.D. Carthy and F.J. Eblin, eds., *The Natural History of Aggression*, Academic Press, New York, (1964).
135. N.A. Chagnon and W. Irons, eds., *Evolutionary Biology and Human Social Behavior, an Anthropological Perspective*, Duxbury Press, N. Scituate, MA, (1979).
136. E. Danielson, *Vold, en Ond Arv?*, Gyldendal, Copenhagen, (1929).
137. M.R. Davie, *The Evolution of War*, Yale University Press, New Haven, CT, (1929).
138. T. Dobzhanski, *Mankind Evolving*, Yale University Press, New Haven, CT, (1962).
139. I. Eibl-Eibesfeldt, *Der Vorprogrammiert Mensch*, Molden, Vienna, (1973).
140. I. Eibl-Eibesfeldt, *Ethology, the Biology of Behavior*, Holt, Rinehart and Winston, New York, (1975).
141. I. Eibl-Eibesfeldt, *Liebe und Hass*, Molden, Vienna, (1973).
142. R.L. Holloway, *Primate Aggression: Territoriality and Xenophobia*, Academic Press, New York, (1974).
143. P. Kitcher, *Vaulting Ambition: Sociobiology and the Quest for Human Nature*, MIT Press, Cambridge, MA, (1985).
144. S.L.W. Mellen, *The Evolution of Love*, Freeman, Oxford, (1981).
145. A. Roe and G.G. Simpson, *Behavior and Evolution*, Yale University Press, New Haven, CT, (1958).
146. N.J. Smelser, *The Theory of Collective Behavior*, Free Press, New York, (1963).
147. R. Trivers, *Social Evolution*, Benjamin/Cummings, Menlo Park, CA, (1985).
148. W. Weiser, *Konrad Lorenz und seine Kritiker*, Piper, Munich, (1976).
149. W. Wickler, *Biologie der 10 Gebote*, Piper, Munich, (1971).
150. E.O. Wilson, *Sociobiology*, Harvard University Press (1975).
151. E.O. Wilson, *On Human Nature*, Bantam Books, New York, (1979).
152. C. Zahn-Waxler, *Altruism and Aggression: Biological and Social Origins*, Cambridge University Press, (1986).
153. J. Galtung, *A structural theory of aggression*, Journal of Peace Research, **1**, 95-119, (1964).
154. G.E. Kang, *Exogamy and peace relations of social units: A cross-cultural test*, Ethology, **18**, 85-99, (1979).
155. A. Montagu, *Man and Aggression*, Oxford University Press, New York, (1968).
156. W.A. Nesbitt, *Human Nature and War*, State Education Department of New York, Albany, (1973).
157. W. Suttles, *Subhuman and human fighting*, Anthropologica, **3**, 148-163, (1961).
158. V. Vale and Andrea Juno, editors, *Modern Primitives: An Investigation of Contemporary Adornment and Ritual*, San Francisco Re/Search, (1990).
159. R.A. Hinde, editor, *The Institution of War*, Cambridge University Press, (1991).
160. R.A. Hinde, *Individuals, Relationships and Culture: Links Between Ethology and the Social Sciences*, Cambridge University Press, (1987).
161. R.A. Hinde, *Ethology: Its Nature and Relationship With Other Sciences*

162. R.A. Hinde, *Animal Behaviour: A Synthesis of Ethology and Comparative Psychology*
163. R.A. Hinde, *Non-Verbal Communication*, Cambridge University Press, (1972).
164. R.A. Hinde, *Why Gods Persist: A Scientific Approach to Religion*, Routledge, London, (1999).
165. P.P.G. Bateson and R.A. Hinde, editors, *Growing Points in Ethology: Based on a Conference Sponsored by St. John's College and King's College, Cambridge*, Cambridge University Press, (1976).
166. R.A. Hinde, A.-N. Perret-Clermont and J. Stevenson-Hinde, editors, *Social Relationships and Cognitive Development*, Clarendon, Oxford, (1985).
167. R.A. Hinde and J. Stevenson-Hinde, editors, *Relationships Within Families: Mutual Influences*, Clarendon Press, Oxford, (1988).
168. P. Bateson, editor, *The Development and Integration of Behaviour: Essays in Honour of Robert Hinde*, Cambridge University Press, (1991).
169. C. Darwin, *The Expression of Emotions in Man and Animals*, The University of Chicago Press (1965).
170. P. Kropotkin, *Mutual Aid, A Factor in Evolution*, Walter Heinemann, London, (1902).
171. R.A. Fischer, *The Genetical Theory of Natural Selection*, Clarendon, Oxford, (1930).
172. J.B.S. Haldane, *Population genetics*, *New Biology* **18**, 34-51, (1955).
173. L. Margulis, *Symbiosis as a Source of Evolutionary Innovation: Speciation and Morphogenesis*, The MIT Press, (1991).
174. L. Margulis, *Symbiosis in Cell Evolution: Microbial Communities in the Archean and Proterozoic Eons*, W.H. Freeman, (1992).
175. N. Tinbergen, *The Study of Instinct*, Oxford University Press, (1951).
176. I. Eibl-Eibesfeldt, *The Biology of Peace and War*, Thames and Hudson, New York (1979).
177. E.O. Wilson, *On Human Nature*, Bantam Books, New York, (1979).
178. R.A. Hinde, *Biological Bases of Human Social Behavior*, McGraw-Hill, New York (1977).
179. R.A. Hinde, *Individuals, Relationships and Culture: Links Between Ethology and the Social Sciences*, Cambridge University Press, (1987).
180. W.M. Senner, editor, *The Origins of Writing*, University of Nebraska Press, Lincoln and London, (1989).
181. A. Robock, L. Oman, G. L. Stenchikov, O. B. Toon, C. Bardeen, and R. Turco, *Climatic consequences of regional nuclear conflicts*, *Atmospheric Chemistry and Physics*, Vol. 7, p. 2003-2012, (2007).
182. M. Mills, O. Toon, R. Turco, D. Kinnison, R. Garcia, *Massive global ozone loss predicted following regional nuclear conflict*, *Proceedings of the National Academy of Sciences (USA)*, vol. 105(14), pp. 5307-12, Apr 8, (2008).
183. O. Toon, A. Robock, and R. Turco, *The Environmental Consequences of Nuclear War*, *Physics Today*, vol. 61, No. 12, p. 37-42, (2008).

184. R. Turco, O. Toon, T. Ackermann, J. Pollack, and C. Sagan, *Nuclear Winter: Global consequences of multiple nuclear explosions*, Science, Vol. 222, No. 4630, pp. 1283-1292, December (1983).
185. A. Robock, L. Oman, G. Stenchikov, *Nuclear winter revisited with a modern climate model and current nuclear arsenals: Still catastrophic consequences*, Journal of Geophysical Research - Atmospheres, Vol. 112, No. D13, p. 4 of 14, (2007).
186. I. Helfand, *An Assessment of the Extent of Projected Global Famine Resulting From Limited, Regional Nuclear War*, International Physicians for the Prevention of Nuclear War, Physicians for Social Responsibility, Leeds, MA, (2007).
187. George P. Schultz, William J. Perry, Henry A. Kissinger and Sam Nunn, *A World Free of Nuclear Weapons*, The Wall Street Journal, January 4, 2007, page A15 and January 15, (2008), page A15.
188. Mikhail Gorbachev, *The Nuclear Threat*, The Wall Street Journal, January 30, (2007), page A15.
189. Massimo D'Alema, Gianfranco Fini, Giorgio La Malfa, Arturo Parisi and Francesco Calogero, *For a World Free of Nuclear Weapons*, Corriere Della Sera, July 24, (2008).
190. Hoover Institution, *Reykjavik Revisited; Steps Towards a World Free of Nuclear Weapons*, October, (2007).
191. Douglas Hurd, Malcolm Rifkind, David Owen and George Robertson, *Start Worrying and Learn to Ditch the Bomb*, The Times, June 30, (2008).
192. Des Brown, Secretary of State for Defense, UK, *Laying the Foundations for Multilateral Disarmament*, Geneva Conference on Disarmament, February 5, (2008).
193. Government of Norway, International Conference on *Achieving the Vision of a World Free of Nuclear Weapons*, Oslo, Norway, February 26-27, (2008).
194. Jonas Gahr Støre, Foreign Minister, Norway, *Statement at the Conference on Disarmament*, Geneva, March 4, (2008).
195. Anne-Grete Strøm-Erichsen, Defense Minister, Norway, *Emerging Opportunities for Nuclear Disarmament*, Pugwash Conference, Canada, July 11, (2008).
196. Kevin Rudd, Prime Minister, Australia, *International Commission on Nuclear Non-Proliferation and Disarmament*, Media Release, July 9, (2008).
197. Helmut Schmidt, Richard von Weizsäcker, Egon Bahr and Hans-Dietrich Genscher, *Towards a Nuclear-Free World: a German View*, International Herald Tribune, January 9, (2009).
198. Hans M. Kristensen and Elliot Negin, *Support Growing for Removal of U.S. Nuclear Weapons from Europe*, Common Dreams Newscenter, first posted May 6, (2005).
199. David Krieger, *President-elect Obama and a World Free of Nuclear Weapons*, Nuclear Age Peace Foundation Website, (2008).
200. J.L. Henderson, *Hiroshima*, Longmans (1974).
201. A. Osada, *Children of the A-Bomb, The Testament of Boys and Girls of Hiroshima*, Putnam, New York (1963).
202. M. Hachiya, M.D., *Hiroshima Diary*, The University of North Carolina Press, Chapel Hill, N.C. (1955).
203. M. Yass, *Hiroshima*, G.P. Putnam's Sons, New York (1972).

204. R. Jungk, *Children of the Ashes*, Harcourt, Brace and World (1961).
205. B. Hirschfield, *A Cloud Over Hiroshima*, Baily Brothers and Swinfin Ltd. (1974).
206. J. Hersey, *Hiroshima*, Penguin Books Ltd. (1975).
207. R. Rhodes, *Dark Sun: The Making of the Hydrogen Bomb*, Simon and Schuster, New York, (1995)
208. R. Rhodes, *The Making of the Atomic Bomb*, Simon and Schuster, New York, (1988).
209. D.V. Babst et al., *Accidental Nuclear War: The Growing Peril*, Peace Research Institute, Dundas, Ontario, (1984).
210. S. Britten, *The Invisible Event: An Assessment of the Risk of Accidental or Unauthorized Detonation of Nuclear Weapons and of War by Miscalculation*, Menard Press, London, (1983).
211. M. Dando and P. Rogers, *The Death of Deterrence*, CND Publications, London, (1984).
212. N.F. Dixon, *On the Psychology of Military Incompetence*, Futura, London, (1976).
213. D. Frei and C. Catrina, *Risks of Unintentional Nuclear War*, United Nations, Geneva, (1982).
214. H. L'Etang, *Fit to Lead?*, Heinemann Medical, London, (1980).
215. SPANW, *Nuclear War by Mistake - Inevitable or Preventable?*, Swedish Physicians Against Nuclear War, Lulea, (1985).
216. J. Goldblat, *Nuclear Non-proliferation: The Why and the Wherefore*, (SIPRI Publications), Taylor and Francis, (1985).
217. J. Schear, ed., *Nuclear Weapons Proliferation and Nuclear Risk*, Gower, London, (1984).
218. D.P. Barash and J.E. Lipton, *Stop Nuclear War! A Handbook*, Grove Press, New York, (1982).
219. C.F. Barnaby and G.P. Thomas, eds., *The Nuclear Arms Race: Control or Catastrophe*, Francis Pinter, London, (1982).
220. L.R. Beres, *Apocalypse: Nuclear Catastrophe in World Politics*, Chicago University press, Chicago, IL, (1980).
221. F. Blackaby et al., eds., *No-first-use*, Taylor and Francis, London, (1984).
222. NS, ed., *New Statesman Papers on Destruction and Disarmament* (NS Report No. 3), New Statesman, London, (1981).
223. H. Caldicot, *Missile Envy: The Arms Race and Nuclear War*, William Morrow, New York, (1984).
224. R. Ehrlich, *Waging the Peace: The Technology and Politics of Nuclear Weapons*, State University of New York Press, Albany, NY, (1985).
225. W. Epstein, *The Prevention of Nuclear War: A United Nations Perspective*, Gunn and Hain, Cambridge, MA, (1984).
226. W. Epstein and T. Toyoda, eds., *A New Design for Nuclear Disarmament*, Spokesman, Nottingham, (1975).
227. G.F. Kennan, *The Nuclear Delusion*, Pantheon, New York, (1983).
228. R.J. Lifton and R. Falk, *Indefensible Weapons: The Political and Psychological Case Against Nuclearism*, Basic Books, New York, (1982).

229. J.R. Macy, *Despair and Personal Power in the Nuclear Age*, New Society Publishers, Philadelphia, PA, (1983).
230. A.S. Miller et al., eds., *Nuclear Weapons and Law*, Greenwood Press, Westport, CT, (1984).
231. MIT Coalition on Disarmament, eds., *The Nuclear Almanac: Confronting the Atom in War and Peace*, Addison-Wesley, Reading, MA, (1984).
232. UN, *Nuclear Weapons: Report of the Secretary-General of the United Nations*, United Nations, New York, (1980).
233. IC, *Proceedings of the Conference on Understanding Nuclear War*, Imperial College, London, (1980).
234. B. Russell, *Common Sense and Nuclear Warfare*, Allen and Unwin, London, (1959).
235. F. Barnaby, *The Nuclear Age*, Almqvist and Wiksell, Stockholm, (1974).
236. D. Albright, F. Berkhout and W. Walker, *Plutonium and Highly Enriched Uranium 1996: World Inventories, Capabilities and Policies*, Oxford University Press, Oxford, (1997).
237. G.T. Allison et al., *Avoiding Nuclear Anarchy: Containing the Threat of Loose Russian Nuclear Weapons and Fissile Material*, MIT Press, Cambridge MA, (1996).
238. B. Bailin, *The Making of the Indian Atomic Bomb: Science, Secrecy, and the Post-colonial State*, Zed Books, London, (1998).
239. P. Bidawi and A. Vanaik, *South Asia on a Short Fuse: Nuclear Politics and the Future of Global Disarmament*, Oxford University Press, Oxford, (2001).
240. F.A. Boyle, *The Criminality of Nuclear Deterrence: Could the U.S. War on Terrorism Go Nuclear?*, Clarity Press, Atlanta GA, (2002).
241. G. Burns, *The Atomic Papers: A Citizen's Guide to Selected Books and Articles on the Bomb, the Arms Race, Nuclear Power, the Peace Movement, and Related Issues*, Scarecrow Press, Metuchen NJ, (1984).
242. L. Butler, *A Voice of Reason*, The Bulletin of Atomic Scientists, **54**, 58-61, (1998).
243. R. Butler, *Fatal Choice: Nuclear Weapons and the Illusion of Missile Defense*, Westview Press, Boulder CO, (2001).
244. R.P. Carlisle (Ed.), *Encyclopedia of the Atomic Age*, Facts on File, New York, (2001).
245. G.A. Cheney, *Nuclear Proliferation: The Problems and Possibilities*, Franklin Watts, New York, (1999).
246. A. Cohen, *Israel and the Bomb*, Columbia University Press, New York, (1998).
247. S.J. Diehl and J.C. Moltz, *Nuclear Weapons and Nonproliferation: A Reference Handbook*, ABC-Clio Information Services, Santa Barbara CA, (2002).
248. H.A. Feiveson (Ed.), *The Nuclear Turning Point: A Blueprint for Deep Cuts and De-Alerting of Nuclear Weapons*, Brookings Institution Press, Washington D.C., (1999).
249. R. Hilsman, *From Nuclear Military Strategy to a World Without War: A History and a Proposal*, Praeger Publishers, Westport, (1999).
250. International Physicians for the Prevention of Nuclear War and The Institute for Energy and Environmental Research *Plutonium: Deadly Gold of the Nuclear Age*, International Physicians Press, Cambridge MA, (1992).

251. R.W. Jones and M.G. McDonough, *Tracking Nuclear Proliferation: A Guide in Maps and Charts, 1998*, The Carnegie Endowment for International Peace, Washington D.C., (1998).
252. R.J. Lifton and R. Falk, *Indefensible Weapons: The Political and Psychological Case Against Nuclearism*, Basic Books, New York, (1982).
253. R.E. Powaski, *March to Armageddon: The United States and the Nuclear Arms Race, 1939 to the Present*, Oxford University Press, (1987).
254. J. Rotblat, J. Steinberger and B. Udgaonkar (Eds.), *A Nuclear-Weapon-Free World: Desirable? Feasible?*, Westview Press, (1993).
255. The United Methodist Council of Bishops, *In Defense of Creation: The Nuclear Crisis and a Just Peace*, Graded Press, Nashville, (1986).
256. U.S. Congress Office of Technology Assessment (Ed.), *Dismantling the Bomb and Managing the Nuclear Materials*, U.S. Government Printing Office, Washington D.C., (1993).
257. S.R. Weart, *Nuclear Fear: A History of Images*, Harvard University Press, (1988).
258. P. Boyer, *By the Bomb's Early Light: American Thought and Culture at the Dawn of the Atomic Age*, University of North Carolina Press, (1985).
259. C. Perrow, *Normal Accidents: Living With High-Risk Technologies*, Basic Books, (1984).
260. P. Rogers, *The Risk of Nuclear Terrorism in Britain*, Oxford Research Group, Oxford, (2006).
261. MIT, *The Future of Nuclear Power: An Interdisciplinary MIT Study*, <http://web.mit.edu/nuclearpower> (2003).
262. Z. Mian and A. Glaser, *Life in a Nuclear Powered Crowd*, INES Newsletter No. 52, 9-13, April, (2006).
263. K. Bergeron, *Nuclear Weapons: The Death of No Dual-use*, Bulletin of the Atomic Scientists, 15-17, January, (2004).
264. E. Chivian, and others (eds.), *Last Aid: The Medical Dimensions of Nuclear War*, W.H. Freeman, San Fransisco, (1982).
265. Medical Association's Board of Science and Education, *The Medical Effects of Nuclear War*, Wiley, (1983).
266. Kevin Rudd, Prime Minister, Australia, "International Commission on Nuclear Non-Proliferation and Disarmament", Media Release, July 9, 2008.
267. Global Zero, www.globalzero.org/paris-conference
268. Helmut Schmidt, Richard von Weizäcker, Egon Bahr and Hans-Dietrich Genscher, "Towards a Nuclear-Free World: a German View", International Herald Tribune, January 9, 2009.
269. Hans M. Kristensen and Elliot Negin, "Support Growing for Removal of U.S. Nuclear Weapons from Europe", Common Dreams Newscenter, first posted May 6, 2005.
270. David Krieger, "President-elect Obama and a World Free of Nuclear Weapons", Nuclear Age Peace Foundation Website, 2008.
271. J.L. Henderson, *Hiroshima*, Longmans (1974).

272. A. Osada, *Children of the A-Bomb, The Testament of Boys and Girls of Hiroshima*, Putnam, New York (1963).
273. M. Hachiya, M.D., *Hiroshima Diary*, The University of North Carolina Press, Chapel Hill, N.C. (1955).
274. M. Yass, *Hiroshima*, G.P. Putnam's Sons, New York (1972).
275. R. Jungk, *Children of the Ashes*, Harcourt, Brace and World (1961).
276. B. Hirschfield, *A Cloud Over Hiroshima*, Baily Brothers and Swinfin Ltd. (1974).
277. J. Hersey, *Hiroshima*, Penguin Books Ltd. (1975).
278. R. Rhodes, *Dark Sun: The Making of the Hydrogen Bomb*, Simon and Schuster, New York, (1995)
279. R. Rhodes, *The Making of the Atomic Bomb*, Simon and Schuster, New York, (1988).
280. D.V. Babst et al., *Accidental Nuclear War: The Growing Peril*, Peace Research Institute, Dundas, Ontario, (1984).
281. S. Britten, *The Invisible Event: An Assessment of the Risk of Accidental or Unauthorized Detonation of Nuclear Weapons and of War by Miscalculation*, Menard Press, London, (1983).
282. M. Dando and P. Rogers, *The Death of Deterrence*, CND Publications, London, (1984).
283. N.F. Dixon, *On the Psychology of Military Incompetence*, Futura, London, (1976).
284. D. Frei and C. Catrina, *Risks of Unintentional Nuclear War*, United Nations, Geneva, (1982).
285. H. L'Etang, *Fit to Lead?*, Heinemann Medical, London, (1980).
286. SPANW, *Nuclear War by Mistake - Inevitable or Preventable?*, Swedish Physicians Against Nuclear War, Lulea, (1985).
287. J. Goldblat, *Nuclear Non-proliferation: The Why and the Wherefore*, (SIPRI Publications), Taylor and Francis, (1985).
288. IAEA, *International Safeguards and the Non-proliferation of Nuclear Weapons*, International Atomic Energy Agency, Vienna, (1985).
289. J. Schear, ed., *Nuclear Weapons Proliferation and Nuclear Risk*, Gower, London, (1984).
290. D.P. Barash and J.E. Lipton, *Stop Nuclear War! A Handbook*, Grove Press, New York, (1982).
291. C.F. Barnaby and G.P. Thomas, eds., *The Nuclear Arms Race: Control or Catastrophe*, Francis Pinter, London, (1982).
292. L.R. Beres, *Apocalypse: Nuclear Catastrophe in World Politics*, Chicago University press, Chicago, IL, (1980).
293. F. Blackaby et al., eds., *No-first-use*, Taylor and Francis, London, (1984).
294. NS, ed., *New Statesman Papers on Destruction and Disarmament* (NS Report No. 3), New Statesman, London, (1981).
295. H. Caldicot, *Missile Envy: The Arms Race and Nuclear War*, William Morrow, New York, (1984).
296. R. Ehrlich, *Waging the Peace: The Technology and Politics of Nuclear Weapons*, State University of New York Press, Albany, NY, (1985).

297. W. Epstein, *The Prevention of Nuclear War: A United Nations Perspective*, Gunn and Hain, Cambridge, MA, (1984).
298. W. Epstein and T. Toyoda, eds., *A New Design for Nuclear Disarmament*, Spokesman, Nottingham, (1975).
299. G.F. Kennan, *The Nuclear Delusion*, Pantheon, New York, (1983).
300. R.J. Lifton and R. Falk, *Indefensible Weapons: The Political and Psychological Case Against Nuclearism*, Basic Books, New York, (1982).
301. J.R. Macy, *Despair and Personal Power in the Nuclear Age*, New Society Publishers, Philadelphia, PA, (1983).
302. A.S. Miller et al., eds., *Nuclear Weapons and Law*, Greenwood Press, Westport, CT, (1984).
303. MIT Coalition on Disarmament, eds., *The Nuclear Almanac: Confronting the Atom in War and Peace*, Addison-Wesley, Reading, MA, (1984).
304. UN, *Nuclear Weapons: Report of the Secretary-General of the United Nations*, United Nations, New York, (1980).
305. IC, *Proceedings of the Conference on Understanding Nuclear War*, Imperial College, London, (1980).
306. B. Russell, *Common Sense and Nuclear Warfare*, Allen and Unwin, London, (1959).
307. F. Barnaby, *The Nuclear Age*, Almqvist and Wiksell, Stockholm, (1974).
308. D. Albright, F. Berkhout and W. Walker, *Plutonium and Highly Enriched Uranium 1996: World Inventories, Capabilities and Policies*, Oxford University Press, Oxford, (1997).
309. G.T. Allison et al., *Avoiding Nuclear Anarchy: Containing the Threat of Loose Russian Nuclear Weapons and Fissile Material*, MIT Press, Cambridge MA, (1996).
310. B. Bailin, *The Making of the Indian Atomic Bomb: Science, Secrecy, and the Post-colonial State*, Zed Books, London, (1998).
311. G.K. Bertsch and S.R. Grillot, (Eds.), *Arms on the Market: Reducing the Risks of Proliferation in the Former Soviet Union*, Routledge, New York, (1998).
312. P. Bidawi and A. Vanaik, *South Asia on a Short Fuse: Nuclear Politics and the Future of Global Disarmament*, Oxford University Press, Oxford, (2001).
313. F.A. Boyle, *The Criminality of Nuclear Deterrence: Could the U.S. War on Terrorism Go Nuclear?*, Clarity Press, Atlanta GA, (2002).
314. G. Burns, *The Atomic Papers: A Citizen's Guide to Selected Books and Articles on the Bomb, the Arms Race, Nuclear Power, the Peace Movement, and Related Issues*, Scarecrow Press, Metuchen NJ, (1984).
315. L. Butler, *A Voice of Reason*, The Bulletin of Atomic Scientists, **54**, 58-61, (1998).
316. R. Butler, *Fatal Choice: Nuclear Weapons and the Illusion of Missile Defense*, Westview Press, Boulder CO, (2001).
317. R.P. Carlisle (Ed.), *Encyclopedia of the Atomic Age*, Facts on File, New York, (2001).
318. G.A. Cheney, *Nuclear Proliferation: The Problems and Possibilities*, Franklin Watts, New York, (1999).
319. A. Cohen, *Israel and the Bomb*, Columbia University Press, New York, (1998).

320. S.J. Diehl and J.C. Moltz, *Nuclear Weapons and Nonproliferation: A Reference Handbook*, ABC-Clio Information Services, Santa Barbara CA, (2002).
321. H.A. Feiveson (Ed.), *The Nuclear Turning Point: A Blueprint for Deep Cuts and De-Alerting of Nuclear Weapons*, Brookings Institution Press, Washington D.C., (1999).
322. R. Hilsman, *From Nuclear Military Strategy to a World Without War: A History and a Proposal*, Praeger Publishers, Westport, (1999).
323. International Physicians for the Prevention of Nuclear War and The Institute for Energy and Environmental Research *Plutonium: Deadly Gold of the Nuclear Age*, International Physicians Press, Cambridge MA, (1992).
324. R.W. Jones and M.G. McDonough, *Tracking Nuclear Proliferation: A Guide in Maps and Charts, 1998*, The Carnegie Endowment for International Peace, Washington D.C., (1998).
325. R.J. Lifton and R. Falk, *Indefensible Weapons: The Political and Psychological Case Against Nuclearism*, Basic Books, New York, (1982).
326. J. Rotblat, J. Steinberger and B. Udgaonkar (Eds.), *A Nuclear-Weapon-Free World: Desirable? Feasible?*, Westview Press, (1993).
327. The United Methodist Council of Bishops, *In Defense of Creation: The Nuclear Crisis and a Just Peace*, Graded Press, Nashville, (1986).
328. U.S. Congress Office of Technology Assessment (Ed.), *Dismantling the Bomb and Managing the Nuclear Materials*, U.S. Government Printing Office, Washington D.C., (1993).
329. S.R. Weart, *Nuclear Fear: A History of Images*, Harvard University Press, (1988).
330. P. Boyer, *By the Bomb's Early Light: American Thought and Culture at the Dawn of the Atomic Age*, University of North Carolina Press, (1985).
331. A. Makhijani and S. Saleska, *The Nuclear Power Deception: Nuclear Mythology From Electricity 'Too Cheap to Meter' to 'Inherently Safe' Reactors*, Apex Press, (1999).
332. C. Perrow, *Normal Accidents: Living With High-Risk Technologies*, Basic Books, (1984).
333. P. Rogers, *The Risk of Nuclear Terrorism in Britain*, Oxford Research Group, Oxford, (2006).
334. MIT, *The Future of Nuclear Power: An Interdisciplinary MIT Study*, <http://web.mit.edu/nuclearpow> (2003).
335. Z. Mian and A. Glaser, *Life in a Nuclear Powered Crowd*, INES Newsletter No. 52, 9-13, April, (2006).
336. E. Chivian, and others (eds.), *Last Aid: The Medical Dimensions of Nuclear War*, W.H. Freeman, San Fransisco, (1982).
337. P.B. Smith, J.D. Schilling and A.P. Haines, *Introduction and Summary*, in *Draft Report of the Pugwash Study Group: The World at the Crossroads*, Berlin, (1992).
338. World Resources Institute, *World Resources*, Oxford University Press, New York, (published annually).
339. J.R. Craig, D.J. Vaughan and B.J. Skinner, *Resources of the Earth: Origin, Use and Environmental Impact, Third Edition*, Prentice Hall, (2001).

340. W. Youngquist, *Geodesinies: The Inevitable Control of Earth Resources Over Nations and Individuals*, National Book Company, Portland Oregon, (1997).
341. M. Tanzer, *The Race for Resources. Continuing Struggles Over Minerals and Fuels*, Monthly Review Press, New York, (1980).
342. C.B. Reed, *Fuels, Minerals and Human Survival*, Ann Arbor Science Publishers Inc., Ann Arbor Michigan, (1975).
343. A.A. Bartlett, *Forgotten Fundamentals of the Energy Crisis*, American Journal of Physics, **46**, 876-888, (1978).
344. N. Gall, *We are Living Off Our Capital*, Forbes, September, (1986).

Chapter 6

ECOLOGY AND THE VIETNAM WAR

6.1 McNamara's evil lives on

Here are some quotations from an article by Robert Sheer entitled *McNamara's Evil Lives On*, published in *The Nation* on July 8, 2008.¹

Why not speak ill of the dead?

Robert McNamara, who died this week, was a complex man - charming even, in a blustery way, and someone I found quite thoughtful when I interviewed him. In the third act of his life he was often an advocate for enlightened positions on world poverty and the dangers of the nuclear arms race. But whatever his better nature, it was the stark evil he perpetrated as secretary of defense that must indelibly frame our memory of him.

To not speak out fully because of respect for the deceased would be to mock the memory of the millions of innocent people McNamara caused to be maimed and killed in a war that he later freely admitted never made any sense. Much has been made of the fact that he recanted his support for the war, but that came 20 years after the holocaust he visited upon Vietnam was over.

Is holocaust too emotionally charged a word? How many millions of dead innocent civilians does it take to qualify labels like holocaust, genocide or terrorism? How many of the limbless victims of his fragmentation bombs and land mines whom I saw in Vietnam during and after the war? Or are America's leaders always to be exempted from such questions? Perhaps if McNamara had been held legally accountable for his actions, the architects of the Iraq debacle might have paused.

Instead, McNamara was honored with the Medal of Freedom by President Lyndon Johnson, to whom he had written a private memo nine months earlier

¹<https://www.thenation.com/article/archive/mcnamaras-evil-lives/>

offering this assessment of their Vietnam carnage: 'The picture of the world's greatest superpower killing or seriously injuring 1,000 noncombatants a week, while trying to pound a tiny backward nation into submission on an issue whose merits are hotly disputed, is not a pretty one.'

He knew it then, and, give him this, the dimensions of that horror never left him. When I interviewed him for the Los Angeles Times in 1995, after the publication of his confessional memoir, his assessment of the madness he had unleashed was all too clear:

'Look, we dropped three to four times the tonnage on that tiny little area as were dropped by the Allies in all of the theaters in World War II over a period of five years. It was unbelievable. We killed - there were killed - 3,200,000 Vietnamese, excluding the South Vietnamese military. My God! The killing, the tonnage - it was fantastic. The problem was that we were trying to do something that was militarily impossible - we were trying to break the will; I don't think we can break the will by bombing short of genocide.'

We - no, he - couldn't break their will because their fight was for national independence. They had defeated the French and would defeat the Americans who took over when French colonialists gave up the ghost. The war was a lie from the first. It never had anything to do with the freedom of the Vietnamese (we installed one tyrant after another in power), but instead had to do with our irrational cold war obsession with 'international communism.' Irrational, as President Richard Nixon acknowledged when he embraced detente with the Soviet communists, toasted China's fierce communist Mao Tse-tung and then escalated the war against 'communist' Vietnam and neutral Cambodia.

It was always a lie and our leaders knew it, but that did not give them pause. Both Johnson and Nixon make it quite clear on their White House tapes that the mindless killing, McNamara's infamous body count, was about domestic politics and never security.

The lies are clearly revealed in the Pentagon Papers study that McNamara commissioned, but they were made public only through the bravery of Daniel Ellsberg. Yet when Ellsberg, a former Marine who had worked for McNamara in the Pentagon, was in the docket facing the full wrath of Nixon's Justice Department, McNamara would lift not a finger in his defense. Worse, as Ellsberg reminded me this week, McNamara threatened that if subpoenaed to testify at the trial by Ellsberg's defense team, 'I would hurt your client badly.'

Not as badly as those he killed or severely wounded. Not as badly as the almost 59,000 American soldiers killed and the many more horribly hurt. One of them was the writer and activist Ron Kovic, who as a kid from Long Island was seduced by McNamara's lies into volunteering for two tours in Vietnam. Eventually, struggling with his mostly paralyzed body, he spoke out against the war in the hope that others would not have to suffer as he did (and still does). Meanwhile, McNamara maintained his golden silence, even as Richard Nixon managed to kill and maim millions more. What McNamara did was evil

- deeply so.

6.2 The Pentagon Papers

Wikipedia states that:

The Pentagon Papers, officially titled *Report of the Office of the Secretary of Defense Vietnam Task Force*, is a United States Department of Defense history of the United States' political and military involvement in Vietnam from 1945 to 1967. The papers were released by Daniel Ellsberg, who had worked on the study; they were first brought to the attention of the public on the front page of *The New York Times* in 1971. A 1996 article in *The New York Times* said that the Pentagon Papers had demonstrated, among other things, that the Johnson Administration 'systematically lied, not only to the public but also to Congress.'

More specifically, the papers revealed that the U.S. had secretly enlarged the scope of its actions in the Vietnam War with the bombings of nearby Cambodia and Laos, coastal raids on North Vietnam, as well as Marine Corps attacks, none of which were reported in the mainstream media. For his disclosure of the Pentagon Papers, Ellsberg was initially charged with conspiracy, espionage, and theft of government property, but the charges were later dismissed after prosecutors investigating the Watergate scandal discovered that the staff members in the Nixon White House had ordered the so-called White House Plumbers to engage in unlawful efforts to discredit Ellsberg...

To ensure the possibility of public debate about the papers' content, on June 29, US Senator Mike Gravel, an Alaska Democrat, entered 4,100 pages of the papers into the record of his Subcommittee on Public Buildings and Grounds. These portions of the papers, which were edited for Gravel by Howard Zinn and Noam Chomsky, were subsequently published by Beacon Press, the publishing arm of the Unitarian Universalist Association of Congregations. A federal grand jury was subsequently empaneled to investigate possible violations of federal law in the release of the report. Leonard Rodberg, a Gravel aide, was subpoenaed to testify about his role in obtaining and arranging for publication of the Pentagon Papers. Gravel asked the court (in *Gravel v. United States*) to quash the subpoena on the basis of the Speech or Debate Clause in Article I, Section 6 of the United States Constitution.

Daniel Ellsberg believed that when U.S. citizens discovered that the Vietnam War was based on lies, the war would end. However, it continued for many more years.



Figure 6.1: Victims of the Mai Lai Massacre.



Figure 6.2: Napalm burn victims during the war being treated at the 67th Combat Support Hospital. 1967-1968 Innocent children become burn victims in the Vietnam War.



Figure 6.3: Frightened children flee from an air attack in Vietnam.

6.3 Effects of Agent Orange

Wikipedia states that:

“Up to four million people in Vietnam were exposed to the defoliant. The government of Vietnam says as many as three million people have suffered illness because of Agent Orange,[4] and the Red Cross of Vietnam estimates that up to one million people are disabled or have health problems as a result of Agent Orange contamination. The United States government has described these figures as unreliable, while documenting higher cases of leukemia, Hodgkin’s lymphoma, and various kinds of cancer in exposed US military veterans. An epidemiological study done by the Centers for Disease Control and Prevention showed that there was an increase in the rate of birth defects of the children of military personnel as a result of Agent Orange. Agent Orange has also caused enormous environmental damage in Vietnam. Over 3,100,000 hectares (31,000 km² or 11,969 mi²) of forest were defoliated. Defoliants eroded tree cover and seedling forest stock, making reforestation difficult in numerous areas. Animal species diversity sharply reduced in contrast with unsprayed areas.”



Figure 6.4: Nguyen Xuan Minh lies in a crib at the Tu Du Hospital May 2, 2005 in Ho Chi Minh City, Vietnam.



Figure 6.5: A disabled and malformed victim of foliant Agent Orange, begs on the streets of Saigon to make a living, 1996.

6.4 Bombing of Cambodia and Laos

According to an article by Jessica Pearce Rotondi entitled *Why Laos Has Been Bombed More Than Any Other Country*²,

“The U.S. bombing of Laos (1964-1973) was part of a covert attempt by the CIA to wrest power from the communist Pathet Lao, a group allied with North Vietnam and the Soviet Union during the Vietnam War.

“The officially neutral country became a battleground in the Cold War between the United States and Soviet Union, with American bombers dropping over two million tons of cluster bombs over Laos - more than all the bombs dropped during WWII combined. Today, Laos is the most heavily bombed nation in history. Here are facts about the so-called secret war in Laos.

“Laos is a landlocked country bordered by China and Myanmar to the North, Vietnam to the East, Cambodia to the South and Thailand and the Mekong River to the West.

“Its proximity to Mao Zedong’s China made it critical to Dwight D. Eisenhower’s Domino Theory of keeping communism at bay. ‘If Laos were lost, the rest of Southeast Asia would follow,’ Eisenhower told his National Security Council. On the day of his farewell address in 1961, President Eisenhower approved the CIA’s training of anti-communist forces in the mountains of Laos. Their mission: To disrupt communist supply routes across the Ho Chi Minh Trail to Vietnam.

“Eisenhower’s successors in the White House: John F. Kennedy, Lyndon B. Johnson and Richard Nixon, all approved escalating air support for the guerrilla fighters, but not publicly. The 1962 International Agreement on the Neutrality of Laos, signed by China, the Soviet Union, Vietnam, the United States and 10 other countries, forbid signers from directly invading Laos or establishing military bases there. The secret war in Laos had begun...

“In Laos, the legacy of U.S. bombs continues to wreak havoc. Since 1964, more than 50,000 Lao have been killed or injured by U.S. bombs, 98 percent of them civilians. An estimated 30 percent of the bombs dropped on Laos failed to explode upon impact, and in the years since the bombing ended, 20,000 people have been killed or maimed by the estimated 80 million bombs left behind.”

By 1975, one tenth of the population of Laos had been killed by the bombs, and a quarter of the population were refugees.

²<https://www.history.com/news/laos-most-bombed-country-vietnam-war>

Cambodia

Here are some quotations from an article by Maximilian Wechsler entitled *America's 'Secret War' and the Bombing of Southeast Asia*³:

“On March 18, 1969, USAF Strategic Air Command (SAC) B-52 bombers began carpet bombing Cambodia on the order of President Nixon. The overall covert operation was code-named ‘Operation Menu’, with various phases named ‘Breakfast’, ‘Lunch’, ‘Dinner’, ‘Snack’, ‘Supper’ and ‘Dessert’.

“President Nixon ordered the campaign without consulting Congress and even kept it secret from top military officials. Five members of Congress were informed several months after the start of Operation Menu, but it was kept secret from the American people until The New York Times broke the story in May 1969. Henry Kissinger, President Nixon’s National Security Adviser, was reportedly outraged over the leaked information in the story and ordered the FBI to wiretap the phones of top White House aides and reporters to find the source.

“More reports of the secret bombing campaign surfaced in the press and records of Congressional proceedings, but it was not until 2000 that official the USAF records of US bombing activity over Indochina from 1964 to 1973 were declassified by President Bill Clinton.

“Some sources say that during the first phase of the bombings lasting until April 1970, ‘Operation Breakfast’, the SAC conducted 3,630 sorties and dropped 110,000 tons of bombs and that in the entire four-year campaign the US dropped about 540,000 tons of bombs. In the book *Bombs Over Cambodia*, historians Ben Kiernan and Taylor Owen state that, based on their analysis of the declassified documents, 2,756,941 tons of ordnance was dropped during Operation Menu, more than the US dropped on Japan during World War II.

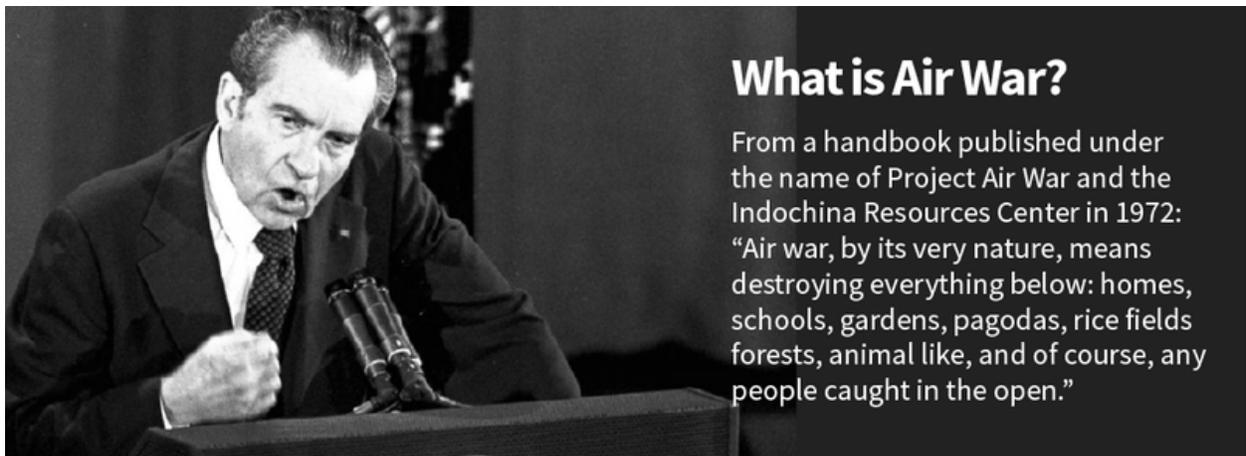
“The authors also say that US planes flew 230,516 sorties over 113,716 sites. Estimates of casualties vary widely as well, but it is believed that somewhere between 100,000 and 600,000 civilians died in the bombing and two million became homeless. Some sources say that hundreds of thousands more Cambodians died from the effects of displacement, illness or starvation as a direct result of the bombings.

“The carpet bombing of Cambodia lasted until August 1973. It devastated the countryside and the chaos and upheaval it unleashed played a big part in the installation of the genocidal Khmer Rouge regime led by Pol Pot. The Khmer Rouge was responsible for the deaths of up to two million Cambodians through executions, forced labour and starvation.”

³<https://www.thebigchilli.com/feature-stories/americas-secret-war-and-the-bombing-of-southeast-asia>



President Nixon



Suggestions for further reading

1. Anderson, David L. (2004). *Columbia Guide to the Vietnam War*. New York: Columbia University Press.
2. Angio, Joe. *Nixon a Presidency Revealed* (2007) The History Channel television documentary
3. Appy, Christian G. (2006). *Vietnam: The Definitive Oral History, Told from All Sides*. London: Ebury Press.
4. Baker, Kevin. *Stabbed in the Back! The past and future of a right-wing myth*, Harper's Magazine (June 2006)
5. Berman, Larry (1989). *Lyndon Johnson's War: The Road to Stalemate in Vietnam*. New York: W. W. Norton & Company.
6. Blaufarb, Douglas S. (1977). *The Counterinsurgency Era: U.S. Doctrine and Performance, 1950 to the Present*. New York: Free Press.
7. Blaufarb Douglas S. *The Counterinsurgency Era* (1977). A history of the Kennedy Administration's involvement in South Vietnam.
8. Brigham, Robert K. *Battlefield Vietnam: A Brief History*. A PBS interactive website.
9. Brocheux, Pierre (2007). *Ho Chi Minh: a biography*. Cambridge University Press. p. 198.
10. Buckley, Kevin. *Pacification's Deadly Price*, Newsweek, 19 June 1972.
11. Buzzanco, Bob. *25 Years After End of Vietnam War: Myths Keep Us from Coming to Terms with Vietnam*, The Baltimore Sun (17 April 2000) "25 Years After End of Vietnam War Myths Keep Us From Coming To Terms With Vietnam". Archived from the original on 5 June 2008. Retrieved 11 June 2008.
12. Carney, Timothy (1989). *The Unexpected Victory*. In Karl D. Jackson, ed., *Cambodia, 1975-1978: Rendezvous with Death* (pp. 13-35). Princeton, NJ: Princeton University Press.
13. Church, Peter, ed. (2006). *A Short History of South-East Asia*.
14. Cooper, Chester L. (1970). *The Lost Crusade: America in Vietnam*.
15. Cooper, John F. (2019). *Communist Nations' Military Assistance*. Routledge.
16. Courtwright, David T. (2005). *Sky as Frontier: Adventure, Aviation, and Empire*. College Station, TX: Texas A&M University Press.
17. Crook, John R. (2008). *Court of Appeals Affirms Dismissal of Agent Orange Litigation*. American Journal of International Law. 102 (3): 662-64.
18. Crump, Laurien (2015). *The Warsaw Pact Reconsidered: International Relations in Eastern Europe, 1955-1969*. Oxon: Routledge.
19. Demma, Vincent H. (1989). *The U.S. Army in Vietnam*. American Military History. Washington, DC: US Army Center of Military History. pp. 619-94.
20. Dennis, Peter; et al. (2008). *The Oxford Companion to Australian Military History (Second ed.)*. Melbourne: Oxford University Press Australia & New Zealand. ISBN 978-0195517842.
21. DoD (6 November 1998). *Name of Technical Sergeant Richard B. Fitzgibbon to be added to the Vietnam Veterans Memorial*. Department of Defense (DoD). Archived from the original on 20 October 2013.

22. Duiker, William J. (1981). *The Communist Road to Power in Vietnam*. Westview Press. ISBN 978-0891587941.
23. Duncanson, Dennis J. (1968). *Government and Revolution in Vietnam*. Oxford University Press. OCLC 411221.
24. Etcheson, Craig (2005). *After the Killing Fields: Lessons from the Cambodian Genocide*. New York: Praeger.
25. Fall, Bernard B. (1967). *The Two Viet-Nams: A Political and Military Analysis (2nd ed.)*. New York: Praeger.
26. Fincher, Ernest Barksdale, *The Vietnam War* (1980).
27. Ford, Harold P. (1998). *CIA and the Vietnam Policymakers: Three Episodes, 1962-1968*.
28. Gerdes, Louise I., ed. (2005). *Examining Issues Through Political Cartoons: The Vietnam War*. Greenhaven Press.
29. Gettleman, Marvin E.; Franklin, Jane; Young, Marilyn *Vietnam and America: A Documented History*. (1995).
30. Greiner, Bernd (2010). *War Without Fronts: The USA in Vietnam*. London: Vintage Books.
31. Hammond, William. *Public Affairs: The Military and the Media, 1962-1968* (1987); *Public Affairs: The Military and the Media, 1968-1973* (1995). Full-scale history of the war by U.S. Army; much broader than title suggests.
32. Healy, Gene (2009). *The Cult of the Presidency: America's Dangerous Devotion to Executive Power*. Cato Institute.
33. Herring, George C. (2001). *America's Longest War: The United States and Vietnam, 1950-1975* (4th ed.). New York: McGraw-Hill.
34. Hitchens, Christopher. *The Vietnam Syndrome*.
35. Holm, Jeanne (1992). *Women in the Military: An Unfinished Revolution (Rev. ed.)*. Novato, CA: Presidio Press.
36. Karnow, Stanley (1997). *Vietnam: A History (2nd ed.)*. New York: Penguin Books.
37. Kelly, Michael P. (2002). *Where We Were in Vietnam*. Oregon: Hellgate Press.
38. Khong, Yuen Foong (1992). *Analogies at War: Korea, Munich, Dien Bien Phu, and the Vietnam Decisions of 1965*. Princeton University Press.
39. Kiernan, Ben (2008). *The Pol Pot Regime: Race, Power, and Genocide in Cambodia Under the Khmer Rouge (3rd ed.)*. New Haven, Connecticut: Yale University Press.
40. Kolko, Gabriel (1985). *Anatomy of a War: Vietnam, the United States, and the Modern Historical Experience*. New York: Pantheon Books.
41. Kutler, Stanley I., ed. (1996). *Encyclopedia of the Vietnam War*. New York: Charles Scribner's Sons.
42. Lawrence, A.T. (2009). *Crucible Vietnam: Memoir of an Infantry Lieutenant*. Jefferson, North Carolina: McFarland.
43. Lawrence, Mark Atwood (2008). *The Vietnam War: A Concise International History*. Oxford University Press.
44. Leepson, Marc ed. (1999). *Dictionary of the Vietnam War*. New York: Webster's New World.

45. Lewy, Guenter (1978). *America in Vietnam*. New York: Oxford University Press.
46. Logevall, Fredrik (2001). *The Origins of the Vietnam War*. Harlow: Longman.
47. McGibbon, Ian; ed (2000). *The Oxford Companion to New Zealand Military History*. Auckland: Oxford University Press.
48. McMahan, Robert J. (1995). *Major Problems in the History of the Vietnam War: Documents and Essays*.
49. McNamara, Robert S.; Blight, James G.; Brigham, Robert K.; Biersteker, Thomas J.; Schandler, Herbert (1999). *Argument Without End: In Search of Answers to the Vietnam Tragedy*. New York: PublicAffairs.
50. McNeill, Ian (1993). *To Long Tan: The Australian Army and the Vietnam War 1950-1966*. St Leonards: Allen & Unwin.
51. Milne, David (2008). *America's Rasputin: Walt Rostow and the Vietnam War*. New York: Hill & Wang.
52. Morse, Edwin E. (1996). *Tonkin Gulf and the Escalation of the Vietnam War*. Chapel Hill, North Carolina: University of North Carolina Press.
53. Moss, George D. *Vietnam (4th ed 2002)* textbook.
54. Moyar, Mark (2006). *Triumph Forsaken: The Vietnam War, 1954-1965*. New York: Cambridge University Press.
55. Major General Spurgeon Neel. *Medical Support of the U.S. Army in Vietnam 1965-1970* (Department of the Army 1991) official medical history
56. Neale, Jonathan (2001). *The American War: Vietnam, 1960-1975*. London: Bookmarks.
57. Nelson, Deborah (2008). *The War Behind Me: Vietnam Veterans Confront the Truth about U.S. War Crimes*. Philadelphia, PA: Basic Books.
58. Nulty, Bernard. *The Vietnam War* (1998) New York: Barnes and Noble.
59. Oberdorfer, Don (2001) [1971]. *Tet! The Turning Point in the Vietnam War*. Baltimore, MD: Johns Hopkins University Press.
60. Obermeyer, Ziad; Murray, Christopher J.L.; Gakidou, Emmanuela (2008). *Fifty years of violent war deaths from Vietnam to Bosnia: analysis of data from the world health survey programme*. BMJ. 336 (7659): 1482-86.
61. Olson, James S.; Roberts, Randy (2008). *Where the Domino Fell: America and Vietnam, Where the Domino Fell: America and Vietnam 1945-1995 (5th ed.)*. Malden, MA: Blackwell Publishing.
62. Palmer, Bruce Jr. *The Twenty-Five Year War*. (1984), narrative military history by a senior U.S. general.
63. Palmer, Dave R. (1978). *Summons of Trumpet: U.S.-Vietnam in Perspective*. Novato, CA: Presidio Press.
64. Palmer, Michael G. (2007). *The Case of Agent Orange*. Contemporary Southeast Asia. 29 (1): 172-95.
65. Prados, John (2006). *The Road South: The Ho Chi Minh Trail*. In Andrew Wiest, ed., *Rolling Thunder in a Gentle Land* (pp. 74-95). Oxford: Osprey Publishing.
66. Robbins, Mary Susannah (2007). *Against the Vietnam War: Writings by Activists*. Lanham, MD: Rowman & Littlefield Publishers.

67. Roberts, Anthea (2005). *The Agent Orange Case: Vietnam Ass'n for Victims of Agent Orange/Dioxin v. Dow Chemical Co.* ASIL Proceedings. 99 (1): 380-85.
68. Roberts III, Mervyn Edwin. *The Psychological War for Vietnam, 1960-1968* (2018)
69. Schandler, Herbert Y. (2009). *America in Vietnam: The War That Couldn't Be Won.* Lanham, MD: Rowman & Littlefield.
70. Schell, Jonathan. *The Time of Illusion* (1976).
71. Schulzinger, Robert D. *A Time for War: The United States and Vietnam, 1941-1975* (1997).
72. Sheehan, Neil (1989). *A Bright Shining Lie: John Paul Vann and America in Vietnam.* New York: Vintage.
73. Sorley, Lewis, *A Better War: The Unexamined Victories and Final Tragedy of America's Last Years in Vietnam.* (1999), based upon still classified tape-recorded meetings of top level US commanders in Vietnam,
74. Spector, Ronald. *After Tet: The Bloodiest Year in Vietnam* (1992), very broad coverage of 1968.
75. Stanton, Shelby L. (2003). *Vietnam order of battle (2003 ed.).* Stackpole Books.
76. Stone, Richard (2007). *Agent Orange's Bitter Harvest.* Science. 315 (5809): 176-79.
77. Stuart-Fox, Martin (1997). *A History of Laos.* Cambridge: Cambridge University Press.
78. Summers, Harry G. *On Strategy: A Critical Analysis of the Vietnam War,* Presidio press (1982),
79. Thayer, Thomas C. (1985). *War Without Fronts: The American Experience in Vietnam.* Boulder, CO: Westview Press.
80. Tucker, Spencer. ed. *Encyclopedia of the Vietnam War,* (1998) 3 vol. reference set; also one-volume abridgement (2001).
81. Tucker, Spencer (2011) [1998]. *The Encyclopedia of the Vietnam War: A Political, Social, and Military History.* ABC-CLIO.
82. Turner, Robert F. (1975). *Vietnamese Communism: Its Origins and Development.* Stanford, CA: Hoover Institution Press.
83. Turse, Nick (2013). *Kill Anything That Moves: The Real American War in Vietnam.* New York: Metropolitan Books.
84. Vietnam Task Force (1969). *Report of the Office of the Secretary of Defense Vietnam Task Force.* Washington, DC: Office of the Secretary of Defense.
85. Westheider, James E. (2007). *The Vietnam War.* Westport, CN: Greenwood Press. ISBN 978-0313337550.
86. Willbanks, James H. (2009). *Vietnam War almanac.* Infobase Publishing. ISBN 978-0816071029.
87. Witz, James J. *The Tet Offensive: Intelligence Failure in War* (1991).
88. Woodruff, Mark (2005). *Unheralded Victory: The Defeat of The Viet Cong and The North Vietnamese.* Arlington, VA: Presidio Press.
89. Young, Marilyn B. (1991). *The Vietnam Wars, 1945-1990.* New York: HarperPerennial.

Chapter 7

THE “WAR AGAINST TERROR”

7.1 Perpetual war

The military-industrial complex needs enemies. Without them it would wither. Thus at the end of the Second World War, this vast power complex was faced with a crisis, but it was saved by the discovery of a new enemy: communism. However, at the end of the Cold War there was another terrible crisis for the military establishment, the arms manufacturers and their supporters in research, government and the mass media. People spoke of the “peace dividend”, i.e., constructive use of the trillion dollars that the world wastes each year on armaments. However, just in time, the military-industrial complex was saved from the nightmare of the “peace dividend” by the September 11 attacks on New York and Washington.

No matter that the attacks were crimes committed by individuals rather than acts of war, crimes against which police action rather than military action would have been appropriate. The Bush Administration (and CNN, Fox, etc.) quickly proclaimed that a state of war existed, and that the rules of war were in effect. The Cold War was replaced with the “War on Terrorism”.

To a large extent, this over-reaction to the events of 9/11/2001 can be interpreted in terms of the needs of the military-industrial complex against which Eisenhower had warned. Without a state of war and without enemies, this vast conglomerate of organizations and pressure groups would have languished.

If the aim of the “War on Terror” had been to rid the world of the threat of terrorism, acts like illegal assassination using drones would have been counterproductive, since they create many more terrorists than they destroy. But since the real aim is to produce a state of perpetual war, thus increasing the profits of the military-industrial complex, such methods are the best imaginable. Urinating on Afghan corpses or burning the Koran or murderous night-time raids on civilian homes also help to promote the real goal: perpetual war.

Even the events that initiated the “War on Terror”, seem to have been made worse than they otherwise might have been, in order to give a better excuse for invading Iraq, attacking

Afghanistan, and attacking civil liberties. There is evidence that a number of highly placed officials in the US government knew as early as April 2001 that the World Trade Center might soon be attacked. The testimony given by CIA insider Susan Lindauer is very explicit about this point. There is also evidence that charges of thermite were placed on the steel structures of several buildings, to melt the steel and thus ensure collapse. Molten steel and traces of thermite were found in the ruins before these were sealed off from public scrutiny by the FBI.

The collapse of Building 7 (which was not hit by any aircraft) is particularly suspicious. Larry Silverstein, the leaseholder of the World Trade Center, said shortly afterwards in a PBS interview: “I remember getting a call from the fire department commander telling me that they were not sure that they would be able to contain the fire...” (and he said that) “I think that the smartest thing to do is to pull it.” The phrase “pull it” is one used to speak of controlled demolition, and the subsequent free-falling collapse of Building 7 had all the earmarks of this process.

Architects and Engineers for 9/11 Truth, an organization of more than a thousand accredited architects and engineers, have produced a two hour documentary film pointing to evidence that the collapse of the World Trade Center buildings was due to explosive charges of thermite rather than to fire or the impact of airplanes ¹

For those who belong to the military-industrial complex, perpetual war is a blessing, but for the majority of the people of the world it is a curse. Since we who oppose war are the vast majority, can we not make our wills felt?

7.2 Are we being driven like cattle?

As we stand in line for security checks at airports, we may have the distinct feeling that we are being herded like cattle. Air travel has changed, and has become much less pleasant, since the fear of terrorism replaced the fear of communism as the excuse that governments give for diverting colossal sums of money from desperately needed social goals into the bottomless pit of war. Innocent grandmothers, and their grandchildren, are required to remove their shoes and belts. Everyone is treated like a criminal. It is a humiliating experience. We may well feel like dumb driven cattle; and the purpose of the charade is not so much to prevent airliners from being sabotaged as it is to keep the idea of terrorism fresh in our minds.

Is the threat of terrorism real? Or is it like the barking of a dog driving a herd? The threat of climate change is very real indeed. The threat to future global food security is real too. Already 11 million children die every year from malnutrition and poverty-related causes. The threat to human civilization and the biosphere posed by a possible Third World War is real. The threat of exhaustion of non-renewable resources and economic collapse is real. The dangers associated with our unstable fractional reserve banking system are also real. Beside these all too real threats to our future, the threat of terrorism is negligible.

¹<https://topdocumentaryfilms.com/911-explosive-evidence-experts-speak-out/>



Figure 7.1: **Passengers waiting to be examined before boarding their flights.**

Millions starve. Millions die yearly from preventable diseases. Millions die as a consequence of wars. Compared with these numbers, the total count of terrorist victims is vanishingly small. It is even invisible compared with the number of people killed yearly in automobile accidents.

Terrorism is an invented threat. Our military industrial complex invented it to take the place of the threat of communism after the end of the Cold War. They invented it so that they would be able to continue spending 1,700,000,000,000 dollars each year on armaments, an amount almost too large to be imagined.

So the people, the driven cattle, have been made to fear terrorism. How was this done? It was easy after 9/11. Could it be that the purpose of the 9/11 disaster was to make people fear terrorism, so that they could be more easily manipulated, more easily deprived of their civil rights, more easily driven into a war against Iraq? There is strong evidence that many highly placed governmental figures knew well in advanced that the World Trade Center would be attacked, and that they made the disaster much worse than it otherwise would have been. This evidence is available on the Internet. ²

²<http://www.transcend.org/tms/2013/12/911-explosive-evidence-experts-speak-out/>
<https://www.youtube.com/watch?v=7OE3Adu4l0g>
<http://www.youtube.com/watch?v=e-wXcJA-et0>



Figure 7.2: Are we being driven like cattle? Is the true purpose of excessive security checks to make people believe that terrorism is a major danger?





Figure 7.3: Building 7 was not hit by any airplane. Suddenly, six hours after the collapse twin towers, it collapsed in what experts have testified to be a classic example of controlled demolition.



Figure 7.4: Molten steel pouring from one of the twin towers before its collapse.



Figure 7.5: The heat of an ordinary fire is far below the temperature needed to melt steel.

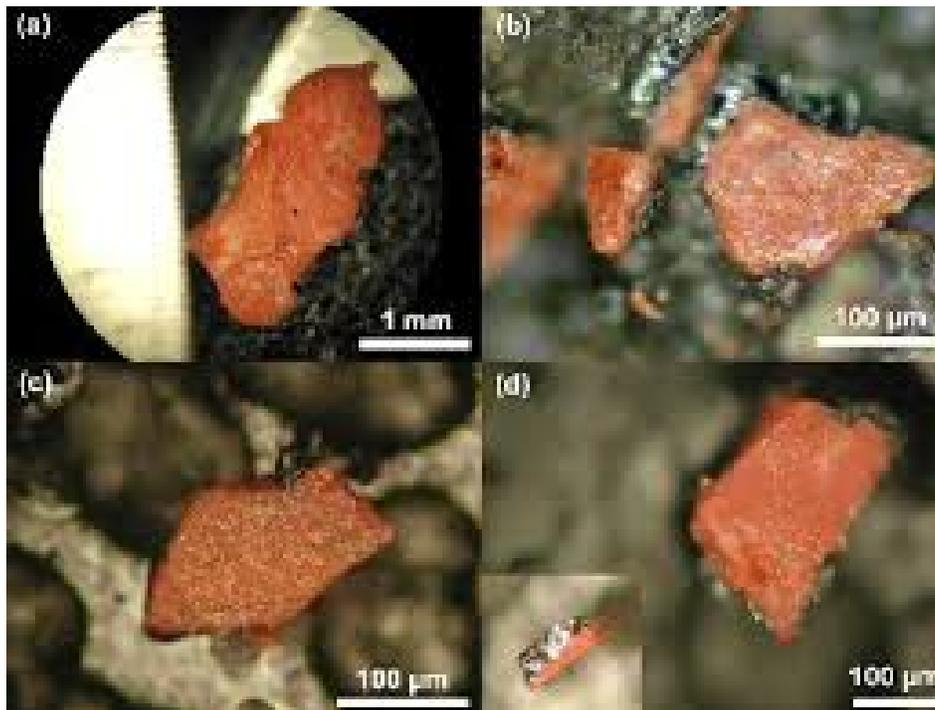


Figure 7.6: Many samples of dust were collected after the collapse of the World Trade Center buildings. In all of these samples, traces of nanothermite were found. Nanothermite is compound that produces intense heat when it is burned, and it can be used for melting steel.

7.3 Media exaggeration of attacks in Paris

For more than a week after the terrorist attacks in Paris on 13 November, 2015, every television news program of any kind was completely dominated by non-stop day-and-night coverage of the “breaking news”. The attacks, in which 130 people were killed and 80-99 seriously injured, were presented by our mass media with such a concentration of hysteria that they blotted out every other type of news from the public consciousness. The rather small number of people killed or injured by the attackers did not seem to matter. Our corporate-controlled mass media succeeded in robbing us of our sense of proportion.

With the extremely important Climate Conference COP21 starting in the same city, Paris, on 30 November, we urgently need to regain our lost sense of proportion. Is terrorism a great danger to human civilization and the biosphere? Or is it something very small, that has been blow up to a completely disproportionate size by our perfidious mass media in order to sell wars, sell weapons, to undermine civil liberties, and to disenfranchise ordinary citizens?

Comparing terrorism with other risks

What are the real dangers? What is their comparative size, in terms of numbers of people involved? Science is unanimous in telling us that out-of-control climate change, thermonuclear war, and large-scale famine are the real threats.

Consider what would happen if the change from fossil fuels to 100% renewable energy is not completed within a few decades: We know from the geological record that there have been 5 mass extinction events during each of which more than half of all living organisms became extinct. The largest of these was the Permian-Triassic event, during which 96% of all marine species became extinct, together with 70% of all terrestrial vertebrates.

If we do not quickly shift from fossil fuels to renewable energy, we will be in danger of passing a tipping point, beyond which human efforts to control climate change will be useless because feed-back loops such as the albedo effect and the methane-hydrate feedback loop will have taken over. If we do not act quickly and globally to change from fossil fuels to renewable energy, there is a danger of a human-caused 6th mass extinction. The human species might survive such an event by moving to polar or high mountainous regions, but the global population would then be measured in millions rather than in billions. The family trees of most humans living today would die out. Added to this tragedy, would be the tragic loss of most of the animal and plant species which we value today and strive to protect.

Is a shift from fossil fuels to 100% renewable energy possible? Such a shift must come within a century or so because of the exhaustion of coal, oil and gas resources. However, it is vitally important that the change should come quickly, within a very few decades, to avoid a tipping point beyond which climate change would become uncontrollable. Hope that this energy revolution is indeed technically possible comes especially from the current extremely high rates of growth of wind and solar power. If these growth rates are maintained, the transition to renewable energy can be accomplished within two decades.

It is important that the governmental subsidies that are currently paid to fossil fuel corporations should be discussed at COP21. In 2011, these subsidies amounted to more than \$500 billion globally, compared with only \$88 billion given to support renewable energy initiatives. These proportions must be reversed. In fact, subsidies to fossil fuel corporations ought to be abolished entirely. Given a more level playing field, renewable energy can win simply by being cheaper than fossil fuels.

Let us turn next to the danger of thermonuclear war. Unless nuclear weapons are completely abolished, there will be a continual danger that a catastrophic war of this type may occur by accident or miscalculation. In any given year, this danger is finite, but over a long period of time, the chance that a disaster will not occur becomes vanishingly small. Such a war would be an environmental catastrophe, affecting neutral countries as well as belligerents. Agriculture might be damaged to such an extent that the resulting global famine could involve a large fraction of the world's human population.

Finally, we must consider the threat of a global famine partly due to climate change, but also due to explosively growing human populations and the end of fossil fuels, on which modern high-yield agriculture depends.

7.4 Driven towards war by fake threats

Are we being driven like cattle into another war, by another fake threat? Is Iran really a threat? It is a country which has not attacked any of its neighbors for a century, although it has frequently itself been attacked. Israel has 300 nuclear weapons, and the US has many thousands, yet they claim that Iran's civilian nuclear program is a threat. Is it a real threat, or are we being driven, like cattle, by a false threat.

The precipice towards which we are being driven is very dangerous indeed. There is a real danger that a military attack on Iran could escalate uncontrollably into World War III. As we approach the 100th anniversary of the start of World War I, we should remember that this catastrophic conflagration was started as a limited operation by Austria to punish the Serbian nationalists, but it escalated uncontrollably.

The Middle East is already a deeply troubled region, and it is a region in which the US and Israel cannot be said to be universally popular. Might not an attack on Iran initiate a revolution in Pakistan, thus throwing Pakistan's nuclear weapons into the conflict on the side of Iran? Furthermore, both China and Russia are staunch allies of Iran. Perhaps they would be drawn into the war. At the very least, China would certainly do economic damage to the US by means of its large dollar holdings.

Let us stop being driven like cattle by invented threats. Let us instead look at the very real dangers that threaten human civilization, and do our utmost to avoid them.

7.5 The role of the media

Throughout history, art was commissioned by rulers to communicate, and exaggerate, their power, glory, absolute rightness etc, to the populace. The pyramids gave visual support to the power of the Pharaoh; portraits of rulers are a traditional form of propaganda supporting monarchies; and palaces were built as symbols of power.

Modern powerholders are also aware of the importance of propaganda. Thus the media are a battleground where reformers struggle for attention, but are defeated with great regularity by the wealth and power of the establishment. This is a tragedy because today there is an urgent need to make public opinion aware of the serious problems facing civilization, and the steps that are needed to solve these problems. The mass media could potentially be a great force for public education, but often their role is not only unhelpful - it is negative.

It is certainly possible to find a few television programs and newspaper articles that present the facts about climate change in a realistic way. For example *The Guardian* gives outstanding climate change coverage. However, the mass media could do very much more. One has to conclude that the media are neglecting their great responsibilities at a time of acute crisis for human civilization and the biosphere. The same can be said of our educational systems at both both the primary and advanced levels. We urgently need much more public education about the severe dangers that we face today.

7.6 Television as a part of our educational system

In the mid-1950's, television became cheap enough so that ordinary people in the industrialized countries could afford to own sets. During the infancy of television, its power was underestimated. The great power of television is due to the fact that it grips two senses simultaneously, both vision and hearing. The viewer becomes an almost-hypnotized captive of the broadcast.

In the 1950's, this enormous power, which can be used both for good and for ill, was not yet fully apparent. Thus insufficient attention was given to the role of television in education, in setting norms, and in establishing values. Television was not seen as an integral part of the total educational system. It is interesting to compare the educational systems of traditional cultures with those of modern industrial societies.

In traditional societies, multigenerational families often live together in the same dwelling. In general, there is a great deal of contact between grandparents and grandchildren, with much transmission of values and norms between generations. Old people are regarded with great respect, since they are considered to be repositories of wisdom, knowledge, and culture.

By contrast, modern societies usually favor nuclear families, consisting of only parents and children. Old people are marginalized. They live by themselves in communities or homes especially for the old. Their cultural education knowledge and norms are not valued because they are "out of date". In fact, during the life of a young person in one of the

rapidly-changing industrial societies of the modern world, there is often a period when they rebel against the authority of their parents and are acutely embarrassed by their parents, who are “so old-fashioned that they don’t understand anything”.

Although the intergenerational transmission of values, norms, and culture is much less important in industrial societies than it is in traditional ones, modern young people of the West and North are by no means at a loss over where to find their values, fashions and role models. With every breath, they inhale the values and norms of the mass media. Totally surrounded by a world of television and film images, they accept this world as their own.

7.7 The mass media have failed us

The predicament of humanity today has been called “a race between education and catastrophe”: How do the media fulfil this life-or-death responsibility? Do they give us insight? No, they give us pop music. Do they give us an understanding of the sweep of evolution and history? No, they give us sport. Do they give us an understanding of the ecological catastrophes that threaten our planet because of unrestricted growth of population and industries? No, they give us sit-coms and soap operas. Do they give us unbiased news? No, they give us news that has been edited to conform with the interests of powerful lobbys. Do they present us with the urgent need to leave fossil fuels in the ground? No, they do not, because this would offend the powerholders. Do they tell of the danger of passing tipping points after which human efforts to prevent catastrophic climate change will be useless? No, they give us programs about gardening and making food.

A consumer who subscribes to the “package” of broadcasts sold by a cable company can often search through all 95 channels without finding a single program that offers insight into the various problems that are facing the world today. What the viewer finds instead is a mixture of pro-establishment propaganda and entertainment. Meanwhile the neglected global problems are becoming progressively more severe.

In general, the mass media behave as though their role is to prevent the peoples of the world from joining hands and working to change the world and to save it from thermonuclear war, environmental catastrophes and threatened global famine. The television viewer sits slumped in a chair, passive, isolated, disempowered and stupefied. The future of the world hangs in the balance, the fate of children and grandchildren hangs in the balance, but the television viewer feels no impulse to work actively to change the world or to save it. The Roman emperors gave their people bread and circuses to numb them into political inactivity. The modern mass media seem to be playing a similar role.

7.8 Alternative media

Luckily, the mass media do not have a complete monopoly on public information. With a little effort, citizens who are concerned about the future can find alternative media. These include a large number of independent on-line news services that are supported by

subscriber donations rather than by corporate sponsors. *YouTube* videos also represent an extremely important source of public information.

Suggestions for further reading

1. Peter Barber, (June 7, 2008). *The truth is out there*. Financial Times. Archived from the original on June 3, 2009.
2. Michael Powell, (September 8, 2006). *The Disbelievers*. Washington Post. Retrieved May 30, 2009.
3. Jonathan Kay, (April 25, 2009). *Richard Gage: 9/11 truther extraordinaire*. Financial Post. Archived from the original on July 1, 2010.
4. Jan Ravensbergen, (May 2, 2010). *9/11 skeptics to speak at UQAM*. Montreal Gazette. Archived from the original on May 4, 2010.
5. Frank Morales, (June 11, 2009). *9/11 Truth comes home; Poles back new investigation*. Villager. Archived from the original on June 14, 2009.
6. Eli Lake, (April 10, 2008). *U.N. Official Calls for Study Of Neocons' Role in 9/11*. New York Sun. Archived from the original on May 29, 2009.
7. *Citizens Petition New York Attorney General to Open 9-11 Inquiry*. Environment News Service. October 29, 2004.
8. Jefferson Siegel, (June 18, 2008). *'Pentagon Papers senator' calls for new 9/11 probe*. Villager. Retrieved June 21, 2009.
9. Tori Sutton, (February 18, 2010). *Seeking the truth about 9/11*. Stratford Gazette. Archived from the original on March 24, 2010.
10. Sonny Bunch, (September 24, 2007). *The Truthers Are Out There*. Weekly Standard. Retrieved September 19, 2011.

Chapter 8

OUR WAR AGAINST NATURE; IS THIS WISDOM?

8.1 How many earths does it take to support us?

The total ecological footprint of humanity is a concept used to measure the relationship between the resources that humans demand from their environment, compared with the ability of nature to provide those resources. In recent years humans have been asking the earth to provide the with much more than the earth can regenerate. Our collective footprint on the face of nature has become too large.

Here are some quotations from the homepage of the Footprint Network organization:¹

“If a population’s Ecological Footprint exceeds the region’s biocapacity, that region runs an ecological deficit. Its demand for the goods and services that its land and seas can provide - fruits and vegetables, meat, fish, wood, cotton for clothing, and carbon dioxide absorption - exceeds what the region’s ecosystems can renew. A region in ecological deficit meets demand by importing, liquidating its own ecological assets (such as overfishing), and/or emitting carbon dioxide into the atmosphere. If a region’s biocapacity exceeds its Ecological Footprint, it has an ecological reserve.

“Conceived in 1990 by Mathis Wackernagel and William Rees at the University of British Columbia, the Ecological Footprint launched the broader Footprint movement, including the carbon Footprint, and is now widely used by scientists, businesses, governments, individuals, and institutions working to monitor ecological resource use and advance sustainable development.

“A rich introduction to the theory and practice of the approach is available in the book *Ecological Footprint: Managing Our Biocapacity Budget* (2019).”

¹<https://www.footprintnetwork.org/our-work/ecological-footprint/>

How many Earths does it take to support humanity?

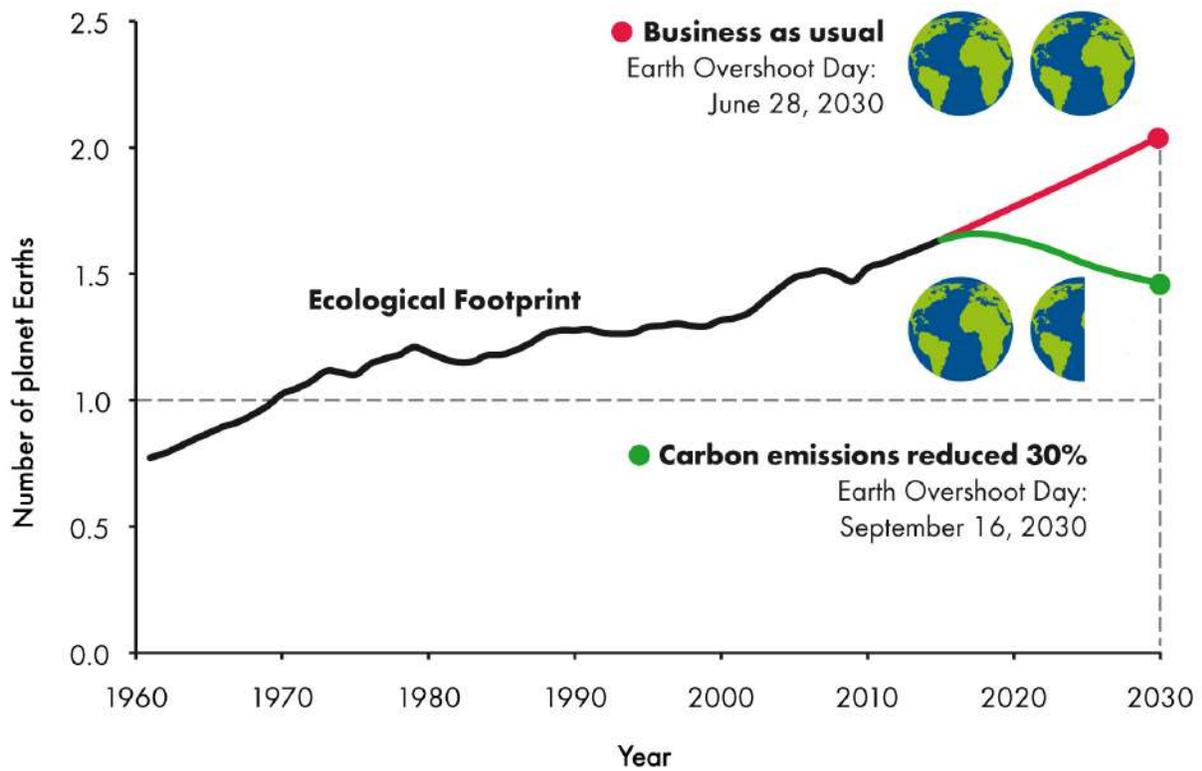


Figure 8.1: The business as usual course would lead us to disaster.



Figure 8.2: Both the Ecological Footprint and biocapacity are expressed in global hectares - globally comparable, standardized hectares with world average productivity.

8.2 Overuse of pesticides and the insect apocalypse

Loss of flying insects, especially bees

Studies have shown an annual decline of 5.2% in flying insect biomass found in nature reserves in Germany - about 75% loss in 26 years.

In the United States the managed bee populations have declined dramatically. According to one study, for the single year, from April 1, 2018, to April 1, 2019, the managed bee population decreased by 40.7%.

Overuse of pesticides degrades topsoil

It is not only the loss of bees and other pollinator insects that is dangerous to agriculture. The excessive use of pesticides and other agricultural chemicals also degrades topsoil. Normally, topsoil contains richly numerous and diverse populations of tiny worms and bacteria, that aid the recycling of crop residue from previous years into nutrients for plant growth. However, the overuse of pesticides and other agricultural chemicals kills these vitally important populations. Carbon from the dead topsoil is released into the atmosphere, thus increasing the concentrations of dangerous greenhouse gases. Having killed the living topsoil, farmers then find that they need increased quantities of petroleum-derived fertilizers to make their crops grow.

The Stockholm Convention on Persistent Organic Pollutants

An environmental treaty, signed in 2001 and effective since May, 2004, aims at restricting the production and use of persistent organic pollutants (POPs). These are defined by the United Nations Environmental Institute as “chemical substances that persist in the environment, bio-accumulate through the food web, and pose a risk of causing adverse effects to human health and the environment”. Besides DDT, the Stockholm Treaty also lists Aldrin, α -Hexachlorocyclohexane, β -Hexachlorocyclohexane, Chlordane, Chlordecone, Decabromodiphenyl ether, Dicofol, Dieldrin, Endosulfan, Endrin, Heptachlor, Hexabromobiphenyl, Hexabromocyclododecane, Hexabromodiphenylether, Hexachlorobenzene, Hexachlorobutadiene, Lindane, Mirex, Pentachlorobenzene, Pentachlorophenol, Perfluorooctanoic acid, Perfluorooctane sulfonic acid, Polychlorinated biphenyls, Polychlorinated dibenzodioxins, Polychlorinated naphthalenes, Tetrabromodiphenyl ether, Short-chain chlorinated paraffins, and Toxaphene.

Although some critics have claimed that the treaty is responsible for the continuing death toll from malaria, in reality it specifically permits the public health use of DDT for the control of malaria-carrying mosquitoes. In 2016, there were 216 million cases of malaria worldwide, resulting in an estimated 445,000 to 731,000 deaths.



Figure 8.3: 20 May 2019, Rome - The global decline in bee populations poses a serious threat to a wide variety of plants critical to human well-being and livelihoods, and countries should do more to safeguard our key allies in the fight against hunger and malnutrition, FAO stressed today as it marked UN World Bee Day. Bees and other pollinator are declining in abundance in many parts of the world largely due to intensive farming practices, mono-cropping, excessive use of agricultural chemicals and higher temperatures associated with climate change, affecting not only crop yields but also nutrition. If this trend continues, nutritious crops such as fruits, nuts, and many vegetables will be substituted increasingly by staple crops like rice, corn, and potatoes, eventually resulting in an imbalanced diet.

8.3 The Silent Spring

Dangers from pesticide pollution

Rachel Carson's most influential book, *The Silent Spring*, was published in 1962, when she was already suffering from breast cancer. Eventually it sold over two million copies. The book expresses Carson's worries about the environmental consequences of overuse of pesticides, such as DDT, which were killing not only their targeted pests, but also many vitally important insects, as well as causing health problems in humans. Part of the anger that Carson expressed in the book may have come because the cancer from which she was suffering could have been caused by mutagenic pesticides.

The town was fictitious, but the problems were real

The Silent Spring begins by describing a fictitious Midwestern American town, where people are mysteriously suffering and dying from a variety of unexplained illnesses previously unseen by doctors. Sheep and cattle, fish in the river, and birds, all sicken and die. Orchards bear no fruit and vegetation withers. It gradually becomes clear that the people of the town are themselves to blame. That have been poisoning themselves and their environment by overuse of pesticides.

Some quotations from *The Silent Spring*

Here are two quotations from the book:

As crude a weapon as the cave man's club, the chemical barrage has been hurled against the fabric of life - a fabric on the one hand delicate and destructible, on the other miraculously tough and resilient, and capable of striking back in unexpected ways... It is our alarming misfortune that so primitive a science has armed itself with the most modern and terrible weapons, and that in turning them against the insects it has also turned them against the earth...

Among the herbicides are some that are classified as 'mutagens,' or agents capable of modifying the genes, the materials of heredity. We are rightly appalled by the genetic effects of radiation; how then, can we be indifferent to the same effect in chemicals that we disseminate widely in our environment?

Although extremely ill with cancer and in constant pain, Carson gave newspaper interviews and appeared on television to make her case. In July, 1962, the US Department of agriculture issued the following statement: **"Miss Carson provides a lucid description of the real and potential dangers of misusing chemical pesticides... She expresses the concern of many people about the effect of chemical pesticides on birds, animals and people. We are fully aware of and share this concern."**

'Silent Spring' Is Now Noisy Summer

Pesticides Industry Up in Arms Over a New Book

By JOHN M. LEE

The \$200,000,000 pesticides industry has been highly irritated by a quiet woman author whose previous works on science have been praised for the beauty and precision of the writing.

The author is Rachel Carson, whose "The Sea Around Us" and "The Edge of the Sea" were best sellers in 1951 and 1955. Miss Carson, trained as a marine biologist, wrote gracefully of sea and shore life.

In her latest work, however, Miss Carson is not so gentle,



Rachel Carson Stirs Conflict—Producers Are Crying 'Foul'

condemning the use of their products. Meetings have been held in Washington and New York. Statements are being drafted and counter-attacks plotted.

A drowsy midsummer has suddenly been enlivened by the greatest uproar in the pesticides industry since the cranberry scare of 1959.

Miss Carson's new book is entitled "Silent Spring." The title is derived from an idealized situation in which Miss Carson envisions an imaginary town where chemical pollution has silenced "the voices of insects."

Figure 8.4: Rachel Carson's book, *The Silent Spring*, was controversial, to say the least, but it focused public attention on problems of ecology.

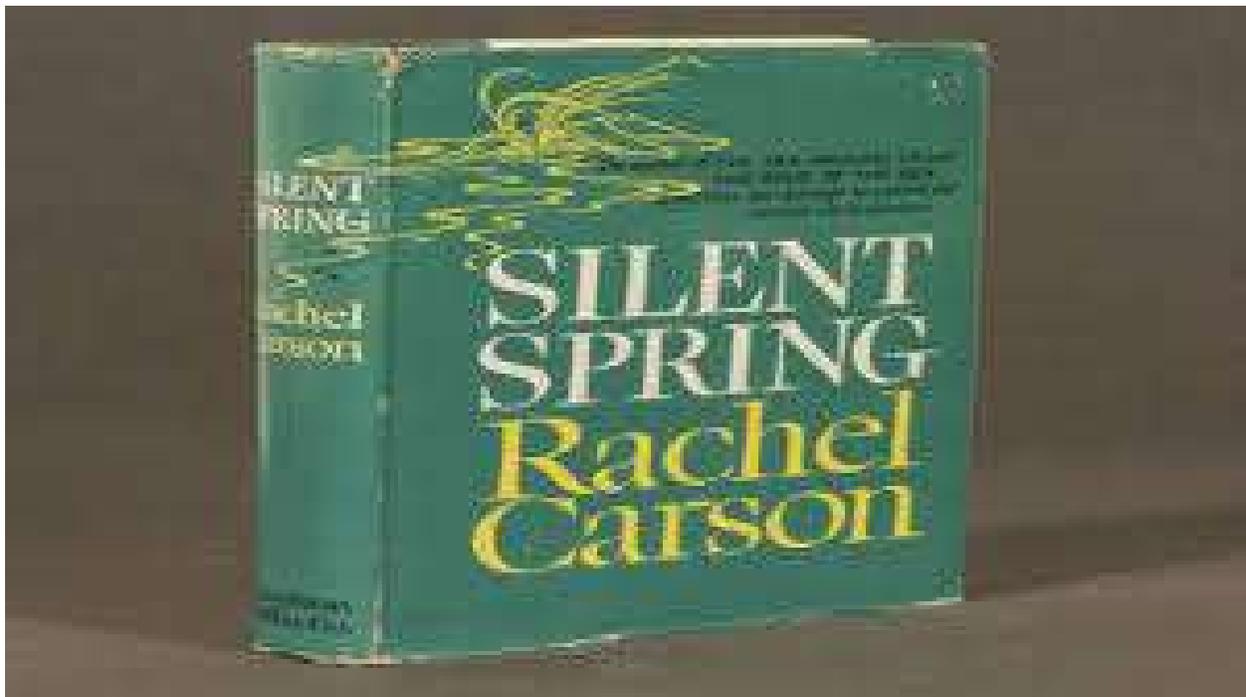


Figure 8.5: *The Silent Spring* was an international best-seller, and it ignited the environmental movement.

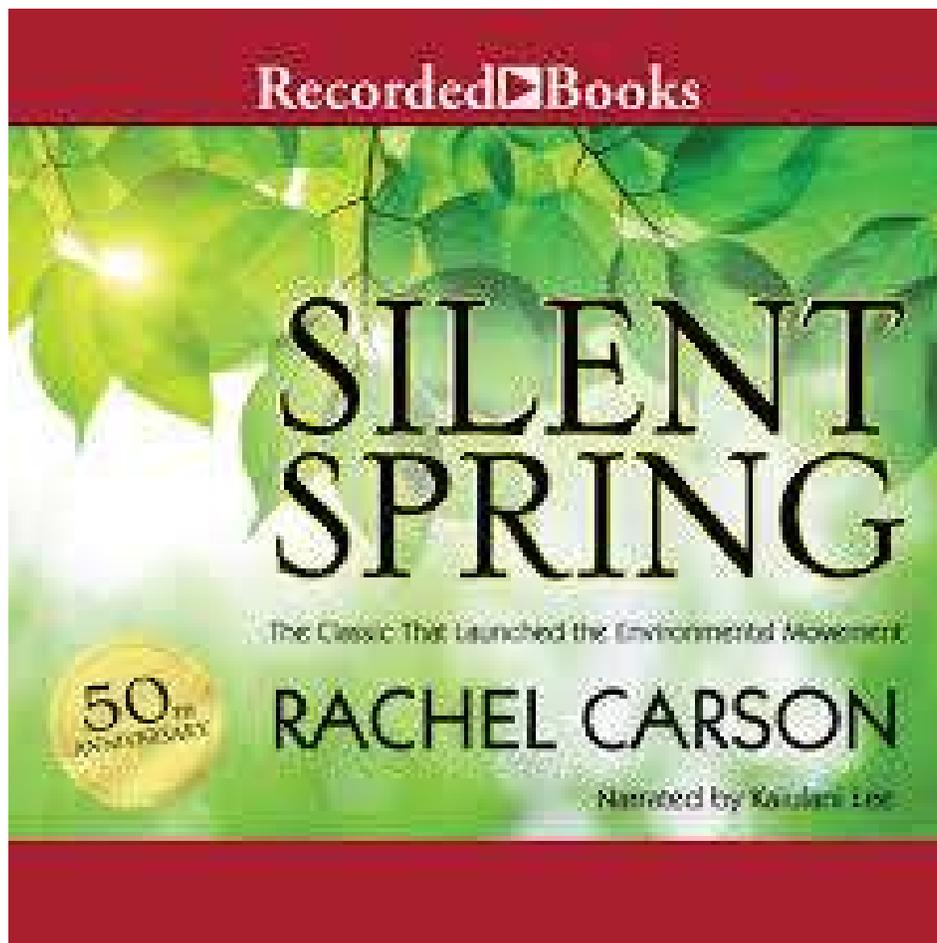


Figure 8.6: An audio version of *The Silent Spring*.



Figure 8.7: As Rachel Carson's influence increased, she began speaking to large audiences.



Figure 8.8: Statue of Carson at the Museo Rocsen, Nono, Argentina.

8.4 Biodiversity loss

According to Wikipedia's article on *Biodiversity Loss*,

“The current rate of global diversity loss is estimated to be 100 to 1000 times higher than the (naturally occurring) background extinction rate and expected to still grow in the upcoming years...

“According to the UN's Global Biodiversity Outlook 2014 estimates that 70 percent of the projected loss of terrestrial biodiversity are caused by agriculture use. Moreover, more than 1/3 of the planet's land surface is utilized for crops and grazing of livestock. Agriculture destroys biodiversity by converting natural habitats to intensely managed systems and by releasing pollutants, including greenhouses gases. Food value chains further amplify impacts including through energy use, transport and waste. The direct effects of urban growth on habitat loss are well understood: Building construction often results in habitat destruction and fragmentation. The rise of urbanization greatly reduced biodiversity when large areas of natural habitat are fragmented. Small habitat patches are unable to support the same level of genetic or taxonomic diversity as they formerly could while some of the more sensitive species may become locally extinct.

“Pollution from burning fossil fuels such as oil, coal and gas can remain in the air as particle pollutants or fall to the ground as acid rain. Acid rain, which is primarily composed of sulfuric and nitric acid, causes acidification of lakes, streams and sensitive forest soils, and contributes to slower forest growth and tree damage at high elevations. Moreover, Carbon dioxide released from burning fossil fuels and biomass, deforestation, and agricultural practices contributes to greenhouse gases, which prevent heat from escaping the earth's surface. With the increase in temperature expected from increasing greenhouse gases, there will be higher levels of air pollution, greater variability in weather patterns, and changes in the distribution of vegetation in the landscape. These two factors play a huge role towards biodiversity loss and entirely depended on human-driven factors.”

8.5 Illegal burning for palm oil plantations

According to a recent article published by the Union of Concerned Scientists, “One huge source of global warming emissions associated with palm oil is the draining and burning of the carbon-rich swamps known as peatlands. Peatlands can hold up to 18 to 28 times as much carbon as the forests above them; when they are drained and burned, both carbon and methane are released into the atmosphere - and unless the water table is restored, peatlands continue to decay and release global warming emissions for decades.

“As if that wasn't bad enough, the burning of peatlands releases a dangerous haze into

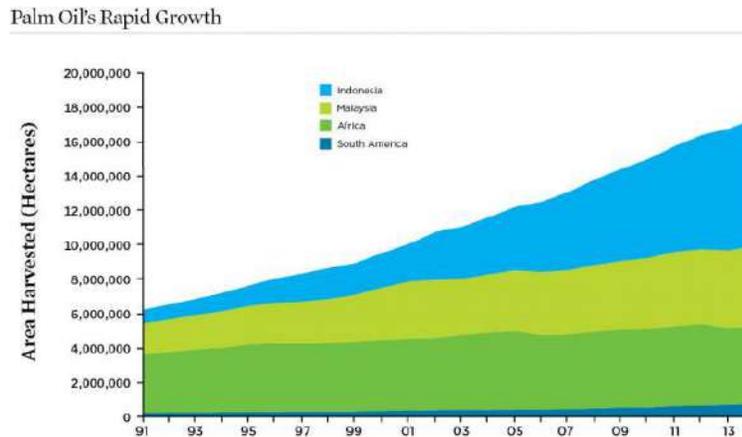


Figure 8.9: **The growth of palm oil cultivation between 1993 and 2013. The blue area at the top of the graph indicates the dramatic growth of palm oil production in Southeast Asia, especially Indonesia.**

the air, resulting in severe health impacts and significant economic losses. Each year, more than 100,000 deaths in Southeast Asia can be attributed to particulate matter exposure from landscape fires, many of which are peat fires.

“Beyond its global warming and human health impacts, palm oil production also takes a toll on biodiversity and human rights. Only about 15 percent of native animal species can survive the transition from primary forest to plantation. Among the species vulnerable to palm oil expansion are orangutans, tigers, rhinoceros, and elephants. Furthermore, palm oil growers have also been accused of using forced labor, seizing land from local populations, and other human rights abuses.”

Licences to burn forests for palm oil plantations are often granted by corrupt government officials. Fortunately, through the efforts of NGO’s the public has become increasingly aware of the problem, and supermarkets are being urged to purchase products containing deforestation-free palm oil.

Another recent article² states that “Indonesia is being deforested faster than any other country in the world, and it has everything to do with one product: palm oil.

“According to a new study in the journal *Nature Climate Change*, deforestation in the Southeast Asian archipelago is nearly double the rate in the Amazon. Indonesia is said to have lost 840,000 hectares (3,250 square miles) of forest in 2012 while Brazil - which has four times Indonesia’s rainforest - lost a still-massive 460,000 hectares.

“The report’s authors found that government figures underestimated the true toll of forest clearing by as much as half. In the last 12 years, it’s possible that the destruction of one million hectares of ‘primary forest’ went unreported.

“The tree-killing spree is largely due to slashing and burning vegetation for the expansion of palm oil plantations to feed growing demand in countries like China and India.

²<https://news.vice.com/article/indonesia-is-killing-the-planet-for-palm-oil>

Americans and Europeans are still far and away the top consumers per capita - it's estimated that palm oil can be found in roughly half the manufactured goods in any supermarket or drug store. Everything from peanut butter to soap to cosmetics contains the oil in its various forms.

"In Indonesia, where much of the land consists of carbon-rich soil known as peat, the problem is acute. Water-logged peat is commonly found in the jungles of Sumatra and Borneo, and merely exposing it to the air releases carbon dioxide into the atmosphere."

8.6 Jair Bolsonaro's attack on the Amazon rainforest

Beef is killing the rainforest

Beef Production is Killing the Amazon Rainforest. That is the title of an article published by onegreenplanet.org³. Here are some excerpts from the article

"The Amazon rainforest has been facing severe deforestation problems for several decades - it has lost about a fifth of its forest in the past three. While there are many causes, one of the main causes is cattle ranching, particularly in Brazil. Trees are cut and the land is converted into a pasture for cattle grazing. According to one report, an estimated 70 percent of deforestation in the Amazon basin can be attributed to cattle ranching. Using these numbers, cattle ranching in the Amazon has resulted in the loss of an area larger than the state of Washington.

"The government of Brazil offers loans of billions of dollars to support the expansion of its beef industry. Approximately 200 million pounds of beef is imported by the United States from Central America every year. While the chief importers of Brazilian beef were previously Europe and North America, nowadays Asian countries such as China and Russia consume more Brazilian beef than the European market. So, the demand is increasing day by day.

"With increasing population and increased per capita meat consumption, the rate of deforestation is increasing every day as well. It is expected that by 2018, the beef export will increase 93 percent, thereby increasing Brazil's beef market share of world exports to 61 percent. Beef is the most carbon-intensive form of meat production on the planet. The United Nations Food and Agriculture Organization finds that beef production gives rise to more greenhouse gases than the transportation industry."

Beef production and methane

A cow (or a bull) releases between 70 and 120 kg of methane per year. Methane is a greenhouse gas like carbon dioxide, but the negative effect on the climate of methane (CH₄) is 23 times higher than the effect of CO₂. Therefore the release of about 100 kg methane per year for each cow is equivalent to about 2,300 kg CO₂ per year.

³<http://www.onegreenplanet.org/animalsandnature/beef-production-is-killing-the-amazon-rainforest/>

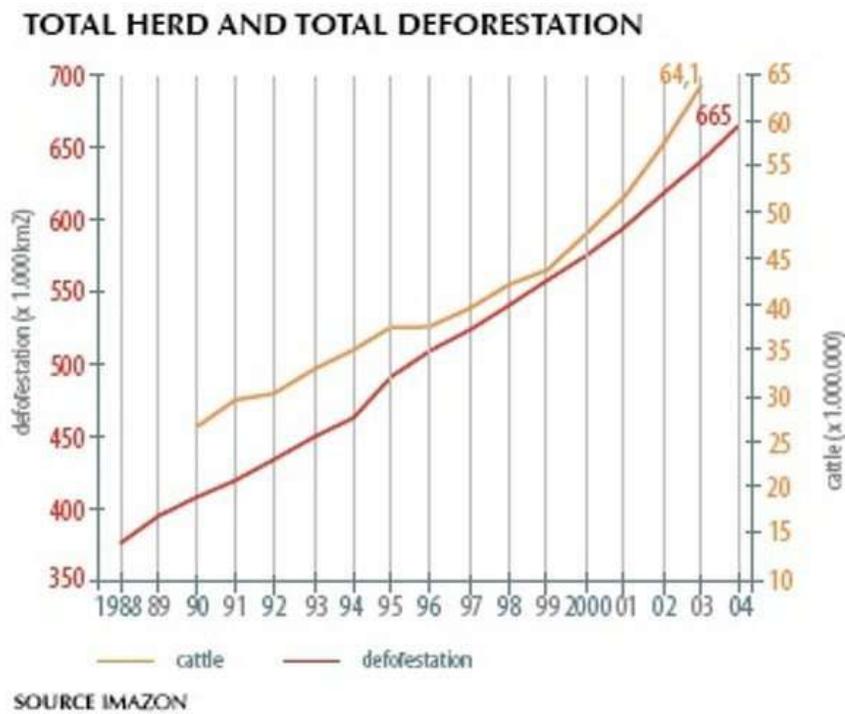


Figure 8.10: Total cattle herds and total deforestation in Amazonia between 1988 and 2104. Deforestation is measured in thousands of square kilometers, while herd size is measured in millions.

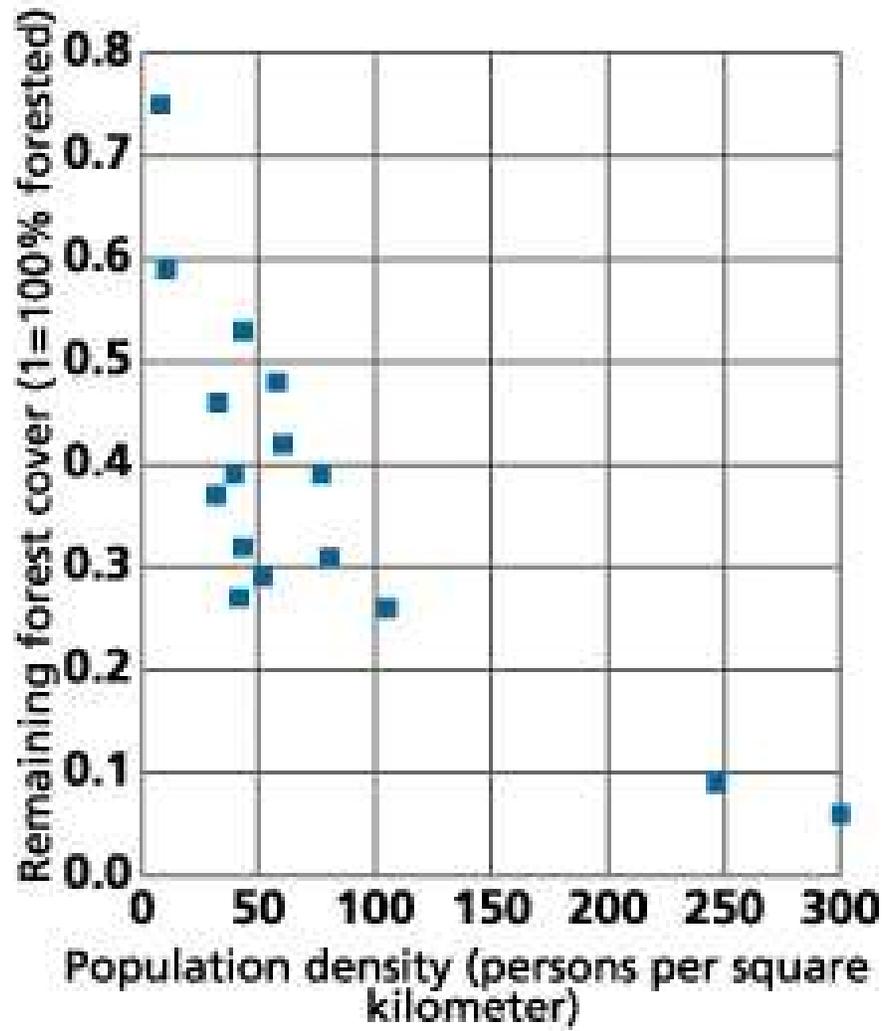


Figure 8.11: Population density and forest size.

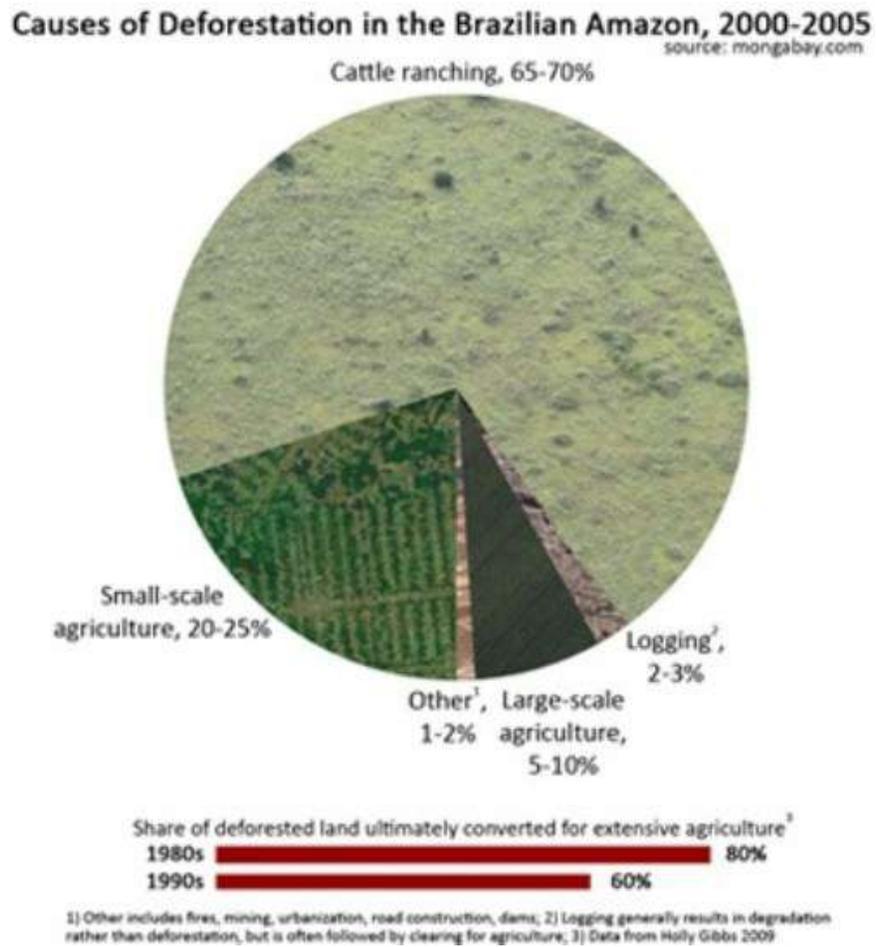


Figure 8.12: This figure shows the causes of Amazonian deforestation. The largest is beef production.

World-wide, there are about 1.5 billion cows and bulls. All ruminants (animals which regurgitates food and re-chews it) on the world emit about two billion metric tons of CO₂, equivalents per year. In addition, clearing of tropical forests and rain forests to get more grazing land and farm land is responsible for an extra 2.8 billion metric tons of CO₂ emission per year!

According to the Food and Agriculture Organization of the United Nations (FAO) agriculture is responsible for 18% of the total release of greenhouse gases world-wide (this is more than the whole transportation sector). Cattle-breeding is taking a major factor for these greenhouse gas emissions according to FAO. Says Henning Steinfeld, Chief of FAO's Livestock Information and Policy Branch and senior author of the report: "Livestock are one of the most significant contributors to today's most serious environmental problems. Urgent action is required to remedy the situation."

Livestock now use 30 percent of the earth's entire land surface, mostly permanent pasture but also including 33 percent of the global arable land used to producing feed for livestock, the report notes. As forests are cleared to create new pastures, it is a major driver of deforestation, especially in Latin America where, for example, some 70 percent of former forests in the Amazon have been turned over to grazing.

Dietary changes can help

You and I can help to save our common future by changing our diets, especially by cutting out beef. Not only does beef production produce methane and destroy rainforests, it also requires much more land per calorie than other forms of agriculture. By switching from beef to other protein-rich foods, we not only substantially reduce greenhouse gas emissions, but we also shorten the food chain, so that more grain will be available to feed the world's growing population. Furthermore a changed diet with less meat would improve our health, since animal fats have been linked with heart disease, circulatory problems and strokes.

8.7 Growing populations and forest loss

Deforestation is occurring at alarming rates, especially in countries that have high levels of population growth.⁴ The following table shows the forest loss in some countries where it is particularly high, together with their present and projected populations⁵. In the table, the annual rate of forest loss in the period 2000-2010. measured both in thousands of hectares and in percent. Populations in millions in 2010 are shown, together with projected populations in 2050.

⁴<http://www.prb.org/Publications/Articles/2004/PopulationGrowthandDeforestationACriticalandComplexRelationship.aspx>
⁵Population Action International, *Why Population Matters to Forests*

country	forest loss	percent	pop. 2010	pop. 2050
Brazil	-2642	-0.49	194.9	222.8
Australia	-562	-0.37	22.3	31.4
Indonesia	-498	-0.51	239.9	293.5
Nigeria	-410	-3.67	158.4	389.6
Tanzania	-403	-1.13	44.8	138.3
Zimbabwe	-327	-1.88	12.6	20.6
Dem. Rep. Congo	.311	-0.20	66.0	148.5
Myanmar	-310	-0.93	47.9	55.3
Bolivia	-290	-0.49	9.9	16.8
Venezuela	-288	-0.60	28.0	41.8

The main mechanism through which rapid population growth is linked to forest loss is felling forests for the sake of agriculture.

Notice that Nigeria is losing 3.67% of its forests each year. The population of Nigeria is projected to more than double by 2050, but rising death rates from heat, famine and conflicts may prevent this. In general, rising death rates from these causes may ultimately lead populations in the tropics to decrease rather than increase.

Population Action International points out that “Deforestation threatens the well-being and livelihoods of millions of people who heavily depend on forest resources. It is particularly devastating for women and children in poor rural communities.” The organization recommends that information and materials for family planning be made available to all through universal provision of primary health care.

8.8 Desertification and soil erosion

The Princeton University Dictionary defines *desertification* as “the process of fertile land transforming into desert typically as a result of deforestation, drought or improper/inappropriate agriculture”. It is estimated that approximately a billion people are under threat from further expansions of deserts.

Southward expansion of the Gobi desert

The Gobi desert is the fastest moving desert on earth. The rapid southward expansion of the Gobi is mainly due to human activities, such as overgrazing, deforestation and overuse of water. Dust storms from the Gobi desert are becoming more and more frequent. Sand dunes are reportedly forming only 70 km north of Beijing.

The Sahel

Another region in which the threat of desertification is extremely acute is the Sahel, which is the boundary between Africa's Sahara desert to the north and a region of savanna to the south. The Sahel stretches between the Atlantic Ocean and the Red Sea. During the last 50 years, the Sahel has lost approximately 650,000 km² of fertile land to the desert, and the boundary of the Sahara has moved 250 km southward.

The southward expansion of the Sahara has been caused partly by climate change, and partly by human activities. Growing human populations have put pressure on the fragile arid environment by overgrazing, tree-cutting for firewood and inappropriate agriculture.

8.9 Forest drying and wildfires: a feedback loop

When climate change produces aridity in a forested region, wildfires produced by lightning, stray sparks from falling stones, or human carelessness become increasingly likely. Forest fires contribute to global warming by releasing CO₂ into the atmosphere and by destroying climate-friendly tree-covered areas. Thus a dangerous feedback loop can be formed, and with every feedback loop there is an associated tipping point. In the case of forest drying and wildfires, passing the tipping point means that forest cover will be lost irrevocably. We must avoid passing wildfire tipping points through human activities, such as the deliberate burning of rainforests for the sake of oil palm plantations.

8.10 Degraded forests are carbon emitters

According to an article published in the journal *Science* on 28 September, 2017⁶, degraded tropical forest throughout the world have stopped being carbon absorbers, and are now carbon emitters.

Reporting on the study, *The Guardian*,⁷ noted that "Researchers found that forest areas in South America, Africa and Asia - which have until recently played a key role in absorbing greenhouse gases - are now releasing 425 teragrams of carbon annually, which is more than all the traffic in the United States.

"The study went further than any of its predecessors in measuring the impact of disturbance and degradation - the thinning of tree density and the culling of biodiversity below an apparently protected canopy - usually as a result of selective logging, fire, drought and hunting.

"Overall, more carbon was lost to degradation and disturbance than deforestation. The researchers stressed this was an opportunity as well as a concern because it was now possible

⁶A. Baccini et al., *Tropical forests are a net carbon source based on aboveground measurements of gain and loss*, DOI: 10.1126/science.aam5962

⁷<https://www.theguardian.com/environment/2017/sep/28/alarm-as-study-reveals-worlds-tropical-forests-are-huge-carbon-emission-source>

to identify which areas are being affected and to restore forests before they disappeared completely.”

8.11 Replanting forests

Around the world, people interested in replanting forests can take inspiration from the Green Belt Movement, which was founded in 1977 by Wangari Maathai.

The Green Belt Movement organizes women in rural Africa to combat deforestation by planting trees. In this way they restore their main source of fuel for cooking, generate income and stop soil erosion. Since its foundation in 1977, the movement has planted 51 million trees. Over 30,000 women have been trained in forestry, food processing, bee-keeping, and other trades. The movement emphasizes economic justice and empowerment of women. This work is particularly valuable in regions of water scarcity, because besides preventing soil erosion, forests prevent the rapid run-off of water.

In order to combat climate change and to prevent southward expansion of the Sahara, the African Union has initiated a project called the Great Green Wall. The project aims at creating a mosaic of green and productive landscapes stretching across Africa, the Sahel region to the Horn of Africa, a strip of forested land 15 km wide and 7,500 km long, stretching from Dakar to Djibouti.

In China, the Green Great Wall project aims at preventing the expansion of the Gobi desert by planting a 4,500-kilometer-long windbreaking line of forests. The project is expected to be completed by 2050.

Reforestation initiatives also exist in other countries, for example in India, Lebanon, Philippines, Japan, Germany, Canada and the United States.



Figure 8.13: Nobel Laureate Wangari Maathai (1940-2011).



Figure 8.14: Wangari Maathai speaks about deforestation.

8.12 Human ecology

By definition, “Human Ecology is the study of the interactions between man and nature in different cultures. Human Ecology combines the ideas and methods from several disciplines, including anthropology, sociology, biology, economic history and archeology.”

8.13 Paul R. Ehrlich and Anne H. Ehrlich

Education

Paul R. Ehrlich was born in 1932 in Philadelphia, Pennsylvania. He studied zoology at the University of Pennsylvania, and later received a Ph.D. from the University of Kansas, where he specialized in the study of insects. In 1959, Ehrlich joined the staff of Stanford University, where he was appointed to the Bing Professorship in Zoology in 1977.

Involvement in the population debate

In 1967, a lecture on population that Ehrlich gave at the Commonwealth Club of California was broadcast on the radio. Because of the publicity that followed the radio broadcast, Ehrlich was invited by the Sierra Club and Ballantine Books to write a book on the dangers of a human population explosion. Paul R. Ehrlich and his wife, Anne H. Ehrlich together wrote a book entitled *The Population Bomb*, which was published in 1968. Although the book was a joint husband and wife production, the publisher insisted that only Paul’s name should appear as author. Although others had written about the dangers of overpopulation, it was this book that brought the problem to a wide audience.

Books by Paul R. Ehrlich

- *How to Know the Butterflies* (1960)
- *Process of Evolution* (1963)
- *Butterflies and Plants: A Study in Coevolution* (1964)
- *The Population Bomb* (1968, revised 1971, updated 1978, re-issued 1988, 1998, 2008 and 2018)
- *Population, Resources, Environments: Issues in Human Ecology* (1970)
- *How to Be a Survivor* (1971)
- *Man and the Ecosphere: Readings from Scientific American* (1971)
- *Population, Resources, Environments: Issues in Human Ecology* Second Edition (1972)
- *Human Ecology: Problems and Solutions* (1973)
- *Introductory Biology* (1973)
- *The End of Affluence* (1975)
- *Biology and Society* (1976)

- *Ecoscience: Population, Resources, Environment* (1978)
- *The Race Bomb* (1978)
- *Extinction* (1981)
- *The Golden Door: International Migration, Mexico, and the United States* (1981)
- *The Cold and the Dark: The World after Nuclear War* (1984, with Carl Sagan, Donald Kennedy, and Walter Orr Roberts)
- *The Machinery of Nature: The Living World Around Us and How it Works* (1986)
- *Earth* (1987, co-authored with Anne Ehrlich)
- *Science of Ecology* (1987, with Joan Roughgarden)
- *The Cassandra Conference: Resources and the Human Predicament* (1988)
- *The Birder's Handbook: A field Guide to the Natural History of North American Birds* (1988, with David S. Dobkin and Darryl Wheye)
- *New World, New Mind: Moving Towards Conscious Evolution* (1988, co-authored with Robert E. Ornstein)
- *The Population Explosion* (1990, with Anne Ehrlich)
- *Healing the Planet: Strategies for Resolving the Environmental Crisis* (1991, co-authored with Anne Ehrlich)
- *Birds in Jeopardy: The Imperiled and Extinct Birds of the United States and Canada, Including Hawaii and Puerto Rico* (1992, with David S. Dobkin and Darryl Wheye)
- *The Stork and the Plow : The Equity Answer to the Human Dilemma* (1995, with Anne Ehrlich and Gretchen C. Daily)
- *A World of Wounds: Ecologists and the Human Dilemma* (1997)
- *Betrayal of Science and Reason: How Anti-Environment Rhetoric Threatens Our Future* (1998, with Anne Ehrlich)
- *Wild Solutions: How Biodiversity is Money in the Bank* (2001, with Andrew Beattie)
- *Human Natures: Genes, Cultures, and the Human Prospect* (2002)
- *One With Nineveh: Politics, Consumption, and the Human Future* (2004, with Anne Ehrlich)
- *On the Wings of Checkerspots: A Model System for Population Biology* (2004, edited volume, co-edited with Ilkka Hanski)
- *The Dominant Animal: Human Evolution and the Environment* (2008, with Anne Ehrlich)
- *Humanity on a Tightrope: Thoughts on Empathy, Family, and Big Changes for a Viable Future* (2010, with Robert E. Ornstein)
- *Conservation Biology for All* (2010, edited volume, co-edited with Navjot S. Sodhi)
- *Hope on Earth: A Conversation* (2014, co-authored with Michael Charles Tobias)
- *Killing the Koala and Poisoning the Prairie: Australia, America and the Environment* (2015, co-authored with Corey J. A. Bradshaw)
- *The Annihilation of Nature: Human Extinction of Birds and Mammals* (2015, with Anne Ehrlich and Gerardo Ceballos)



Figure 8.15: Paul R. Ehrlich in 1974.



Figure 8.16: Ehrlich speaking in 2008.



Figure 8.17: Anne H. Ehrlich, Paul Ehrlich's wife, is the co-author of many of his books. I know her personally because of the many Pugwash Conferences that we both have attended. I also know John P. Holdren for the same reason,

8.14 John P. Holdren

Education

John P. Holdren was born in Pennsylvania in 1944, but grew to in California. He graduated from MIT with a B.Sc. degree in 1965, and was awarded a Ph.D. by Stanford University in 1970, having studied aeronautics, astronautics and plasma physics.

Professor of environmental science

Holdren taught for 13 years at Harvard, and later for more than 20 years at the University of California, Berkeley. His research interests centered on environmental questions. These included global environmental change, population stabilization, energy technologies and policies, ways to reduce the dangers from nuclear weapons and materials, and science and technology policy.

Pugwash Conferences on Science and World Affairs

John P. Holdren served as the Chairman of the Executive Committee of Pugwash Conferences on Science and World Affairs. The Russell-Einstein Manifesto of 1955 called for a meeting of scientists from both sides of the Cold War to try to minimize the danger of a thermonuclear conflict. The first meeting took place at the summer home of the Canadian philanthropist Cyrus Eaton at the small village of Pugwash, Nova Scotia.

From this small beginning, a series of conferences developed, in which scientists, especially physicists, attempted to work for peace, and tried to address urgent global problems related to science, and especially to reduce the danger of a thermonuclear war. In 1995, Pugwash Conferences, and its president, Sir Joseph Rotblat, shared the Nobel Peace Prize. John P. Holdren delivered the acceptance speech on behalf of the organization.

Some books and articles by John P. Holdren

Holdren has authored over 200 articles and papers and has co-authored and co-edited some 20 books and book-length reports including

- *Ecoscience : Population, Resources, Environment* by John P. Holdren, Paul R. Ehrlich, Ann H. Ehrlich
- *Global Ecology* by John P. Holdren and Paul R. Ehrlich
- *The Cassandra Conference : Resources and the Human Predicament* by John P. Holdren and Paul R. Ehrlich
- *Strategic Defense and the Future of the Arms Race : A Pugwash Symposium* by John P. Holdren
- *Energy* by John P. Holdren
- *Science in the White House*. *Science*, May 2009, 567.[
- *Policy for Energy Technology Innovation. Acting in Time on Energy Policy*, (with Laura Diaz Anadon, Max H. Bazerman, David T. Ellwood, Kelly Sims Gallagher, William H. Hogan, Henry Lee, and Daniel Schrag), Brookings Institution Press, 2009.
- *The Future of Climate Change Policy: The U.S.'s Last Chance to Lead*. *Scientific American* 2008 Earth 3.0 Supplement. October 13, 2008, 20-21.
- *Convincing the Climate Change Skeptics*. *The Boston Globe*, August 4, 2008.[
- *Ending the Energy Stalemate: A Bipartisan Strategy To Meet America's Energy Challenges*. Presentation at the National Academies 2008 Energy Summit, Washington, D.C., March 14, 2008.
- *Global Climatic Disruption: Risks and Opportunities*. Presentation at Investor Summit on Climate Risk, New York, February 14, 2008.
- *Meeting the Climate-Change Challenge*. The John H. Chafee Memorial Lecture, National Council for Science and the Environment, Washington, D.C., January 17, 2008.



Figure 8.18: John P. Holdren held the position of Assistant to the President for Science and Technology between 2009 and 2017.



Figure 8.19: John P. Holdren with Barack Obama.



Figure 8.20: John P. Holdren: “Trump has no science policy to speak of”.

8.15 The earth is our mother

The World People's Conference on Climate Change and the Rights of Mother Earth

This conference took place in Tiquipaya, just outside the city of Cochabamba, Bolivia, from April 19-22, 2010. The event was attended by around 30,000 people from over 100 countries. It was hosted by the Bolivian government, and the proceedings were transmitted online by the organizations OneClimate and Global Campaign for Climate Action.

One of the outstanding results of the conference was the drafting of a Universal Declaration of the Rights of Mother Earth, modeled on the United Nations' Universal Declaration of Human Rights. Both Declarations might be criticized for being unrealistic,⁸ but both have great normative value. They define the goals towards which we ought to be striving.

Proposed Universal Declaration of the Rights of Mother Earth⁹

Preamble

We, the peoples and nations of Earth:

- *considering that we are all part of Mother Earth, an indivisible, living community of interrelated and interdependent beings with a common destiny;*
- *gratefully acknowledging that Mother Earth is the source of life, nourishment and learning and provides everything we need to live well;*
- *recognizing that the capitalist system and all forms of depredation, exploitation, abuse and contamination have caused great destruction, degradation and disruption of Mother Earth, putting life as we know it today at risk through phenomena such as climate change;*
- *convinced that in an interdependent living community it is not possible to recognize the rights of only human beings without causing an imbalance within Mother Earth;*
- *affirming that to guarantee human rights it is necessary to recognize and defend the rights of Mother Earth and all beings in her and that there are existing cultures, practices and laws that do so;*
- *conscious of the urgency of taking decisive, collective action to transform structures and systems that cause climate change and other threats to Mother Earth;*

⁸<https://www.transcend.org/tms/2012/12/human-rights-a-letter-to-santa-claus/>

⁹<https://www.theguardian.com/environment/2011/apr/10/bolivia-enshrines-natural-worlds-rights>
<https://pwccc.wordpress.com>

- *proclaim this Universal Declaration of the Rights of Mother Earth, and call on the General Assembly of the United Nation to adopt it, as a common standard of achievement for all peoples and all nations of the world, and to the end that every individual and institution takes responsibility for promoting through teaching, education, and consciousness raising, respect for the rights recognized in this Declaration and ensure through prompt and progressive measures and mechanisms, national and international, their universal and effective recognition and observance among all peoples and States in the world.*

Article 1: Mother Earth

1. *Mother Earth is a living being.*
2. *Mother Earth is a unique, indivisible, self-regulating community of interrelated beings that sustains, contains and reproduces all beings.*
3. *Each being is defined by its relationships as an integral part of Mother Earth.*
4. *The inherent rights of Mother Earth are inalienable in that they arise from the same source as existence.*
5. *Mother Earth and all beings are entitled to all the inherent rights recognized in this Declaration without distinction of any kind, such as may be made between organic and inorganic beings, species, origin, use to human beings, or any other status.*
6. *Just as human beings have human rights, all other beings also have rights which are specific to their species or kind and appropriate for their role and function within the communities within which they exist.*
7. *The rights of each being are limited by the rights of other beings and any conflict between their rights must be resolved in a way that maintains the integrity, balance and health of Mother Earth.*

Article 2. Inherent Rights of Mother Earth

1. *Mother Earth and all beings of which she is composed have the following inherent rights:*
 - (a) *the right to life and to exist;*
 - (b) *the right to be respected;*
 - (c) *the right to regenerate its bio-capacity and to continue its vital cycles and processes free from human disruptions;*
 - (d) *the right to maintain its identity and integrity as a distinct, self-regulating and interrelated being;*



Figure 8.21: **The earth is our mother.**

- (e) *the right to water as a source of life;*
 - (f) *the right to clean air;*
 - (g) *the right to integral health;*
 - (h) *the right to be free from contamination, pollution and toxic or radioactive waste;*
 - (i) *the right to not have its genetic structure modified or disrupted in a manner that threatens its integrity or vital and healthy functioning;*
 - (j) *the right to full and prompt restoration the violation of the rights recognized in this Declaration caused by human activities;*
2. *Each being has the right to a place and to play its role in Mother Earth for her harmonious functioning.*
 3. *Every being has the right to wellbeing and to live free from torture or cruel treatment by human beings.*

Article 3. Obligations of human beings to Mother Earth

1. *Every human being is responsible for respecting and living in harmony with Mother Earth.*

2. *Human beings, and all States guarantee peace and eliminate nuclear, chemical and biological weapons;*
 - (a) *act in accordance with the rights and obligations recognized in this Declaration;*
 - (b) *recognize and promote the full implementation and enforcement of the rights and obligations recognized in this Declaration;*
 - (c) *promote and participate in learning, analysis, interpretation and communication about how to live in harmony with Mother Earth in accordance with this Declaration;*
 - (d) *ensure that the pursuit of human wellbeing contributes to the wellbeing of Mother Earth, now and in the future;*
 - (e) *establish and apply effective norms and laws for the defense, protection and conservation of the rights of Mother Earth;*
 - (f) *respect, protect, conserve and where necessary, restore the integrity, of the vital ecological cycles, processes and balances of Mother Earth;*
 - (g) *guarantee that the damages caused by human violations of the inherent rights recognized in this Declaration are rectified and that those responsible are held accountable for restoring the integrity and health of Mother Earth;*
 - (h) *empower human beings and institutions to defend the rights of Mother Earth and of all beings;*
 - (i) *establish precautionary and restrictive measures to prevent human activities from causing species extinction, the destruction of ecosystems or the disruption of ecological cycles;*
 - (j) *guarantee peace and eliminate nuclear, chemical and biological weapons;*
 - (k) *promote and support practices of respect for Mother Earth and all beings, in accordance with their own cultures, traditions and customs;*
 - (l) *promote economic systems that are in harmony with Mother Earth and in accordance with the rights recognized in this Declaration.*

Article 4: Definitions

1. *The term “being” includes ecosystems, natural communities, species and all other natural entities which exist as part of Mother Earth.*
2. *Nothing in this Declaration restricts the recognition of other inherent rights of all beings or specified beings.*



Figure 8.22: Love and respect Mother Earth.



Figure 8.23: We need reverence for all life, and even reverence for inanimate nature. We need respect and love for Mother Earth. She will return out love.

Suggestions for further reading

1. Rachel L. Carson *Under the Sea-Wind* Oxford University Press, 1952
2. Rachel L. Carson *The Sea Around Us* Oxford University Press, 1953
3. Rachel Carson *The Edge of the Sea* Houghton Mifflin, 1955
4. Rachel Carson *Silent Spring* Houghton Mifflin, 1962
5. Linda Lear *Rachel Carson: The Life of the Author of Silent Spring* Penguin Group, 1997
6. William Souder *On a Farther Shore: The Life and Legacy of Rachel Carson* Crown Publishers, 2012
7. C.H. Wood and David L. Skole, *Linking satellite, census, and survey data to study deforestation in the Brazilian Amazon*, in **People and Pixels**, ed. D. Liverman et al. (Washington, DC: National Academies Press, 1998).
8. Suzi Kerr, Alexander S. Pfaff, and Arturo Sanchez, *Development and Deforestation: Evidence From Costa Rica* (unpublished paper, 2003).
9. Frederick A.B. Meyerson, *Population, Biodiversity and Changing Climate*, *Advances in Applied Biodiversity Science* **4** (2003), Chapter 11 (2003): 83-90
10. Andrew D. Foster and Mark R. Rosenzweig, *Economic Growth and the Rise of Forests*,” *The Quarterly Journal of Economics* (May 2003): 601-637.
11. A. Balmford et al., *Conservation Conflicts Across Africa*, *Science* **291** (2001): 2616-19.
12. Richard P. Cincotta, Jennifer Wisniewski, and Robert Engelman, *Human Population in the Biodiversity Hotspots*, *Nature* **404** (2000): 990-92.
13. Food and Agriculture Organization of the United Nations (FAO). 2010. *Global Forest Resources Assessment 2010*. Rome: FAO.
14. World Bank. 2004. *Sustaining Forests: A Development Strategy*. Washington DC: World Bank.
15. Food and Agriculture Organization of the United Nations (FAO). 2006. *Global Forest Resources Assessment 2005: Progress Towards Sustainable Forest Management*. Rome: FAO.
16. United Nations Population Division. 2009. *World Population Prospects: The 2008 Revision*. New York: UN Population Division.
17. Pan, W, D Carr, A Barbierri, R Bilsborrow and C Suchindran. 2007. *Forest Clearing in the Ecuadorian Amazon: A Study of Patterns Over Space and Time*. *Population Research and Policy Review* **26**:635-659.
18. Geist, H J and E F Lambin. 2002. *Proximate Causes and Underlying Driving Forces of Tropical Deforestation*. *Bioscience* **52(2)**: 143-150.
19. Rosero-Bixby, L and A Palloni. 1996. *Population and Deforestation in Costa Rica*. CDE Working Paper No. 96-19. Madison: 1996.
20. Carr, D, L Sutter and A Barbieri. 2006. *Population Dynamics and Tropical Deforestation: State of the Debate and Conceptual Challenges*. *Population and Environment* **27**:89-113.

21. Barreto, P, C Souza, R Nogueron, A Anderson, R Salamao and J Wiles. 2006. *Human Pressure on the Brazilian Amazon Forests*. Washington DC: World Resources Institute (WRI).
22. Ramankutty, N, JA Foley and NJ Olejniczak. 2002. *People on the Land: Changes in Global Population and Croplands during the 20th Century*. *Ambio* **31(3)**: 251-257.
23. Food and Agriculture Organization of the United Nations (FAO). 2008. *Forests and Energy: Key Issues*. Rome: FAO.
24. P. Dasgupta, *Population, Resources and Poverty*, *Ambio*, **21**, 95-101, (1992).
25. L.R. Brown, *Who Will Feed China?*, W.W. Norton, New York, (1995).
26. L.R. Brown, et al., *Saving the Planet. How to Shape and Environmentally Sustainable Global Economy*, W.W. Norton, New York, (1991).
27. L.R. Brown, *Postmodern Malthus: Are There Too Many of Us to Survive?*, *The Washington Post*, July 18, (1993).
28. L.R. Brown and H. Kane, *Full House. Reassessing the Earth's Population Carrying Capacity*, W.W. Norton, New York, (1991).
29. L.R. Brown, *Seeds of Change*, Praeger Publishers, New York, (1970).
30. L.R. Brown, *The Worldwide Loss of Cropland*, Worldwatch Paper 24, Worldwatch Institute, Washington, D.C., (1978).
31. L.R. Brown, and J.L. Jacobson, *Our Demographically Divided World*, Worldwatch Paper 74, Worldwatch Institute, Washington D.C., (1986).
32. L.R. Brown, and J.L. Jacobson, *The Future of Urbanization: Facing the Ecological and Economic Constraints*, Worldwatch Paper 77, Worldwatch Institute, Washington D.C., (1987).
33. L.R. Brown, and others, *State of the World*, W.W. Norton, New York, (published annually).
34. H. Brown, *The Human Future Revisited. The World Predicament and Possible Solutions*, W.W. Norton, New York, (1978).
35. H. Hanson, N.E. Borlaug and N.E. Anderson, *Wheat in the Third World*, Westview Press, Boulder, Colorado, (1982).
36. A. Dil, ed., *Norman Borlaug and World Hunger*, Bookservice International, San Diego/Islamabad/Lahore, (1997).
37. N.E. Borlaug, *The Green Revolution Revisited and the Road Ahead*, Norwegian Nobel Institute, Oslo, Norway, (2000).
38. N.E. Borlaug, *Ending World Hunger. The Promise of Biotechnology and the Threat of Antiscience Zealotry*, *Plant Physiology*, **124**, 487-490, (2000).
39. M. Giampietro and D. Pimental, *The Tightening Conflict: Population, Energy Use and the Ecology of Agriculture*, in *Negative Population Forum*, L. Grant ed., Negative Population Growth, Inc., Teaneck, N.J., (1993).
40. H.W. Kendall and D. Pimental, *Constraints on the Expansion of the Global Food Supply*, *Ambio*, **23**, 198-2005, (1994).
41. D. Pimental et al., *Natural Resources and Optimum Human Population*, *Population and Environment*, **15**, 347-369, (1994).

42. D. Pimental et al., *Environmental and Economic Costs of Soil Erosion and Conservation Benefits*, Science, **267**, 1117-1123, (1995).
43. D. Pimental et al., *Natural Resources and Optimum Human Population*, Population and Environment, **15**, 347-369, (1994).
44. D. Pimental and M. Pimental, *Food Energy and Society*, University Press of Colorado, Niwot, Colorado, (1996).
45. D. Pimental et al., *Environmental and Economic Costs of Soil Erosion and Conservation Benefits*, Science, **267**, 1117-1123, (1995).
46. RS and NAS, *The Royal Society and the National Academy of Sciences on Population Growth and Sustainability*, Population and Development Review, **18**, 375-378, (1992).
47. A.M. Altieri, *Agroecology: The Science of Sustainable Agriculture*, Westview Press, Boulder, Colorado, (1995).
48. G. Conway, *The Doubly Green Revolution*, Cornell University Press, (1997).
49. J. Dreze and A. Sen, *Hunger and Public Action*, Oxford University Press, (1991).
50. G. Bridger, and M. de Soissons, *Famine in Retreat?*, Dent, London, (1970).
51. W. Brandt, *World Armament and World Hunger: A Call for Action*, Victor Gollanz Ltd., London, (1982).
52. A.K.M.A. Chowdhury and L.C. Chen, *The Dynamics of Contemporary Famine*, Ford Foundation, Dacca, Pakistan, (1977)
53. J. Shepard, *The Politics of Starvation*, Carnegie Endowment for International Peace, Washington D.C., (1975).
54. M.E. Clark, *Ariadne's Thread: The Search for New Modes of Thinking*, St. Martin's Press, New York, (1989).
55. J.-C. Chesnais, *The Demographic Transition*, Oxford, (1992).
56. C.M. Cipola, *The Economic History of World Population*, Penguin Books Ltd., (1974).
57. E. Draper, *Birth Control in the Modern World*, Penguin Books, Ltd., (1972).
58. Draper Fund Report No. 15, *Towards Smaller Families: The Crucial Role of the Private Sector*, Population Crisis Committee, 1120 Nineteenth Street, N.W., Washington D.C. 20036, (1986).
59. E. Eckholm, *Losing Ground: Environmental Stress and World Food Prospects*, W.W. Norton, New York, (1975).
60. E. Havemann, *Birth Control*, Time-Life Books, (1967).
61. J. Jacobsen, *Promoting Population Stabilization: Incentives for Small Families*, Worldwatch Paper 54, Worldwatch Institute, Washington D.C., (1983).
62. N. Keyfitz, *Applied Mathematical Demography*, Wiley, New York, (1977).
63. W. Latz (ed.), *Future Demographic Trends*, Academic Press, New York, (1979).
64. World Bank, *Poverty and Hunger: Issues and Options for Food Security in Developing Countries*, Washington D.C., (1986).
65. J.E. Cohen, *How Many People Can the Earth Support?*, W.W. Norton, New York, (1995).
66. J. Amos, *Climate Food Crisis to Deepen*, BBC News (5 September, 2005).

67. J. Vidal and T. Ratford, *One in Six Countries Facing Food Shortage*, The Guardian, (30 June, 2005).
68. J. Mann, *Biting the Environment that Feeds Us*, The Washington Post, July 29, 1994.
69. G.R. Lucas, Jr., and T.W. Ogletree, (editors), *Lifeboat Ethics. The Moral Dilemmas of World Hunger*, Harper and Row, New York.
70. J.L. Jacobson, *Gender Bias: Roadblock to Sustainable Development*, Worldwatch Paper 110, Worldwatch Institute, Washington D.C., (1992).
71. J. Gever, R. Kaufmann, D. Skole and C. Vorosmarty, *Beyond Oil: The Threat to Food and Fuel in the Coming Decades*, Ballinger, Cambridge MA, (1986).
72. M. ul Haq, *The Poverty Curtain: Choices for the Third World*, Columbia University Press, New York, (1976).
73. H. Le Bras, *La Planète au Village*, Datar, Paris, (1993).
74. E. Mayr, *Population, Species and Evolution*, Harvard University Press, Cambridge, (1970).
75. D.C. Pirages and P.R. Ehrlich, *Ark II: Social Responses to Environmental Imperatives*, W.H. Freeman, San Francisco, (1974).
76. Population Reference Bureau, *World Population Data Sheet*, PRM, 777 Fourteenth Street NW, Washington D.C. 20007, (published annually).
77. R. Pressat, *Population*, Penguin Books Ltd., (1970).
78. M. Rechigl (ed.), *Man/Food Equation*, Academic Press, New York, (1975).
79. J.C. Ryan, *Life Support: Conserving Biological Diversity*, Worldwatch Paper 108, Worldwatch Institute, Washington D.C., (1992).
80. J. Shepard, *The Politics of Starvation*, Carnegie Endowment for International Peace, Washington D.C., (1975).
81. P.B. Smith, J.D. Schilling and A.P. Haines, *Introduction and Summary*, in *Draft Report of the Pugwash Study Group: The World at the Crossroads*, Berlin, (1992).
82. B. Stokes, *Local Responses to Global Problems: A Key to Meeting Basic Human Needs*, Worldwatch Paper 17, Worldwatch Institute, Washington D.C., (1978).
83. L. Timberlake, *Only One Earth: Living for the Future*, BBC/ Earthscan, London, (1987).
84. UNEP, *Environmental Data Report*, Blackwell, Oxford, (published annually).
85. UNESCO, *International Coordinating Council of Man and the Biosphere*, MAB Report Series No. 58, Paris, (1985).
86. United Nations Fund for Population Activities, *A Bibliography of United Nations Publications on Population*, United Nations, New York, (1977).
87. United Nations Fund for Population Activities, *The State of World Population*, UNPF, 220 East 42nd Street, New York, 10017, (published annually).
88. United Nations Secretariat, *World Population Prospects Beyond the Year 2000*, U.N., New York, (1973).
89. J. van Klinken, *Het Dierde Punte*, Uitgiversmaatschappij J.H. Kok-Kampen, Netherlands (1989).
90. P.M. Vitousek, P.R. Ehrlich, A.H. Ehrlich and P.A. Matson, *Human Appropriation of the Products of Photosynthesis*, *Bioscience*, 34, 368-373, (1986).

91. B. Ward and R. Dubos, *Only One Earth*, Penguin Books Ltd., (1973).
92. WHO/UNFPA/UNICEF, *The Reproductive Health of Adolescents: A Strategy for Action*, World Health Organization, Geneva, (1989).
93. E.O. Wilson, *Sociobiology*, Harvard University Press, (1975).
94. E.O. Wilson (ed.), *Biodiversity*, National Academy Press, Washington D.C., (1988).
95. E.O. Wilson, *The Diversity of Life*, Allen Lane, The Penguin Press, London, (1992).
96. G. Woodwell (ed.), *The Earth in Transition: Patterns and Processes of Biotic Impoverishment*, Cambridge University Press, (1990).
97. World Commission on Environment and Development, *Our Common Future*, Oxford University Press, (1987).
98. World Bank, *Poverty and Hunger: Issues and Options for Food Security in Developing Countries*, Washington D.C., (1986).
99. World Resources Institute (WRI), *Global Biodiversity Strategy*, The World Conservation Union (IUCN), United Nations Environment Programme (UNEP), (1992).
100. World Resources Institute, *World Resources*, Oxford University Press, New York, (published annually).
101. J.E. Cohen, *How Many People Can the Earth Support?*, W.W. Norton, New York, (1995).
102. D.W. Pearce and R.K. Turner, *Economics of Natural Resources and the Environment*, Johns Hopkins University Press, Baltimore, (1990).
103. P. Bartelmus, *Environment, Growth and Development: The Concepts and Strategies of Sustainability*, Routledge, New York, (1994).
104. D. Pimental et al., *Natural Resources and Optimum Human Population*, Population and Environment, **15**, 347-369, (1994).
105. D. Pimentel and M. Pimentel, *Food Energy and Society*, University Press of Colorado, Niwot, Colorado, (1996).
106. H. Brown, *The Human Future Revisited. The World Predicament and Possible Solutions*, W.W. Norton, New York, (1978).
107. W. Jackson, *Man and the Environment*, Wm. C. Brown, Dubuque, Iowa, (1971).
108. Food and Agriculture Organization (FAO), *The Global Forest Assessment 2000* (Rome: Food and Agriculture Organization, Committee on Forestry, 2000).
109. Thomas K. Rudel, Kevin Flesher, Diana Bates, Sandra Baptista, and Peter Holmgren, *Tropical Deforestation Literature: Geographical and Historical Patterns*, *Unasylva* **203**, Vol. 51 (2000): 11-18;
110. Alexander S. Pfaff, *What drives deforestation in the Brazilian Amazon?* *Journal of Economics and Management* **37** (1999): 26-43.
111. Phillip M. Fearnside, *Human Carrying Capacity Estimation in Brazilian Amazonia as the Basis for Sustainable Development*, *Environmental Conservation* **24** (1997): 271-82;
112. Frederick A.B. Meyerson, *Human Population Density, Deforestation and Protected Areas Management: A Multi-scale Analysis of Central America, Guatemala,*

113. The Maya Biosphere Reserve, *Proceedings of the International Union for the Scientific Study of Population*, XXIV General Population Conference (Salvador, Brazil, 2001).
114. Millenium Ecosystem Assessment. 2005. *Ecosystems and Human Well-Being Biodiversity Synthesis*. Washington DC: World Resources Institute (WRI).
115. Sherbinin, A, D Carr, S Cassels and L Jiang. 2007. *Population and Environment*. The Annual Review of Environment and Resources **32**: 345-373.
116. Leahy, E, R Englelman, C Vogel, S Haddock and T Preston. 2007. *The Shape of Things to Come*. Washington, DC: PAI.
117. DeFries, R, T K Rudel, M Uriarte and M Hansen. 2010. *Deforestation Driven by Urban Population Growth and Agricultural Trade in the Twenty-First Century*. Nature Geoscience **3**: 178-181.
118. Lambin, E F and P Meyfroidt. 2011. *Global Land Use Change, Economic Globalization, and the Looming Land Scarcity*. Proceedings of the National Academy of Sciences **108**: 3465-3472.
119. United Nations Population Division. 2010. *World Urbanization Prospects: The 2009 Revision*. New York: UN Population Division.
120. David Wasdell, *Arctic Dynamics*,
<http://www.envisionation.co.uk/index.php/videos/arctic-dynamics>
121. Wikipedia, *Climate change in the Arctic*,
122. World Bank, *Climate Change Report Warns of Dramatically Warmer World This Century*,
<http://www.worldbank.org/en/news/feature/2012/11/18/Climate-change-report-warns-dramatically-warmer-world-this-century>
123. Wikipedia, *Retreat of glaciers since 1850*,
124. Natural Resources Defense Council, *Climate Change, Water, and Risk: Current water demands are not sustainable*, <http://www.nrdc.org/globalwarming/watersustainability/files/Wat>
125. Wikipedia, *2011 East Africa drought*,
126. OXFAM *Working for the Few: Political capture and economic inequality*, <http://www.oxfam.org/en/rfew>
127. Winnie Byanyima, *Inequality Is Not Inevitable: It's Time to Even It Up!*, Common Dreams <http://www.commondreams.org/views/2014/10/30/inequality-not-inevitable-its-time-even-it>
128. Abarbanel A, McClusky T (1950) *Is the world getting warmer?* Saturday Evening Post, 1 Jul, p22
129. Bagdikian BH (2004) *The New Media Monopoly*. Boston, MA, USA: Beacon
130. Bennett WL (2002) *News: The Politics of Illusion, 5th edition*. New York, NY, USA: Longman
131. Boykoff MT, Boykoff JM (2004) *Balance as bias: global warming and the US prestige press*. Glob Environ Change **14**: 125-136
132. Boykoff MT, Boykoff JM (2007) *Climate change and journalistic norms: A case study of U.S. mass-media coverage*. Geoforum (in press)

133. Carey JW (1989) *Communication as Culture: Essays on Media and Society*. Boston, MA, USA: Unwin Hyman
134. Carvalho A (2005) *Representing the politics of the greenhouse effect: Discursive strategies in the British media*. *Critical Discourse Studies* **2**: 1-29
135. CEI (2006) *We Call it Life*. Washington, DC, USA: Competitive Enterprise Institute
136. Cowen RC (1957) *Are men changing the earth's weather?* *Christian Science Monitor*, 4 Dec, p13
137. Cushman JH (1998) *Industrial group plans to battle climate treaty*. *New York Times*, 26 Apr, p1
138. Doyle G (2002) *Media Ownership: The Economics and Politics of Convergence and Concentration in the UK and European Media*. London, UK: Sage Publications
139. Dunwoody S, Peters HP (1992) *Mass media coverage of technological and environmental risks: A survey of research in the United States and Germany*. *Public Underst Sci* **1**: 199-230
140. Entman RM (1993) *Framing: toward clarification of a fractured paradigm*. *J Commun* **43**: 51-58
141. Fleming JR (1998) *Historical Perspectives on Climate Change*. Oxford, UK: Oxford University Press
142. Gelbspan R (1998) *The Heat Is On*. Cambridge, MA, USA: Perseus Books
143. Grove RH (2003) *Green Imperialism*. Cambridge, UK: Cambridge University Press
144. Leggett J (2001) *The Carbon War*. New York, NY, USA: Routledge
145. McChesney RW (1999) *Rich Media, Poor Democracy: Communication Politics in Dubious Times*. Urbana, IL, USA: University of Illinois Press
146. McComas K, Shanahan J (1999) *Telling stories about global climate change: Measuring the impact of narratives on issue cycles*. *Communic Res* **26**: 30-57
147. McCright AM (2007) *Dealing with climate change contrarians*. In Moser SC, Dilling L (eds) *Creating a Climate for Change: Communicating Climate Change and Facilitating Social Change*, pp 200-212. Cambridge, UK: Cambridge University Press
148. McCright AM, Dunlap RE (2000) *Challenging global warming as a social problem: An analysis of the conservative movement's counter-claims*. *Soc Probl* **47**: 499-522
149. McCright AM, Dunlap RE (2003) *Defeating Kyoto: The conservative movement's impact on U.S. climate change policy*. *Soc Probl* **50**: 348-373
150. Mooney C (2004) *Blinded by science*. *Columbia Journalism Review* 6(Nov/Dec), www.cjr.org
151. NSF (2004) *Science and Engineering Indicators 2004*. Washington, DC, USA: National Science Foundation Project for Excellence in Journalism (2006) *The State of the News Media 2006*. Washington, DC, USA:
152. Project for Excellence in Journalism. www.stateofthenewsmedia.org Rajan SR (2006) *Modernizing Nature*. Oxford, UK: Oxford University Press
153. Sandell C, Blakemore B (2006) *ABC News reporting cited as evidence in congressional hearing on global warming*. *ABC News*, 27 Jul, <http://abcnews.go.com>
154. Shabecoff P (1988) *Global warming has begun, expert tells senate*. *New York Times*, 24 Jun, pA1

155. Shrader-Frechette KS (1993) *Burying Uncertainty*. Berkeley, CA, USA: University of California Press
156. Starr P (2004) *The Creation of the Media: Political Origins of Modern Communications*. New York, NY, USA: Basic Books
157. Ungar S (1992) *The rise and (relative) decline of global warming as a social problem*. *Sociol Q* **33**: 483-501
158. Weart SR (2003) *The Discovery of Global Warming*. Cambridge, MA, USA: Harvard University Press
159. Weingart P, Engels A, Pansegrau P (2000) *Risks of communication: Discourses on climate change in science, politics, and the mass media*. *Public Underst Sci* **9**: 261-283
160. Wilkins L (1993) *Between the facts and values: Print media coverage of the greenhouse effect, 1987-1990*. *Public Underst Sci* **2**: 71-84
161. Wilson KM (1995) *Mass media as sources of global warming knowledge*. *Mass Communication Review* **22**: 75-89
162. Wilson KM (2000) *Communicating climate change through the media: Predictions, politics, and perceptions of risks*. In Allan S, Adam B, Carter C (eds) *Environmental Risks and the Media*, pp 201-217. New York, NY, USA: Routledge
163. Zehr SC (2000) *Public representations of scientific uncertainty about global climate change*. *Public Underst Sci* **9**: 85-103
164. O.N. Larsen, ed., *Violence and the Mass Media*, Harper and Row, (1968).
165. R.M. Liebert et al., *The Early Window: The Effects of Television on Children and Youth*, Pergamon, Elmsford, NY, (1982).
166. G. Noble, *Children in Front of the Small Screen*, Constable, London, (1975).
167. H.J. Schneider, *Das Geschäft mit dem Verbrechen. Massenmedien und Kriminalität*, Kindler, Munich, (1980).
168. W. Schramm, ed., *Grundfragen der Kommunikationsforschung*, Munich, (1973).
169. J.L. Singer and D.G. Singer, *Television, Imagination and Aggression: A Study of Preschoolers*, Erlbaum, Hillsdale, NY, (1981).
170. O.N. Larsen, ed., *Violence and the Mass Media*, Harper and Row, (1968).
171. H.J. Skornia, *Television and Society*, McGraw-Hill, New York, (1965).
172. D.L. Bridgeman, ed., *The Nature of Prosocial Behavior*, New York, Academic Press, (1983).
173. N. Eisenberg, ed., *The Development of Prosocial Behavior*, New York, Academic Press, (1982).
174. W.H. Goodenough, *Cooperation and Change: An Anthropological Approach to Community Development*, New York, Russell Sage Foundation, (1963).
175. J.R. Macauley and L. Berkowitz, *Altruism and Helping Behavior*, Academic Press, New York, (1970).
176. P. Mussen and N. Eisenberg, *Roots of Caring, Sharing and Helping*, Freeman, San Francisco, (1977).
177. J.P. Rushton and R.M. Sorrentino, eds., *Altruism and Helping Behavior*, Erlbaum, Hillsdale, NJ, (1981).

178. L. Wispé, ed, *Altruism, Sympathy and Helping*, Academic Press, New York, (1978).
179. J.-C. Guedon, *La Planète Cyber, Internet et Cyberspace*, Gallimard, (1996).
180. J. Segal, *Théorie de l'information: sciences, techniques et société, de la seconde guerre mondiale ' l'aube du XXI siècle*, Thèse de Doctorat, Université Lumière Lyon II, (1998), (<http://www.mpiwg-berlin.mpg.de/staff/segal/thesis/>)
181. H. von Foerster, editor, *Cybernetics - circular, causal and feed-back mechanisms in biological and social systems*. Transactions of sixth- tenth conferences, Josiah J. Macy Jr. Foundation, New York, (1950- 1954).
182. G. Bateson, *Communication, the Social Matrix of Psychiatry*, Norton, (1951).
183. G. Bateson, *Steps to an Ecology of Mind*, Chandler, San Francisco, (1972).
184. G. Bateson, *Communication et Société*, Seuil, Paris, (1988).
185. R.M.. Liebert et al., *The Early Window: The Effects of Television on Children and Youth*, Pergamon, Elmsford, NY, (1982).
186. G. Noble, *Children in Front of the Small Screen*, Constable, London, (1975).
187. W. Schramm, ed., *Grundfragen der Kommunikationsforschung*, Munich, (1973).
188. J.L. Singer and D.G. Singer, *Television, Imagination and Aggression: A Study of Preschoolers*, Erlbaum, Hillsdale, NY, (1981).
189. P. Dasgupta, *Population, Resources and Poverty*, *Ambio*, **21**, 95-101, (1992).
190. L.R. Brown, *Who Will Feed China?*, W.W. Norton, New York, (1995).
191. L.R. Brown, et al., *Saving the Planet. How to Shape and Environmentally Sustainable Global Economy*, W.W. Norton, New York, (1991).
192. L.R. Brown, *Postmodern Malthus: Are There Too Many of Us to Survive?*, *The Washington Post*, July 18, (1993).
193. L.R. Brown and H. Kane, *Full House. Reassessing the Earth's Population Carrying Capacity*, W.W. Norton, New York, (1991).
194. L.R. Brown, *Seeds of Change*, Praeger Publishers, New York, (1970).
195. L.R. Brown, *The Worldwide Loss of Cropland*, Worldwatch Paper 24, Worldwatch Institute, Washington, D.C., (1978).
196. L.R. Brown, and J.L. Jacobson, *Our Demographically Divided World*, Worldwatch Paper 74, Worldwatch Institute, Washington D.C., (1986).
197. L.R. Brown, and J.L. Jacobson, *The Future of Urbanization: Facing the Ecological and Economic Constraints*, Worldwatch Paper 77, Worldwatch Institute, Washington D.C., (1987).
198. L.R. Brown, and others, *State of the World*, W.W. Norton, New York, (published annually).
199. H. Brown, *The Human Future Revisited. The World Predicament and Possible Solutions*, W.W. Norton, New York, (1978).
200. H. Hanson, N.E. Borlaug and N.E. Anderson, *Wheat in the Third World*, Westview Press, Boulder, Colorado, (1982).
201. A. Dil, ed., *Norman Borlaug and World Hunger*, Bookservice International, San Diego/Islamabad/Lahore, (1997).
202. N.E. Borlaug, *The Green Revolution Revisited and the Road Ahead*, Norwegian Nobel Institute, Oslo, Norway, (2000).

203. N.E. Borlaug, *Ending World Hunger. The Promise of Biotechnology and the Threat of Antiscience Zealotry*, *Plant Physiology*, **124**, 487-490, (2000).
204. M. Giampietro and D. Pimental, *The Tightening Conflict: Population, Energy Use and the Ecology of Agriculture*, in *Negative Population Forum*, L. Grant ed., Negative Population Growth, Inc., Teaneck, N.J., (1993).
205. H.W. Kendall and D. Pimental, *Constraints on the Expansion of the Global Food Supply*, *Ambio*, **23**, 198-2005, (1994).
206. D. Pimental et al., *Natural Resources and Optimum Human Population*, *Population and Environment*, **15**, 347-369, (1994).
207. D. Pimental et al., *Environmental and Economic Costs of Soil Erosion and Conservation Benefits*, *Science*, **267**, 1117-1123, (1995).
208. D. Pimental et al., *Natural Resources and Optimum Human Population*, *Population and Environment*, **15**, 347-369, (1994).
209. D. Pimental and M. Pimental, *Food Energy and Society*, University Press of Colorado, Niwot, Colorado, (1996).
210. D. Pimental et al., *Environmental and Economic Costs of Soil Erosion and Conservation Benefits*, *Science*, **267**, 1117-1123, (1995).
211. RS and NAS, *The Royal Society and the National Academy of Sciences on Population Growth and Sustainability*, *Population and Development Review*, **18**, 375-378, (1992).
212. A.M. Altieri, *Agroecology: The Science of Sustainable Agriculture*, Westview Press, Boulder, Colorado, (1995).
213. G. Conway, *The Doubly Green Revolution*, Cornell University Press, (1997).
214. J. Dreze and A. Sen, *Hunger and Public Action*, Oxford University Press, (1991).
215. G. Bridger, and M. de Soissons, *Famine in Retreat?*, Dent, London, (1970).
216. W. Brandt, *World Armament and World Hunger: A Call for Action*, Victor Gollanz Ltd., London, (1982).
217. A.K.M.A. Chowdhury and L.C. Chen, *The Dynamics of Contemporary Famine*, Ford Foundation, Dacca, Pakistan, (1977)
218. J. Shepard, *The Politics of Starvation*, Carnegie Endowment for International Peace, Washington D.C., (1975).
219. M.E. Clark, *Ariadne's Thread: The Search for New Modes of Thinking*, St. Martin's Press, New York, (1989).
220. J.-C. Chesnais, *The Demographic Transition*, Oxford, (1992).
221. C.M. Cipola, *The Economic History of World Population*, Penguin Books Ltd., (1974).
222. E. Draper, *Birth Control in the Modern World*, Penguin Books, Ltd., (1972).
223. Draper Fund Report No. 15, *Towards Smaller Families: The Crucial Role of the Private Sector*, Population Crisis Committee, 1120 Nineteenth Street, N.W., Washington D.C. 20036, (1986).
224. E. Eckholm, *Losing Ground: Environmental Stress and World Food Prospects*, W.W. Norton, New York, (1975).
225. E. Havemann, *Birth Control*, Time-Life Books, (1967).

226. J. Jacobsen, *Promoting Population Stabilization: Incentives for Small Families*, Worldwatch Paper 54, Worldwatch Institute, Washington D.C., (1983).
227. N. Keyfitz, *Applied Mathematical Demography*, Wiley, New York, (1977).
228. W. Latz (ed.), *Future Demographic Trends*, Academic Press, New York, (1979).
229. World Bank, *Poverty and Hunger: Issues and Options for Food Security in Developing Countries*, Washington D.C., (1986).
230. J.E. Cohen, *How Many People Can the Earth Support?*, W.W. Norton, New York, (1995).
231. J. Amos, *Climate Food Crisis to Deepen*, BBC News (5 September, 2005).
232. J. Vidal and T. Ratford, *One in Six Countries Facing Food Shortage*, The Guardian, (30 June, 2005).
233. J. Mann, *Biting the Environment that Feeds Us*, The Washington Post, July 29, 1994.
234. G.R. Lucas, Jr., and T.W. Ogletree, (editors), *Lifeboat Ethics. The Moral Dilemmas of World Hunger*, Harper and Row, New York.
235. J.L. Jacobson, *Gender Bias: Roadblock to Sustainable Development*, Worldwatch Paper 110, Worldwatch Institute, Washington D.C., (1992).
236. J. Gever, R. Kaufmann, D. Skole and C. Vorosmarty, *Beyond Oil: The Threat to Food and Fuel in the Coming Decades*, Ballinger, Cambridge MA, (1986).
237. M. ul Haq, *The Poverty Curtain: Choices for the Third World*, Columbia University Press, New York, (1976).
238. H. Le Bras, *La Planète au Village*, Datar, Paris, (1993).
239. E. Mayr, *Population, Species and Evolution*, Harvard University Press, Cambridge, (1970).
240. Patz, J. A., Campbell-Lendrum, D., Holloway, T. and Foley, J. A. *Impact of regional climate change on human health*. *Nature* **438**, 310-317 (2005).
241. Basu, R. and Samet, J. M. *Relation between elevated ambient temperature and mortality: a review of the epidemiologic evidence*. *Epidemiol. Rev.* **24**, 190-202 (2002).
242. Kovats, R. S. and Hajat, S. *Heat stress and public health: a critical review*. *Annu. Rev. Publ. Health* **29**, 41-55 (2008).
243. Leon, L. R. *Pathophysiology of Heat Stroke* **Vol. 7** (Colloquium Series on Integrated Systems Physiology: From Molecule to Function to Disease, Morgan Claypool Life Sciences, 2015).
244. Ostro, B. D., Roth, L. A., Green, R. S. and Basu, R. *Estimating the mortality effect of the July 2006 California a heat wave*. *Environ. Res.* **109**, 614-619 (2009).
245. Glas er, J. et al. *Climate change and the emergent epidemic of CKD from heat stress in rural communities: the case for heat stress nephropathy*. *Clin. J. Am. Soc. Nephrol.* **11**, 1472-1483 (2016).
246. Robine, J.-M. et al. *Death toll exceeded 70,000 in Europe during the summer of 2003*. *C. R. Biol.* **331**, 171-178 (2008).
247. Sillmann, J. and Roeckner, E. *Indices for extreme events in projections of anthropogenic climate change*. *Climatic Change* **86**, 83-104 (2008).
248. Meehl, G. A. and Tebaldi, C. *More intense, more frequent, and longer lasting heat waves in the 21st century*. *Science* **305**, 994-997 (2004).

249. Orłowsky, B. and Seneviratne, S. *Global changes in extreme events: regional and seasonal dimension*. Climatic Change **110**, 669-696 (2012).
250. Tebaldi, C., Hayhoe, K., Arblaster, J. M. and Meehl, G. A. *Going to the extremes*. Climatic Change **79**, 185-211 (2006).
251. Tebaldi, C. and Wehner, M. F. *Benefits of mitigation for future heat extremes under RCP4.5 compared to RCP8.5*. Climatic Change <http://dx.doi.org/10.1007/s10584-016-1605-5> (2016).
252. Sterl, A. et al. *When can we expect extremely high surface temperatures?* Geophys. Res. Lett. **35**, L14703 (2008).
253. Huang, C. et al. *Projecting future heat-related mortality under climate change scenarios: a systematic review*. Environ. Health Persp. **119**, 1681-1690 (2011).
254. Guo, Y. et al. *Global variation in the effects of ambient temperature on mortality: a systematic evaluation*. J. Epidemiol. **25**, 781-789 (2014).
255. Luber, G. and McGeehin, M. *Climate change and extreme heat events*. Am. J. Prev. Med. **35**, 429-435 (2008).
256. Bouchama, A. and Knochel, J. P. *Heat stroke*. New. Engl. J. Med. **346**, 1978-1988 (2002).
257. Bobb, J. F., Peng, R. D., Bell, M. L. and Dominici, F. *Heat-related mortality and adaptation to heat in the United States*. Environ. Health Persp. **122**, 811-816 (2014).
258. Gasparrini, A. et al. *Temporal variation in heat-mortality associations: a multi-country study*. Environ. Health Persp. **123**, 1200-1207 (2015).
259. Lowe, D., Ebi, K. L. and Forsberg, B. *Heatwave early warning systems and adaptation advice to reduce human health consequences of heatwaves*. Int. J. Environ. Res. Public Health **8**, 4623-4648 (2011).
260. Hanna, E. G. and Tait, P. W. *Limitations to thermoregulation and acclimatization challenge human adaptation to global warming*. Int. J. Environ. Res. Publ. Health. **12**, 8034-8074 (2015).
261. Sherwood, S. C. and Huber, M. *An adaptability limit to climate change due to heat stress*. Proc. Natl Acad. Sci. USA **107**, 9552-9555 (2010).
262. Whitman, S. et al. *Mortality in Chicago attributed to the July 1995 heat wave*. Am. J. Public Health **87**, 1515-1518 (1997).
263. Dousset, B. et al. *Satellite monitoring of summer heat waves in the Paris metropolitan area*. Int. J. Climatol. **31**, 313-323 (2011).
264. Shaposhnikov, D. et al. *Mortality related to air pollution with the Moscow heat wave and wildfire of 2010*. Epidemiology **25**, 359-364 (2014).
265. Barnett, A. G., Tong, S. and Clements, A. *What measure of temperature is the best predictor of mortality?* Environ. Res. **110**, 604-611 (2010).
266. Willett, K. M. and Sherwood, S. *Exceedance of heat index thresholds for 15 regions under a warming climate using the wet-bulb globe temperature*. Int. J. Climatol. **32**, 161-177 (2012).
267. Argüeso, D., Di Luca, A., Perkins-Kirkpatrick, S. and Evans, J. P. *Seasonal mean temperature changes control future heatwaves*. Geophys. Res. Lett. **43**, 7653-7660 (2016).

268. Jones, B. and O'Neill, B. *Spatially explicit global population scenarios consistent with the Shared Socioeconomic Pathways*. Environ. Res. Lett. **11**, 084003 (2016).
269. Diffenbaugh, N. S. and Field, C. B. *Changes in ecologically critical terrestrial climate conditions*. Science **341**, 486-492 (2013).
270. Mitchell, D. et al. *Attributing human mortality during extreme heat waves to anthropogenic climate change*. Environ. Res. Lett. **11**, 074006 (2016).
271. P. Dasgupta, *Population, Resources and Poverty*, Ambio, **21**, 95-101, (1992).
272. L.R. Brown, *Who Will Feed China?*, W.W. Norton, New York, (1995).
273. L.R. Brown, et al., *Saving the Planet. How to Shape and Environmentally Sustainable Global Economy*, W.W. Norton, New York, (1991).
274. L.R. Brown, *Postmodern Malthus: Are There Too Many of Us to Survive?*, The Washington Post, July 18, (1993).
275. L.R. Brown and H. Kane, *Full House. Reassessing the Earth's Population Carrying Capacity*, W.W. Norton, New York, (1991).
276. L.R. Brown, *Seeds of Change*, Praeger Publishers, New York, (1970).
277. L.R. Brown, *The Worldwide Loss of Cropland*, Worldwatch Paper 24, Worldwatch Institute, Washington, D.C., (1978).
278. L.R. Brown, and J.L. Jacobson, *Our Demographically Divided World*, Worldwatch Paper 74, Worldwatch Institute, Washington D.C., (1986).
279. L.R. Brown, and J.L. Jacobson, *The Future of Urbanization: Facing the Ecological and Economic Constraints*, Worldwatch Paper 77, Worldwatch Institute, Washington D.C., (1987).
280. L.R. Brown, and others, *State of the World*, W.W. Norton, New York, (published annually).
281. H. Brown, *The Human Future Revisited. The World Predicament and Possible Solutions*, W.W. Norton, New York, (1978).
282. H. Hanson, N.E. Borlaug and N.E. Anderson, *Wheat in the Third World*, Westview Press, Boulder, Colorado, (1982).
283. A. Dil, ed., *Norman Borlaug and World Hunger*, Bookservice International, San Diego/Islamabad/Lahore, (1997).
284. N.E. Borlaug, *The Green Revolution Revisited and the Road Ahead*, Norwegian Nobel Institute, Oslo, Norway, (2000).
285. N.E. Borlaug, *Ending World Hunger. The Promise of Biotechnology and the Threat of Antiscience Zealotry*, Plant Physiology, **124**, 487-490, (2000).
286. M. Giampietro and D. Pimental, *The Tightening Conflict: Population, Energy Use and the Ecology of Agriculture*, in **Negative Population Forum**, L. Grant ed., Negative Population Growth, Inc., Teaneck, N.J., (1993).
287. H.W. Kendall and D. Pimental, *Constraints on the Expansion of the Global Food Supply*, Ambio, **23**, 198-2005, (1994).
288. D. Pimental et al., *Natural Resources and Optimum Human Population*, Population and Environment, **15**, 347-369, (1994).
289. D. Pimental et al., *Environmental and Economic Costs of Soil Erosion and Conservation Benefits*, Science, **267**, 1117-1123, (1995).

290. D. Pimental et al., *Natural Resources and Optimum Human Population*, Population and Environment, **15**, 347-369, (1994).
291. D. Pimental and M. Pimental, *Food Energy and Society*, University Press of Colorado, Niwot, Colorado, (1996).
292. D. Pimental et al., *Environmental and Economic Costs of Soil Erosion and Conservation Benefits*, Science, **267**, 1117-1123, (1995).
293. RS and NAS, *The Royal Society and the National Academy of Sciences on Population Growth and Sustainability*, Population and Development Review, **18**, 375-378, (1992).
294. A.M. Altieri, *Agroecology: The Science of Sustainable Agriculture*, Westview Press, Boulder, Colorado, (1995).
295. G. Conway, *The Doubly Green Revolution*, Cornell University Press, (1997).
296. J. Dreze and A. Sen, *Hunger and Public Action*, Oxford University Press, (1991).
297. G. Bridger, and M. de Soissons, *Famine in Retreat?*, Dent, London, (1970).
298. W. Brandt, *World Armament and World Hunger: A Call for Action*, Victor Gollanz Ltd., London, (1982).
299. A.K.M.A. Chowdhury and L.C. Chen, *The Dynamics of Contemporary Famine*, Ford Foundation, Dacca, Pakistan, (1977).
300. J. Shepard, *The Politics of Starvation*, Carnegie Endowment for International Peace, Washington D.C., (1975).
301. M.E. Clark, *Ariadne's Thread: The Search for New Modes of Thinking*, St. Martin's Press, New York, (1989).
302. C.M. Cipola, *The Economic History of World Population*, Penguin Books Ltd., (1974).
303. E. Draper, *Birth Control in the Modern World*, Penguin Books, Ltd., (1972).
304. Draper Fund Report No. 15, *Towards Smaller Families: The Crucial Role of the Private Sector*, Population Crisis Committee, 1120 Nineteenth Street, N.W., Washington D.C. 20036, (1986).
305. E. Eckholm, *Losing Ground: Environmental Stress and World Food Prospects*, W.W. Norton, New York, (1975).
306. E. Havemann, *Birth Control*, Time-Life Books, (1967).
307. J. Jacobsen, *Promoting Population Stabilization: Incentives for Small Families*, Worldwatch Paper 54, Worldwatch Institute, Washington D.C., (1983).
308. N. Keyfitz, *Applied Mathematical Demography*, Wiley, New York, (1977).
309. W. Latz (ed.), *Future Demographic Trends*, Academic Press, New York, (1979).
310. World Bank, *Poverty and Hunger: Issues and Options for Food Security in Developing Countries*, Washington D.C., (1986).
311. J.E. Cohen, *How Many People Can the Earth Support?*, W.W. Norton, New York, (1995).
312. J. Amos, *Climate Food Crisis to Deepen*, BBC News (5 September, 2005).
313. J. Vidal and T. Ratford, *One in Six Countries Facing Food Shortage*, The Guardian, (30 June, 2005).
314. J. Mann, *Biting the Environment that Feeds Us*, The Washington Post, July 29, 1994.

315. G.R. Lucas, Jr., and T.W. Ogletree, (editors), *Lifeboat Ethics. The Moral Dilemmas of World Hunger*, Harper and Row, New York.
316. J.L. Jacobson, *Gender Bias: Roadblock to Sustainable Development*, Worldwatch Paper 110, Worldwatch Institute, Washington D.C., (1992).
317. J. Gever, R. Kaufmann, D. Skole and C. Vorosmarty, *Beyond Oil: The Threat to Food and Fuel in the Coming Decades*, Ballinger, Cambridge MA, (1986).
318. M. ul Haq, *The Poverty Curtain: Choices for the Third World*, Columbia University Press, New York, (1976).
319. H. Le Bras, *La Planète au Village*, Datar, Paris, (1993).
320. E. Mayr, *Population, Species and Evolution*, Harvard University Press, Cambridge, (1970).
321. N.E. Borlaug, *Ending World Hunger. The Promise of Biotechnology and the Threat of Antiscience Zealotry*, *Plant Physiology*, **124**, 487-490, (2000).
322. M. Giampietro and D. Pimentel, *The Tightening Conflict: Population, Energy Use and the Ecology of Agriculture*, in *Negative Population Forum*, L. Grant ed., Negative Population Growth, Inc., Teaneck, N.J., (1993).
323. H.W. Kendall and D. Pimentel, *Constraints on the Expansion of the Global Food Supply*, *Ambio*, **23**, 198-2005, (1994).
324. D. Pimentel et al., *Natural Resources and Optimum Human Population*, *Population and Environment*, **15**, 347-369, (1994).
325. D. Pimentel et al., *Environmental and Economic Costs of Soil Erosion and Conservation Benefits*, *Science*, **267**, 1117-1123, (1995).
326. RS and NAS, *The Royal Society and the National Academy of Sciences on Population Growth and Sustainability*, *Population and Development Review*, **18**, 375-378, (1992).
327. A.M. Altieri, *Agroecology: The Science of Sustainable Agriculture*, Westview Press, Boulder, Colorado, (1995).
328. J. Dreze and A. Sen, *Hunger and Public Action*, Oxford University Press, (1991).
329. B. Commoner, *The Closing Circle: Nature, Man and Technology*, Bantam Books, New York, (1972).
330. Council on Environmental Quality and U.S. Department of State, *Global 2000 Report to the President: Entering the Twenty-First Century*, Technical Report, Volume 2, U.S. Government Printing Office, Washington D.C., (1980).
331. A.B. Durning, *Action at the Grassroots: Fighting Poverty and Environmental Decline*, Worldwatch Paper , Worldwatch Institute, Washington D.C., (1989).
332. P. Donaldson, *Worlds Apart: The Economic Gulf Between Nations*, Penguin Books Ltd., (1973).
333. J.C.I. Dooge et al. (editors), *Agenda of Science for Environment and Development into the 21st Century*, Cambridge University Press, (1993).
334. E. Draper, *Birth Control in the Modern World*, Penguin Books, Ltd., (1972).
335. Draper Fund Report No. 15, *Towards Smaller Families: The Crucial Role of the Private Sector*, Population Crisis Committee, 1120 Nineteenth Street, N.W., Washington D.C. 20036, (1986).

336. Economic Commission for Europe, *Air Pollution Across Boundaries*, United Nations, New York, (1985).
337. A.H. Ehrlich and U. Lele, *Humankind at the Crossroads: Building a Sustainable Food System*, in *Draft Report of the Pugwash Study Group: The World at the Crossroads*, Berlin, (1992).
338. P.R. Ehrlich, *The Population Bomb*, Sierra/Ballentine, New York, (1972).
339. P.R. Ehrlich, A.H. Ehrlich and J. Holdren, *Human Ecology*, W.H. Freeman, San Francisco, (1972).
340. P.R. Ehrlich, A.H. Ehrlich and J. Holdren, *Ecoscience: Population, Resources, Environment*, W.H. Freeman, San Francisco, (1977).
341. P.R. Ehrlich and A.H. Ehrlich, *Extinction*, Victor Gollancz, London, (1982).
342. P.R. Ehrlich and A.H. Ehrlich, *Healing the Planet*, Addison Wesley, Reading MA, (1991).
343. P.R. Ehrlich and A.H. Ehrlich, *The Population Explosion*, Arrow Books, (1991).
344. I. Eibl-Eibesfeldt, *The Biology of War and Peace*, Thames and Hudson, New York, (1979).
345. Food and Agricultural Organization, *The State of Food and Agriculture*, United Nations, Rome, (published annually).
346. K. Griffin, *Land Concentration and Rural Poverty*, Holmes and Meyer, New York, (1976).
347. G. Hagman and others, *Prevention is Better Than Cure*, Report on Human Environmental Disasters in the Third World, Swedish Red Cross, Stockholm, Stockholm, (1986).
348. M. ul Haq, *The Poverty Curtain: Choices for the Third World*, Columbia University Press, New York, (1976).
349. E. Mayr, *Population, Species and Evolution*, Harvard University Press, Cambridge, (1970).
350. N. Myers, *The Sinking Ark*, Pergamon, New York, (1972).
351. N. Myers, *Conservation of Tropical Moist Forests*, National Academy of Sciences, Washington D.C., (1980).
352. K. Newland, *Infant Mortality and the Health of Societies*, Worldwatch Paper 47, Worldwatch Institute, Washington D.C., (1981).
353. W. Ophuls, *Ecology and the Politics of Scarcity*, W.H. Freeman, San Francisco, (1977).
354. D.W. Orr, *Ecological Literacy*, State University of New York Press, Albany, (1992).
355. A. Peccei, *The Human Quality*, Pergamon Press, Oxford, (1977).
356. A. Peccei, *One Hundred Pages for the Future*, Pergamon Press, New York, (1977).
357. A. Peccei and D. Ikeda, *Before it is Too Late*, Kodansha International, Tokyo, (1984).
358. E. Pestel, *Beyond the Limits to Growth*, Universe Books, New York, (1989).
359. Bonan, G. B. (2008). *Forests and climate change: Forcings, feedbacks, and the climate benefits of forests*. *Science*. **320** (5882): 1444-1449.
360. Scheil, D.; Murdiyarso, D. (2009). *How Forests Attract Rain: An Examination of a New Hypothesis*. *BioScience*. **59** (4): 341-347.

361. Ahmad, Y.J. and M. Kassas. 1987. *Desertification: Financial Support for the Biosphere*. West Hartford, Conn.: Kumarian Press.
362. Barrow, C. J. 1991. *Land Degradation - Developments and Breakdown of Terrestrial Environments*. Cambridge: Cambridge University Press.
363. Gadgil, M. 1989. *Deforestation: Problems and prospects*. Foundation Day Lecture, Society for Promotion of Wastelands Development, 12 May, New Delhi. Centre of Ecological Sciences and Theoretical Studies, Indian Institute of Science Bangalore.
364. Government of India. 1987. *State of Forest Report 1987*. Forest Survey of India, Dehradun.
365. Government of India. 1991. *State of Forest Report, 1987-1989*. Forest Survey of India, Dehradun.
366. Kassas, M. 1987. *Drought and desertification*. *Land Use Policy* **4**(4): 389-400.
367. Kemp, D. D. 1990. *Global Environmental Issues - A Climatological Approach*. London: Routledge.
368. Maheshwari, J. K. 1989. *Processing and Utilization of Perennial Vegetation in the Arid Zone of India* in **Role of Forestry in Combatting Desertification**. Rome: FAO Conservation Guide 21, pp. 137-172.
369. Reining, P. 1978. *Handbook on Desertification Indicators*. Washington, D.C.: American Association for the Advancement of Science.
370. Tolba, M. K. 1987. *Sustainable Development: Constraints and Opportunities* London: Butterworth.
371. Tolba, M. K., O. A. El-Kholy, et al. 1992. *The World Environment 1972-1992. Two Decades of Challenge*. London: Chapman and Hall.
372. Tucker, C. J., H. E. Dregne, and W. W. Newcomb. 1991. *Expansion and contraction of Sahara Desert from 1980-1990*. *Science* **253**.
373. UNCED (United Nations Conference on Environment and Development). 1992. *Agenda 21*. United Nations Conference on Environment and Development, Brazil, June 3-14,1992. Brazil: UNCED.
374. UNEP (United Nations Environment Programme). 1984. *General Assessment of Progress in the Implementation of the Plan of Action to Combat Desertification, 1978-1984*. GC-12/9.
375. UNEP (United Nations Environment Programme). 1991. *Status of Desertification and Implementation of the United Nations Plan of Action to Control Desertification*. Nairobi: UNEP.
376. Winpenny, J. T. (ed.). 1990. *Development Research: The Environmental Challenge*. Boulder, Colo.: Westview Press, for the ODI.
377. Wood, W. B. 1990. *Tropical Deforestation. Balancing Regional Development Demands and Global Environmental Concerns*.
378. World Bank. 1992. *World Development Report 1992*. Oxford: Oxford University Press.

Chapter 9

STEPS NEEDED FOR POPULATION STABILIZATION

9.1 All the needed reforms are desirable in themselves

Experts agree that the following steps are needed if we are to avoid a catastrophic global famine and population crash:

1. Higher education and higher status for women throughout the world. Women need higher education to qualify for jobs outside their homes, and higher status within their families so they will not be forced into the role of baby-producing machines.
2. Primary health care for all. Children should be vaccinated against preventable diseases. Materials and information for family planning should be provided for all women who desire smaller families. Advice should be given on improving sanitation.
3. The provision of clean water supplies near to homes is needed in order to reduce the incidence of water-borne diseases. In some countries today, family members, including children, spend large amounts of time carrying water home from distant sources.
4. State provision of care for the elderly is a population-stabilization measure because in many countries, parents produce many children so that the children will provide for them in their old age.
5. In many countries child labor is common, and in some there is even child slavery. Parents who regard their children as a source of income are motivated to produce large families. Enforceable laws against child labor and slavery contribute to population stabilization.
6. General economic progress has been observed to contribute to population stabilization. However in some countries there is a danger of population growing so rapidly that it prevents the economic progress that would otherwise have stabilized population. This situation is known as the demographic trap.



Figure 9.1: **Professor Sir Partha Dasgupta of Cambridge University has pointed out that all of the steps that are needed for population stabilization are desirable in themselves.**

9.2 Higher status and higher education for women

It is only recently that women have had the right to vote. In most of the industrialized countries, this right was only granted during the early part of the 20th century. In some countries, this reform was even slower. For example, in Switzerland, it was only in 1971 that women gained the right to vote in federal elections. In Lichtenstein, women's right to vote was delayed until 1981. It was only in December, 2015 that Saudi Arabia granted the right to vote to women. Currently, the only country in the world where this right is denied is the Vatican City.

It is important that women should have equal political representation because female representation not only advances gender equality in legal matters, such as the inheritance of property, but also promotes the rights of children.

Prior to the 20th century, women were very largely barred from higher education. For example, the famous pioneer of modern educational methods, Dr. Maria Montessori, had to overcome many barriers to obtain her medical degree.

With higher education, comes the motivation and the opportunity for women to have jobs outside their homes. With lower rates of infant mortality, and the aid of machines, being a housewife and mother has become less and less a lifelong full-time occupation. Experts agree that higher education for women, and jobs for women outside their homes are vitally important measures for population stabilization; but these reforms are also very desirable for their own sake, for the sake of justice, and for the sake of the uniquely life-oriented vision that women can bring to public life.



Figure 9.2: Higher education and higher political representation for women are vitally needed reforms.

9.3 Primary health care for all

An International Conference on Primary Health Care took place at Alma-Ata, USSR, 6-12 September, 1978. Point **VII** of the Alma-Ata Declaration defines primary health care as follows:

Primary health care

- 1. reflects and evolves from the economic conditions and sociocultural and political characteristics of the country and its communities and is based on the application of the relevant results of social, biomedical and health services research and public health experience;*
- 2. addresses the main health problems in the community, providing promotive, preventive, curative and rehabilitative services accordingly;*
- 3. includes at least: education concerning prevailing health problems and the methods of preventing and controlling them; promotion of food supply and proper nutrition; an adequate supply of safe water and basic sanitation; maternal and child health care, including family planning; immunization against the major infectious diseases; prevention and control of locally endemic diseases; appropriate treatment of common diseases and injuries; and provision of essential drugs;*
- 4. involves, in addition to the health sector, all related sectors and aspects of national and community development, in particular agriculture, animal husbandry, food, industry, education, housing, public works, communications and other sectors; and demands the coordinated efforts of all those sectors;*
- 5. requires and promotes maximum community and individual self-reliance and participation in the planning, organization, operation and control of primary health care,*



Figure 9.3: The provision of primary health care to all countries throughout the world should include not only measures, such as vaccination, for the prevention of diseases, but also making advice and materials for family planning available to all women who desire them.



Figure 9.4: Bill and Melinda Gates.

making fullest use of local, national and other available resources; and to this end develops through appropriate education the ability of communities to participate;

- 6. should be sustained by integrated, functional and mutually supportive referral systems, leading to the progressive improvement of comprehensive health care for all, and giving priority to those most in need;*
- 7. relies, at local and referral levels, on health workers, including physicians, nurses, midwives, auxiliaries and community workers as applicable, as well as traditional practitioners as needed, suitably trained socially and technically to work as a health team and to respond to the expressed health needs of the community.*

Provision of primary health care is high on the list of priorities of the World Health Organization. The Bill and Melinda Gates Foundation has also made great financial contributions to this goal.



Figure 9.5: Carrying water from distant sources to homes is a time-consuming burden. Often this task is performed by children.

9.4 Clean water supplies near homes

According to the World Health Organization, 842,000 deaths per year are attributable to a lack of safe drinking water supply, sanitation and hygiene. Wikipedia states that “Waterborne diseases can have a significant impact on the economy, locally as well as internationally. People who are infected by a waterborne disease are usually confronted with related costs and not seldom with a huge financial burden. This is especially the case in less developed countries. The financial losses are mostly caused by e.g. costs for medical treatment and medication, costs for transport, special food, and by the loss of manpower. Many families must even sell their land to pay for treatment in a proper hospital. On average, a family spends about 10% of the monthly households income per person infected.”

9.5 State provision of care for the elderly

In many countries, elderly parents have traditionally been cared for by their children. This is one of the motives for large family size. Parents with many children feel that they will have a secure old age. For example, in India, parents are typically cared for by their children into old age, most commonly by their sons. Thus, many parents in India continue to have children until they produce a son, and this often leads to large family sizes. State supported care for the elderly throughout the world is an important step that is needed for population stabilization.



Figure 9.6: **Government-provided care for the elderly will help to stabilize the currently-exploding global population of humans.**

9.6 Abolition of child labor and slavery

Today the hard-won achievements of reformers in the industrialized countries are being undermined and lost because of uncritical and unregulated globalization. A factory owner or CEO, anxious to avoid high labor costs, and anxious to violate environmental regulations merely moves his factory to a country where laws against child labor and rape of the environment do not exist or are poorly enforced. In fact, he must do so or be fired, since the only thing that matters to the stockholders is the bottom line. One might say (as someone has done), that Adam Smith's invisible hand is at the throat of the world's peoples and at the throat of the global environment.

The movement of a factory from Europe or North America to a country with poorly enforced laws against environmental destruction, child labor and slavery puts workers into unfair competition. Unless they are willing to accept revival of the unspeakable conditions of the early Industrial Revolution, they are unable to compete.

Today, child labor accounts for 22% of the workforce in Asia, 32% in Africa, and 17% in Latin America. Large-scale slavery also exists today, although there are formal laws against it in every country. There are more slaves now than ever before - their number is estimated to be between 12 million and 27 million. Besides outright slaves, who are bought and sold for as little as 100 dollars, there many millions of workers whose lack of options and dreadful working conditions must be described as slave-like.

We need to reform our economic system to give it both a social conscience and an ecological conscience. Perhaps some of the things that the world produces and consumes today are not really necessary.



Figure 9.7: Laws prohibiting child labor are non-existent in many countries, or poorly enforced.



Figure 9.8: More slaves exist today than ever before.

9.7 General economic progress

It has been observed that general economic progress leads to population stabilization. However, it often happens that population growth in a country is so rapid that it prevents economic progress. This phenomenon is known as the *demographic trap*. For example, if we look at the population-age structure of Egypt in 2005, shown in Figure 2.9, we see that there are very many young people approaching reproductive age, and very few old people. Thus the birth rate will not be balanced by the death rate, and the population of any country with a similar population-age structure can be expected to grow rapidly, preventing the economic development that might have slowed population growth. In such a situation, strong state-supported birth control programs are clearly needed.

Very early marriage and forced marriage must also be discouraged. We can recall that Malthus mentions late marriage as one of the preventive checks to population growth. Forced and child marriages entrap women and young girls in relationships that deprive them of their basic human rights. Forced marriage constitutes a human rights violation in and of itself.

According to the website Stop Violence Against Women, “In 2003, the International Centre for Research on Women estimated that more than 51 million girls under 18 years were married and they expected the figure to rise to over 100 million within the next ten years. Similarly, in 2006, experts estimated that thirty-eight percent of young women aged 20 to 24 in the fifty least developed countries were married before the age of 18.

“In *Early Marriage: A Harmful Traditional Practice*, UNICEF estimates that among women aged 15 to 24, 48 percent were married before the age of 18 in South Asia. In Bangladesh, 27.3 percent of women aged 15 to 19 years old were married by the age of 15, and 65.3 percent of women aged 20 to 24 were married before the age of 18.

“UNICEF estimates that in Africa 42 percent of women aged 15 to 24 were married before the age of 18. In Niger, 27.3 percent of women ages 15 to 19 were married before the age of 15, and 76.6 percent of women ages 20 to 24 were married before the age of 18. According to surveys conducted by the National Committee on Traditional Practices of Ethiopia (NCTPE), the prevalence of marriage by abduction is as high as 92 per cent in Southern Nations Nationalities and Peoples Region (SNNPR), with a national average of 69 percent.”

Today’s world is one in which the wealth of the richest 1% of the global population increased by 82% in 2017, while for the poorest half of humanity there was no increase at all. It is a world where an estimated 11 million children die every year from starvation or from diseases related to poverty. It is a world where obesity is a serious public health problem in rich nations, while at the same time, children in poorer countries scavenge among toxic wastes in garbage dumps. It is a world where almost a billion people are undernourished.

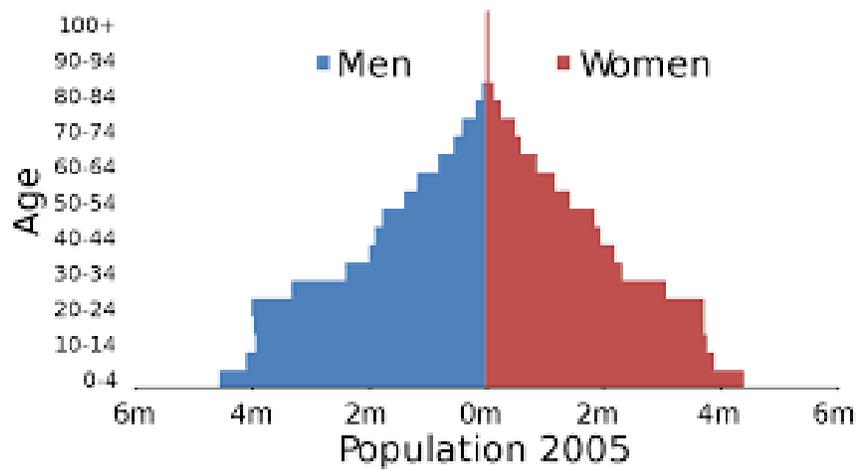


Figure 9.9: The population pyramid of Egypt in 2005.



Figure 9.10: A slum in India



Figure 9.11: Children scavenging at a garbage dump.

9.8 Population projections in Africa

Wikipedia's article on *Projections of Population Growth* states that "By 2070, the bulk of the world's population growth will take place in Africa: of the additional 2.4 billion people projected between 2015 and 2050, 1.3 billion will be added in Africa, 0.9 billion in Asia and only 0.2 billion in the rest of the world. Africa's share of global population is projected to grow from 16% in 2015 to 25% in 2050 and 39% by 2100, while the share of Asia will fall from 60% in 2015 to 54% in 2050 and 44% in 2100. The strong growth of the African population will happen regardless of the rate of decrease of fertility, because of the exceptional proportion of young people already living today. For example, the UN projects that the population of Nigeria will surpass that of the United States by 2050."

"During 2005-2050, twelve countries are expected to account for half of the world's projected population increase: India, China, United States, Indonesia, Nigeria, Pakistan, Brazil, Democratic Republic of the Congo, Ethiopia, Philippines, Mexico and Egypt, listed according to the size of their contribution to population growth."

The predictions shown in Table 2.2, especially the prediction that the population of Africa will be 2.53 billion people, raise some worrying questions. It seems likely that because of climate change, failure of the West African monsoon, desertification, and sale of African agricultural land to rich countries such China and Saudi Arabia, the food available to the people of Africa will diminish rather than increasing. Can the population of Africa really increase by 209% by 2050? Or will this be prevented by the terrible Malthusian forces of famine, disease and war? In some parts of Africa famine is already present.

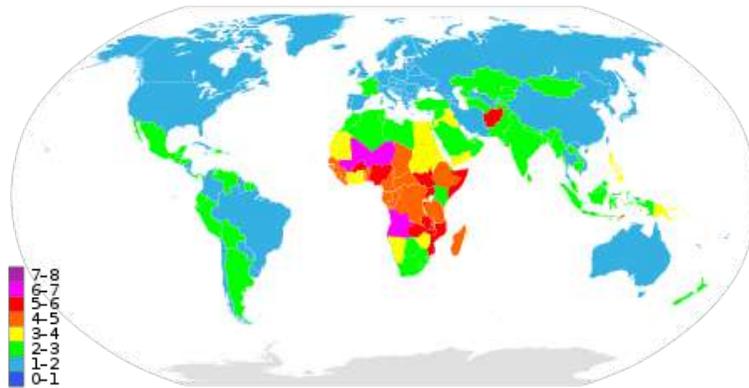


Figure 9.12: A map from the Wikipedia article showing global fertility rates in 2015. The highest fertility rates (purple, 7-8 children per woman-life) occur in Africa.

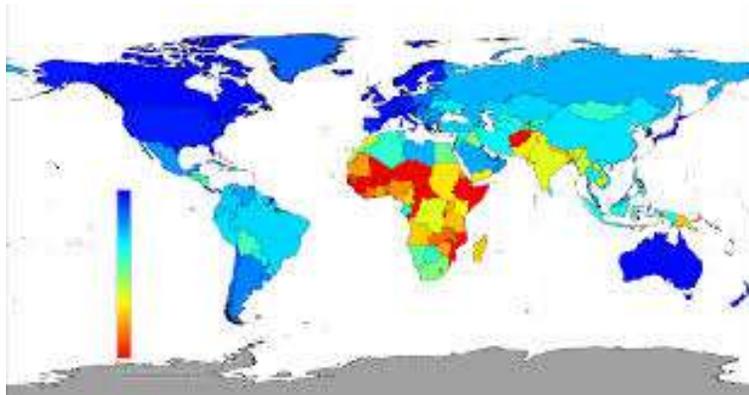


Figure 9.13: A map showing the human development index (HDI) in various parts of the world. The index is based on educational levels, life expectancy, and GDP per capita. It can be seen that regions of high fertility generally have low HDI values.

9.9 What is the future of megacities?

A transformation in cities is going on. Over 80% of the people on the planet today are living in cities. Over 100 new cities will be created within 25 years in China alone. Over 20 new Megacities will redefine the consumer marketplace and society. Most of these cities of over 8 million people each will be in the developing world. With the huge migration to cities of the global population, what challenges will these cities face? What are the opportunities and risks? How should global organizations prepare for the future of cities?

Transition Towns

The Transition Town Movement of today is a response to the end of the fossil fuel era and the threat of economic collapse. It can be thought of as a modern branch of the Cooperative Movement. In 2006, the Transition Town of Totnes in Devon, England was the first to use this name, which implied a transition from globalism, consumerism and growth to a sustainable, local and self-sufficient economy. The ideal was to produce locally all the necessary food for the town, and as much of other necessities as possible. In this way, the energy expenditures involved in transportation could be avoided.

Today there are more than a thousand Transition Towns and they are located in 43 countries. Many of them have local currencies which are legal tender within the town. If the pioneers of this movement are right in saying that this is the only sustainable model for the future, we may wonder whether mega-cities will be able to survive in the long-term future.¹

¹<https://en.wikipedia.org/wiki/Degrowth>
<http://commondreams.org/views/2015/07/31/we-are-all-greece>
<http://www.localfutures.org/>
<http://www.powells.com/biblio/7-9780871566430-2>

Table 9.1: The World's Largest Cities in 2016

Rank	Name	Country	Population
1	Tokyo	Japan	38,140,000
2	Shanghai	China	34,000,000
3	Jakarta	Indonesia	31,500,000
4	Delhi	India	27,200,000
5	Seoul	Korea	25,600,000
6	Guangzhou	China	25,000,000
7	Beijing	China	24,900,000
8	Manila	Philippines	24,100,000
9	Mumbai	India	23,900,000
10	New York City	United States	23,876,155
11	Shenzhen	China	23,300,000
12	Sao Paolo	Brazil	21,242,939

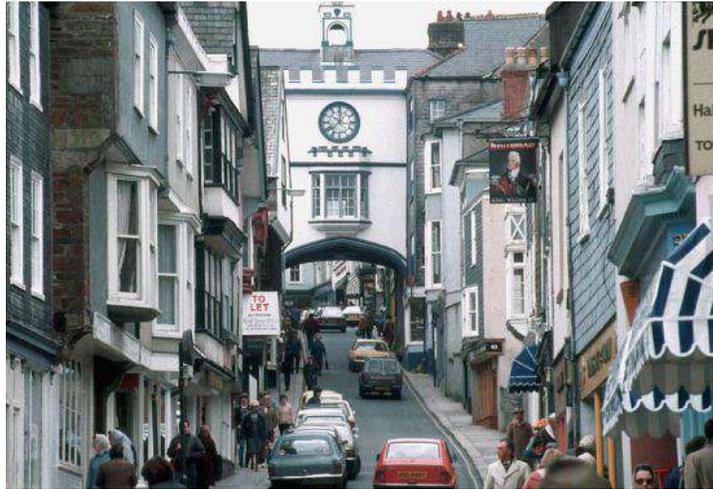


Figure 9.14: Totnes, Devon, England: a transition town.

Suggestions for further reading

1. John Fielden, *The Curse of the Factory System*, (1836).
2. A. Smith, *The Theory of Moral Sentiments...* (1759), ed. D.D. Raphael and A.L. MacPhie, Clarendon, Oxford, (1976).
3. A. Smith, *An Inquiry into the Nature and Causes of the Wealth of Nations* (1776), Everyman edn., 2 vols., Dent, London, (1910).
4. Charles Knowlton *The Fruits of Philosophy, or The Private Companion of Young Married People*, (1832).
5. John A. Hobson, *John Ruskin, Social Reformer*, (1898).
6. E. Pease, *A History of the Fabian Society*, Dutton, New York, (1916).
7. G. Claeys, ed., *New View of Society, and other writings by Robert Owen*, Penguin Classics, (1991).
8. W. Bowden, *Industrial Society in England Towards the End of the Eighteenth Century*, MacMillan, New York, (1925).
9. G.D. Cole, *A Short History of the British Working Class Movement*, MacMillan, New York, (1927).
10. P. Deane, *The First Industrial Revolution*, Cambridge University Press, (1969).
11. Marie Boaz, *Robert Boyle and Seventeenth Century Chemistry*, Cambridge University Press (1958).
12. J.G. Crowther, *Scientists of the Industrial Revolution*, The Cresset Press, London (1962).
13. R.E. Schofield, *The Lunar Society of Birmingham*, Oxford University Press (1963).
14. L.T.C. Rolt, *Isambard Kingdom Brunel*, Arrow Books, London (1961).
15. J.D. Bernal, *Science in History*, Penguin Books Ltd. (1969).
16. Bertrand Russell, *The Impact of Science on Society*, Unwin Books, London (1952).
17. Wilbert E. Moore, *The Impact of Industry*, Prentice Hall (1965).

18. Charles Morazé, *The Nineteenth Century*, George Allen and Unwin Ltd., London (1976).
19. Carlo M. Cipolla (editor), *The Fontana Economic History of Europe*, Fontana/Collins, Glasgow (1977).
20. Martin Gerhard Geisbrecht, *The Evolution of Economic Society*, W.H. Freeman and Co. (1972).
21. P.N. Stearns, *The Industrial Revolution in World History*, Westview Press, (1998).
22. E.P. Thompson, *The Making of the English Working Class*, Penguin Books, London, (1980).
23. N.J. Smelser, *Social Change and the Industrial Revolution: An Application of Theory to the British Cotton Industry*, University of Chicago Press, (1959).
24. D.S. Landes, *The Unbound Prometheus: Technical Change and Industrial Development in Western Europe from 1750 to the Present, 2nd ed.*, Cambridge University Press, (2003).
25. S. Pollard, *Peaceful Conquest: The Industrialization of Europe, 1760-1970*, Oxford University Press, (1981).
26. M. Kranzberg and C.W. Pursell, Jr., eds., *Technology in Western Civilization*, Oxford University Press, (1981).
27. M.J. Daunton, *Progress and Poverty: An Economic and Social History of Britain, 1700-1850*, Oxford University Press, (1990).
28. L.R. Berlanstein, *The Industrial Revolution and Work in 19th Century Europe*, Routledge, (1992).
29. J.D. Bernal, *Science and Industry in the 19th Century*, Indiana University Press, Bloomington, (1970).
30. P.A. Brown, *The French Revolution in English History*, 2nd edn., Allen and Unwin, London, (1923).
31. E. Burke, *Reflections on the Revolution in France and on the Proceedings of Certain Societies in London Relative to that Event...*, Dent, London, (1910).
32. J.B. Bury, *The Idea of Progress*, MacMillan, New York, (1932).
33. I.R. Christie, *Stress and Stability in Late Eighteenth Century Britain; Reflections on the British Avoidance of Revolution* (Ford Lectures, 1983-4), Clarendon, Oxford, (1984).
34. H.T. Dickenson, *Liberty and Property, Political Ideology in Eighteenth Century Britain*, Holmes and Meier, New York, (1977).
35. W. Eltis, *The Classical Theory of Economic Growth*, St. Martin's, New York, (1984).
36. E. Halévy, *A History of the English People in the Nineteenth Century*, (transl. E.I. Watkin), 2nd edn., Benn, London, (1949).
37. E. Halévy, *The Growth of Philosophic Radicalism*, (transl. M. Morris), new edn., reprinted with corrections, Faber, London, (1952).
38. W. Hazlitt, *The Complete Works of William Hazlitt*, ed. P.P. Howe, after the edition of A.R. Walker and A. Glover, 21 vols., J.M. Dent, London, (1932).
39. W. Hazlitt, *A Reply to the Essay on Population by the Rev. T.R. Malthus...*, Longman, Hurst, Rees and Orme, London, (1807).

40. R. Heilbroner, *The Worldly Philosophers: The Lives, Times and Ideas of the Great Economic Thinkers*, 5th edn., Simon and Schuster, New York, (1980).
41. R.K. Kanth, *Political Economy and Laissez-Faire: Economics and Ideology in the Ricardian Era*, Rowman and Littlefield, Totowa N.J., (1986).
42. J.M. Keynes, *Essays in Biography*, in *The Collected Writings of John Maynard Keynes*, MacMillan, London, (1971-82).
43. F. Knight, *University Rebel: The Life of William Frend, 1757-1841*, Gollancz, London (1971).
44. M. Lamb, and C. Lamb, *The Works of Charles and Mary Lamb*, ed. E.V. Lucas, 7 vols., Methuen, London, (1903).
45. A. Lincoln, *Some Political and Social Ideas of English Dissent, 1763-1800*, Cambridge University Press, (1938).
46. D. Locke, *A Fantasy of Reason: The Life and Thought of William Godwin*, Routledge, London, (1980).
47. J. Locke, *Two Treatises on Government. A Critical Edition with an Introduction and Apparatus Criticus*, ed. P. Laslett, Cambridge University Press, (1967).
48. J. Macintosh, *Vindicae Gallicae. Defense of the French Revolution and its English Admirers against the Accusations of the Right Hon. Edmund Burke...*, Robinson, London, (1791).
49. J. Macintosh, *A Discourse on the Study of the Law of Nature and of Nations*, Caldell, London, (1799).
50. T. Paine, *The Rights of Man: being an Answer to Mr. Burke's Attack on The French Revolution*, Jordan, London, part I (1791), part II (1792).
51. H.G. Wells, *Anticipations of the Reaction of Mechanical and Scientific Progress on Human Life and Thought*, Chapman and Hall, London, (1902).
52. B. Wiley, *The Eighteenth Century Background: Studies of the Idea of Nature in the Thought of the Period*, Chatto and Windus, London, (1940).
53. G.R. Morrow, *The Ethical and Economic Theories of Adam Smith: A Study in the Social Philosophy of the 18th Century*, Cornell Studies in Philosophy, **13**, 91-107, (1923).
54. H.W. Schneider, ed., *Adam Smith's Moral and Political Philosophy*, Harper Torchbook edition, New York, (1948).
55. F. Rosen, *Classical Utilitarianism from Hume to Mill*, Routledge, (2003).
56. J.Z. Muller, *The Mind and the Market: Capitalism in Western Thought*, Anchor Books, (2002).
57. J.Z. Muller, *Adam Smith in His Time and Ours: Designing the Decent Society*, Princeton University Press, (1995).
58. S. Hollander, *The Economics of Adam Smith*, University of Toronto Press, (19773).
59. K. Haakonssen, *The Cambridge Companion to Adam Smith*, Cambridge University Press, (2006).
60. K. Haakonssen, *The Science of a Legeslator: The Natural Jurisprudence of David Hume and Adam Smith*, Cambridge University Press, (1981).

61. I. Hont and M. Ignatieff, *Wealth and Virtue: The Shaping of Political Economy in the Scottish Enlightenment*, Cambridge University Press, (1983).
62. I.S. Ross, *The Life of Adam Smith*, Clarendon Press, Oxford, (1976).
63. D. Winch, *Adam Smith's Politics: An Essay in Historiographic Revision*, Cambridge University Press, (1979).
64. King, M., and Elliott, C. (1993). *Legitimate Double-Think*. *Lancet* 341:669-672.
65. Sen, A. (1989). *On Ethics and Economics*. Oxford, UK: Blackwell.
66. Worldwatch Institute (1987). *State of the World 1987*. Washington, DC: Worldwatch Institute.
67. United Nations, Department of Economic and Social Affairs, Population Division (2013) *World Population Prospects: The 2012 Revision*. (United Nations, New York).
68. Campbell, M., Cleland, J., Ezech, A. and Prata, N. (2007) *Return of the Population Growth Factor*. *Science* 315: 1501-1502
69. Coale, A.J. and Hoover, E.M. 1958. *Population growth and economic development in low-income countries*. Princeton University Press, New Jersey USA.
70. Friedman, T.L. (2013) *Tell me how this ends*. *New York Times*, 21 May 2013.
71. George, S. (2010) *Whose crisis, whose future?*, Polity Press, Cambridge.
72. Kirk, D. (1996) *Demographic Transition Theory*. *Population Studies* 50(3): 361-387.
73. Lagi, M., Bertrand, K.Z., Bar-Yam, Y. (2011) *The food crises and political instability in North Africa and the Middle East*. New England Complex Systems Institute
74. P.R. Ehrlich and A.H. Ehrlich, *One With Nineveh: Politics, Consumption and the Human Future*, Island Press, (2004).
75. D.H. Meadows, D.L. Meadows, J. Randers, and W.W. Behrens III, *The Limits to Growth: A Report for the Club of Rome's Project on the Predicament of Mankind*, Universe Books, New York, (1972).
76. D.H. Meadows et al., *Beyond the Limits. Confronting Global Collapse and Envisioning a Sustainable Future*, Chelsea Green Publishing, Post Mills, Vermont, (1992).
77. D.H. Meadows, J. Randers and D.L. Meadows, *Limits to Growth: the 30-Year Update*, Chelsea Green Publishing, White River Jct., VT 05001, (2004).
78. A. Peccei and D. Ikeda, *Before it is Too Late*, Kodansha International, Tokyo, (1984).
79. V.K. Smith, ed., *Scarcity and Growth Reconsidered*, Johns Hopkins University Press, Baltimore, (1979).
80. British Petroleum, *BP Statistical Review of World Energy*, (published yearly).
81. R. Costanza, ed., *Ecological Economics: The Science and Management of Sustainability*, Columbia University Press, New York, (1991).
82. J. Darmstadter, *A Global Energy Perspective*, Sustainable Development Issue Backgrounder, Resources for the Future, (2002).
83. D.C. Hall and J.V. Hall, *Concepts and Measures of Natural Resource Scarcity*, *Journal of Environmental Economics and Management*, **11**, 363-379, (1984).
84. M.K. Hubbert, *Energy Resources*, in *Resources and Man: A Study and Recommendations*, Committee on Resources and Man, National Academy of Sciences, National Research Council, W.H. Freeman, San Francisco, (1969).

85. J.A. Krautkraemer, *Nonrenewable Resource Scarcity*, *Journal of Economic Literature*, bf 36, 2065-2107, (1998).
86. C.J. Cleveland, *Physical and Economic Aspects of Natural Resource Scarcity: The Cost of Oil Supply in the Lower 48 United States 1936-1987*, *Resources and Energy* **13**, 163-188, (1991).
87. C.J. Cleveland, *Yield Per Effort for Additions to Crude Oil Reserves in the Lower 48 States, 1946-1989*, *American Association of Petroleum Geologists Bulletin*, **76**, 948-958, (1992).
88. M.K. Hubbert, *Technique of Prediction as Applied to the Production of Oil and Gas*, in *NBS Special Publication 631*, US Department of Commerce, National Bureau of Standards, (1982).
89. L.F. Ivanhoe, *Oil Discovery Indices and Projected Discoveries*, *Oil and Gas Journal*, **11**, 19, (1984).
90. L.F. Ivanhoe, *Future Crude Oil Supplies and Prices*, *Oil and Gas Journal*, July 25, 111-112, (1988).
91. L.F. Ivanhoe, *Updated Hubbert Curves Analyze World Oil Supply*, *World Oil*, November, 91-94, (1996).
92. L.F. Ivanhoe, *Get Ready for Another Oil Shock!*, *The Futurist*, January-February, 20-23, (1997).
93. Energy Information Administration, *International Energy Outlook, 2001*, US Department of Energy, (2001).
94. Energy Information Administration, *Caspian Sea Region*, US Department of Energy, (2001).
95. National Energy Policy Development Group, *National Energy Policy*, The White House, (2004). (<http://www.whitehouse.gov/energy/>)
96. IEA, *CO2 from Fuel Combustion Fact-Sheet*, International Energy Agency, (2005).
97. H. Youguo, *China's Coal Demand Outlook for 2020 and Analysis of Coal Supply Capacity*, International Energy Agency, (2003).
98. R.H. Williams, *Advanced Energy Supply Technologies*, in *World Energy Assessment: Energy and the Challenge of Sustainability*, UNDP, (2000).
99. H. Lehmann, *Energy Rich Japan*, Institute for Sustainable Solutions and Innovations, Aachen, (2003).
100. W.V. Chandler, *Materials Recycling: The Virtue of Necessity*, Worldwatch Paper 56, Worldwatch Institute, Washington D.C, (1983).
101. W.C. Clark and others, *Managing Planet Earth*, Special Issue, *Scientific American*, September, (1989).
102. B. Commoner, *The Closing Circle: Nature, Man and Technology*, Bantam Books, New York, (1972).
103. J.R. Frisch, *Energy 2000-2020: World Prospects and Regional Stresses*, World Energy Conference, Graham and Trotman, (1983).
104. J. Holdren and P. Herrera, *Energy*, Sierra Club Books, New York, (1971).
105. National Academy of Sciences, *Energy and Climate*, NAS, Washington D.C., (1977).

106. W. Ophuls, *Ecology and the Politics of Scarcity*, W.H. Freeman, San Francisco, (1977).
107. C. Pollock, *Mining Urban Wastes: The Potential for Recycling*, Worldwatch Paper 76, Worldwatch Institute, Washington D.C., (1987).
108. World Resources Institute, *World Resources*, Oxford University Press, New York, (published annually).
109. World Resources Institute, *World Resources 2000-2001: People and Ecosystems: The Fraying Web of Life*, WRI, Washington D.C., (2000).
110. J.E. Young, John E., *Mining the Earth*, Worldwatch Paper 109, Worldwatch Institute, Washington D.C., (1992).
111. J.R. Craig, D.J. Vaughan and B.J. Skinner, *Resources of the Earth: Origin, Use and Environmental Impact, Third Edition*, Prentice Hall, (2001).
112. W. Youngquist, *Geodesinies: The Inevitable Control of Earth Resources Over Nations and Individuals*, National Book Company, Portland Oregon, (1997).
113. M. Tanzer, *The Race for Resources. Continuing Struggles Over Minerals and Fuels*, Monthly Review Press, New York, (1980).
114. C.B. Reed, *Fuels, Minerals and Human Survival*, Ann Arbor Science Publishers Inc., Ann Arbor Michigan, (1975).
115. M.K. Hubbert, *Energy Resources*, in *Resources and Man: A Study and Recommendations*, Committee on Resources and Man, National Academy of Sciences, National Research Council, W.H. Freeman, San Francisco, (1969).
116. J.A. Krautkraemer, *Nonrenewable Resource Scarcity*, *Journal of Economic Literature*, bf 36, 2065-2107, (1998).
117. C.J. Cleveland, *Physical and Economic Aspects of Natural Resource Scarcity: The Cost of Oil Supply in the Lower 48 United States 1936-1987*, *Resources and Energy* **13**, 163-188, (1991).
118. C.J. Cleveland, *Yield Per Effort for Additions to Crude Oil Reserves in the Lower 48 States, 1946-1989*, *American Association of Petroleum Geologists Bulletin*, **76**, 948-958, (1992).
119. M.K. Hubbert, *Technique of Prediction as Applied to the Production of Oil and Gas*, in *NBS Special Publication 631*, US Department of Commerce, National Bureau of Standards, (1982).
120. Energy Information Administration, *International Energy Outlook, 2001*, US Department of Energy, (2001).
121. Energy Information Administration, *Caspian Sea Region*, US Department of Energy, (2001).
122. National Energy Policy Development Group, *National Energy Policy*, The White House, (2004). (<http://www.whitehouse.gov/energy/>)
123. M. Klare, *Bush-Cheney Energy Strategy: Procuring the Rest of the World's Oil*, *Foreign Policy in Focus*, (Interhemispheric Resource Center/Institute for Policy Studies/SEEN), Washington DC and Silver City NM, January, (2004).
124. IEA, *CO2 from Fuel Combustion Fact-Sheet*, International Energy Agency, (2005).

125. H. Youguo, *China's Coal Demand Outlook for 2020 and Analysis of Coal Supply Capacity*, International Energy Agency, (2003).
126. R.H. Williams, *Advanced Energy Supply Technologies*, in *World Energy Assessment: Energy and the Challenge of Sustainability*, UNDP, (2000).
127. H. Lehmann, *Energy Rich Japan*, Institute for Sustainable Solutions and Innovations, Aachen, (2003).
128. W.V. Chandler, *Materials Recycling: The Virtue of Necessity*, Worldwatch Paper 56, Worldwatch Institute, Washington D.C, (1983).
129. J.R. Frisch, *Energy 2000-2020: World Prospects and Regional Stresses*, World Energy Conference, Graham and Trotman, (1983).
130. J. Gever, R. Kaufmann, D. Skole and C. Vorosmarty, *Beyond Oil: The Threat to Food and Fuel in the Coming Decades*, Ballinger, Cambridge MA, (1986).
131. J. Holdren and P. Herrera, *Energy*, Sierra Club Books, New York, (1971).
132. National Academy of Sciences, *Energy and Climate*, NAS, Washington D.C., (1977).
133. W. Ophuls, *Ecology and the Politics of Scarcity*, W.H. Freeman, San Francisco, (1977).
134. P.B. Smith, J.D. Schilling and A.P. Haines, *Introduction and Summary*, in *Draft Report of the Pugwash Study Group: The World at the Crossroads*, Berlin, (1992).
135. World Resources Institute, *World Resources*, Oxford University Press, New York, (published annually).
136. J.R. Craig, D.J. Vaughan and B.J. Skinner, *Resources of the Earth: Origin, Use and Environmental Impact, Third Edition*, Prentice Hall, (2001).
137. W. Youngquist, *Ge Destinies: The Inevitable Control of Earth Resources Over Nations and Individuals*, National Book Company, Portland Oregon, (1997).
138. M. Tanzer, *The Race for Resources. Continuing Struggles Over Minerals and Fuels*, Monthly Review Press, New York, (1980).
139. C.B. Reed, *Fuels, Minerals and Human Survival*, Ann Arbor Science Publishers Inc., Ann Arbor Michigan, (1975).
140. A.A. Bartlett, *Forgotten Fundamentals of the Energy Crisis*, American Journal of Physics, **46**, 876-888, (1978).

Chapter 10

SEX AND OVER-CONSUMPTION

In order to have a chance of avoiding catastrophic climate change, we must reduce our carbon footprints. Understanding the part of human nature that drives us to excessive consumption can help us to achieve this goal.

10.1 Charles Darwin's theory of sexual selection

Darwin's sequel to *The Origin of Species*

In 1871, Charles Darwin published a book entitled *The Descent of Man and Selection in Relation to Sex*. It was a sequel to his 1859 book *On the Origin of Species*, from which he had intentionally omitted any discussion of human ancestry. In 1871, however, honesty compelled him to discuss this highly controversial topic. In his 1871 book, Darwin also discusses a question that had long bothered him. Why do the males of some bird species have extravagantly ornamental plumages, which are so elaborate that they may even hinder the birds' escape from predators? Darwin had often remarked that the sight of a peacock's beautiful feathers made him ill because it seemed to contradict his theory of natural selection. By 1871, however, he had found the answer: sexual selection.

Male-male competition and female choice

In discussing sexual selection, Darwin divided the subject into two headings - male-male competition and female choice.

Regarding male-male competition, Darwin wrote that survival "...depends, not on a struggle for existence, but on a struggle between the males for possession of the females; the result is not death to the unsuccessful competitor, but few or no offspring."

In discussing female selection, he wrote "...when the males and females of any animal have the same general habits ... but differ in structure, colour, or ornament, such differences have been mainly caused by sexual selection."

The statistician and evolutionary biologist Sir Ronald Aylmer Fisher (1890-1962) later wrote that "...plumage development in the male, and sexual preference for such develop-



Figure 10.1: **A male peacock.**

ments in the female, must thus advance together, and so long as the process is unchecked by severe counterselection, will advance with ever-increasing speed. In the total absence of such checks, it is easy to see that the speed of development will be proportional to the development already attained, which will therefore increase with time exponentially, or in geometric progression... In most existing species the runaway process must have been already checked, and we should expect that the more extraordinary developments of sexual plumage are not due like most characters to a long and even course of evolutionary progress, but to sudden spurts of change.”



Figure 10.2: Display by a male bird of paradise.



Figure 10.3: Red bird of paradise male in display.



Figure 10.4: **The King-of-Saxony bird of paradise.**



Figure 10.5: **Mating display of a seabird on the Galapagos Islands. The females find this very attractive.**



Figure 10.6: Female bowerbirds judge males according to their building skills and aesthetic taste.

10.2 We must stop using material goods as a means of social competition

Shooting Santa Claus

No one wants to shoot Santa Claus. That goes without saying! Who would want to harm that jolly old man, with his reindeer and sleigh, and his workshop at the North Pole? Who would want to prevent him from bringing happiness to everyone? Who would want to stop him from making the children's eyes light up like stars? Surely no one!

But the sad truth today is that we have to get rid of Santa somehow, before he kills us, and before he kills most of the plants and animals with which we share our world. Perhaps shooting is too harsh. Perhaps we should just forget Santa and all that he stands for, with his red suit, invented by the advertising department of Coca Cola.

This is what Santa stands for: The customer is always right. Your wish is our command. You have a right to whatever you desire. If you feel like taking a vacation on the other side of the world, don't hesitate, just do it. If you feel like buying a SUV, just do it. Self-fulfillment is your birthright. Spending makes the economy grow, and growth is good. Isn't that right?

But sadly that isn't right. We have to face the fact that endless economic growth on a finite planet is a logical impossibility, and that we have reached or passed the sustainable limits to growth.

In today's world, we are pressing against the absolute limits of the earth's carrying



Figure 10.7: An expensive automobile can be thought of as a mating display used by human males to impress females.

capacity, and further growth carries with it the danger of future collapse. In the long run, neither the growth of industry nor that of population is sustainable; and we have now reached or exceeded the sustainable limits.

The size of the human economy is, of course, the product of two factors: the total number of humans, and the consumption per capita. Let us first consider the problem of reducing the per-capita consumption in the industrialized countries. The whole structure of western society seems designed to push its citizens in the opposite direction, towards ever-increasing levels of consumption. The mass media hold before us continually the ideal of a personal utopia, filled with material goods.

Every young man in a modern industrial society feels that he is a failure unless he fights his way to the “top”; and in recent years, women too have been drawn into the competition. Of course, not everyone can reach the top; there would not be room for everyone; but society urges us all to try, and we feel a sense of failure if we do not reach the goal. Thus, modern life has become a competition of all against all for power and possessions.

When possessions are used for the purpose of social competition, demand has no natural upper limit; it is then limited only by the size of the human ego, which, as we know, is boundless. This would be all to the good if unlimited industrial growth were desirable; but today, when further industrial growth implies future collapse, western society urgently needs to find new values to replace our worship of power, our restless chase after excitement, and our admiration of excessive consumption.

10.2. WE MUST STOP USING MATERIAL GOODS AS A MEANS OF SOCIAL COMPETITION 313



Figure 10.8: A very large house can also be thought of as a human mating display.



Figure 10.9: Size matters!



Figure 10.10: Males fighting for dominance and mating rights.

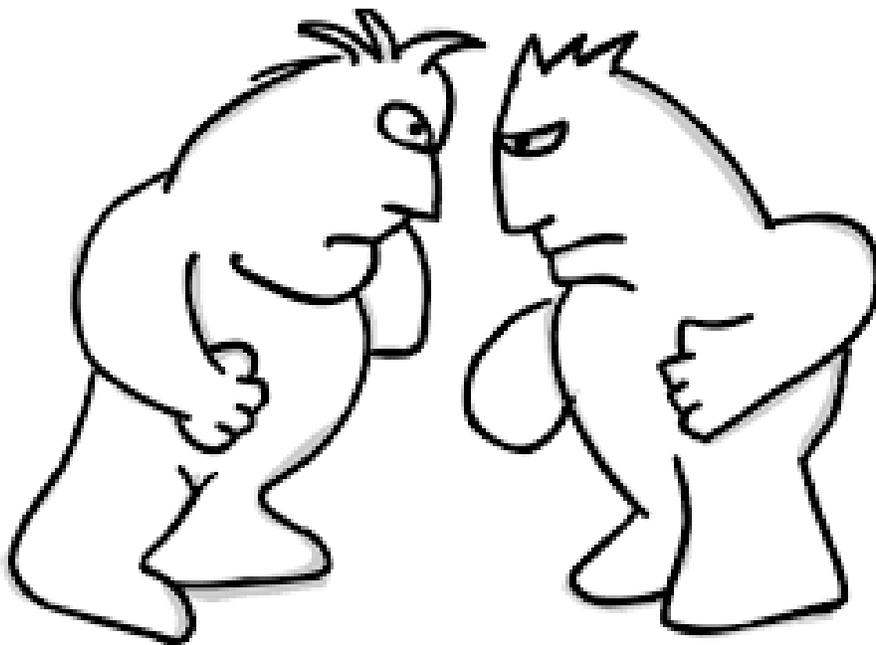


Figure 10.11: Males fighting for dominance and mating rights.

10.3 Thoreau: a pioneer of simple living

In the distant future (and perhaps even in the not-so-distant future) industrial civilization will need to abandon its relentless pursuit of unnecessary material goods and economic growth. Modern society will need to re-establish a balanced and harmonious relationship with nature. In pre-industrial societies harmony with nature is usually a part of the cultural tradition. In our own time, the same principle has become central to the ecological counter-culture while the main-stream culture thunders blindly ahead, addicted to wealth, power and growth.

In the 19th century the American writer, Henry David Thoreau (1817-1862), pioneered the concept of a simple life, in harmony with nature. Today, his classic book, *Walden*, has become a symbol for the principles of ecology, simplicity, and respect for nature.

Thoreau was born in Concord Massachusetts, and he attended Harvard from 1833 to 1837. After graduation, he returned home, worked in his family's pencil factory, did odd jobs, and for three years taught in a progressive school founded by himself and his older brother, John. When John died of lockjaw in 1842, Henry David was so saddened that he felt unable to continue the school alone.

Thoreau refused to pay his poll tax because of his opposition to the Mexican War and to the institution of slavery. Because of his refusal to pay the tax (which was in fact a very small amount) he spent a night in prison. To Thoreau's irritation, his family paid the poll tax for him and he was released. He then wrote down his ideas on the subject in an essay entitled *The Duty of Civil Disobedience*, where he maintains that each person has a duty to follow his own individual conscience even when it conflicts with the orders of his government. "Under a government that which imprisons any unjustly", Thoreau wrote, "the true place for a just man is in prison." *Civil Disobedience* influenced Tolstoy, Gandhi and Martin Luther King, and it anticipated the Nuremberg Principles.

Thoreau became the friend and companion of the transcendentalist writer Ralph Waldo Emerson (1803-1882), who introduced him to a circle of writers and thinkers that included Ellery Channing, Margaret Fuller and Nathaniel Hawthorne.

Nathaniel Hawthorne described Thoreau in the following words: "Mr. Thorow [sic] is a keen and delicate observer of nature - a genuine observer, which, I suspect, is almost as rare a character as even an original poet; and Nature, in return for his love, seems to adopt him as her especial child, and shows him secrets which few others are allowed to witness. He is familiar with beast, fish, fowl, and reptile, and has strange stories to tell of adventures, and friendly passages with these lower brethren of mortality. Herb and flower, likewise, wherever they grow, whether in garden, or wild wood, are his familiar friends. He is also on intimate terms with the clouds and can tell the portents of storms. It is a characteristic trait, that he has a great regard for the memory of the Indian tribes, whose wild life would have suited him so well; and strange to say, he seldom walks over a plowed field without picking up an arrow-point, a spear-head, or other relic of the red men - as if their spirits willed him to be the inheritor of their simple wealth."

At Emerson's suggestion, Thoreau opened a journal, in which he recorded his observations concerning nature and his other thoughts. Ultimately the journal contained more

than 2 million words. Thoreau drew on his journal when writing his books and essays, and in recent years, many previously unpublished parts of his journal have been printed.

From 1845 until 1847, Thoreau lived in a tiny cabin that he built with his own hands. The cabin was in a second-growth forest beside Walden Pond in Concord, on land that belonged to Emerson. Thoreau regarded his life there as an experiment in simple living. He described his life in the forest and his reasons for being there in his book *Walden*, which was published in 1854. The book is arranged according to seasons, so that the two-year sojourn appears compressed into a single year.

“Most of the luxuries”, Thoreau wrote, “and many of the so-called comforts of life, are not only not indispensable, but positive hindrances to the elevation of mankind. With respect to luxuries, the wisest have ever lived a more simple and meager life than the poor. The ancient philosophers, Chinese, Hindoo, Persian, and Greek, were a class than which none has been poorer in outward riches, none so rich in inward.”

Elsewhere in *Walden*, Thoreau remarks, “It is never too late to give up your prejudices”, and he also says, “Why should we be in such desperate haste to succeed, and in such desperate enterprises? If a man does not keep pace with his companions, perhaps it is because he hears a different drummer.” Other favorite quotations from Thoreau include “Rather than love, than money, than fame, give me truth”, “Beware of all enterprises that require new clothes”, “Most men lead lives of quiet desperation” and “Men have become tools of their tools.”

Towards the end of his life, when he was very ill, someone asked Thoreau whether he had made his peace with God. “We never quarreled”, he answered.

Thoreau’s closeness to nature can be seen from the following passage, written by his friend Frederick Willis, who visited him at Walden Pond in 1847, together with the Alcott family: “He was talking to Mr. Alcott of the wild flowers in Walden woods when, suddenly stopping, he said: ‘Keep very still and I will show you my family.’ Stepping quickly outside the cabin door, he gave a low and curious whistle; immediately a woodchuck came running towards him from a nearby burrow. With varying note, yet still low and strange, a pair of gray squirrels were summoned and approached him fearlessly. With still another note several birds, including two crows flew towards him, one of the crows nestling upon his shoulder. I remember that it was the crow resting close to his head that made the most vivid impression on me, knowing how fearful of man this bird is. He fed them all from his hand, taking food from his pocket, and petted them gently before our delighted gaze; and then dismissed them by different whistling, always strange and low and short, each wild thing departing instantly at hearing his special signal.”

In an essay published by the *Atlantic Monthly* in 1853, Thoreau described a pine tree in Maine with the words: “It is as immortal as I am, and perchance will go to as high a heaven, there to tower above me still.” However, the editor (James Russell Lowell) considered the sentence to be blasphemous, and removed it from Thoreau’s essay before publication.

In one of his essays, Thoreau wrote: “If a man walk in the woods for love of them half of each day, he is in danger of being regarded as a loafer; but if he spends his whole day as a speculator, shearing off those woods and making the earth bald before her time, he is esteemed an industrious and enterprising citizen.”



Figure 10.12: Henry David Thoreau, 1817-1862.

10.4 Veblen; economics as anthropology; conspicuous consumption

The phrase “conspicuous consumption” was invented by the Norwegian-American economist Thorstein Veblen (1857-1929) in order to describe the way in which our society uses economic waste as a symbol of social status. In *The Theory of the Leisure Class*, first published in 1899, Veblen pointed out that it is wrong to believe that human economic behavior is rational, or that it can be understood in terms of classical economic theory. To understand it, Veblen maintained, one might preferably make use of insights gained from anthropology, psychology, sociology, and history.

Thorstein Veblen was born into a large Norwegian immigrant family living on a farm in Wisconsin. His first language was Norwegian, and in fact he did not learn English well until he was in his teens. He was a strange boy, precociously addicted to reading, but negligent about doing his chores on the farm. His family recognized that he was unusually intelligent and decided to send him to Carlton College, where he obtained a B.A. in 1880. Later he did graduate work at Johns Hopkins University and finally obtained a Ph.D. from Yale in 1884.

Despite the Ph.D., he failed to obtain an academic position. His iconoclastic views and non-conformist attitudes undoubtedly contributed to this joblessness. Returning to the family farm, Thorstein Veblen continued his voracious reading and his neglect of farm duties for six years. As one of his brothers wrote, “He was lucky enough to come out of a race and family who made family loyalty a religion... He was the only loafer in a highly respectable community... He read and loafed, and the next day he loafed and read.”

An interesting fact about this strange man is that, for some reason, women found him very attractive. In 1888, Thorstein Veblen married Ellen Rolfe, the niece of the president of Carlton College. His wife was to leave him many times, partly because of his many infidelities, and partly because of his aloofness and detachment. He was like a visitor from another planet.

In part, the marriage to Ellen was motivated by Veblen’s search for a job. He hoped to obtain work as an economist for the Atchison, Topeka and Santa Fe Railway, of which her uncle was president. However, the railway was in financial difficulties, and it was taken over by bankers, after which the position disappeared.

Finally a family council was held on the Veblen farm, and it was decided that Thorstein should once again attempt to enter the academic world. In 1891, wearing corduroy trousers and a coonskin hat, he walked into the office of the conservative economist J.L. Laughlan and introduced himself. Although taken aback by Veblen’s appearance, Laughlan began to talk with him, and he soon recognized Veblen’s genius. A year later, when he moved to the University of Chicago, Laughlan brought Veblen with him at a salary of \$520 per year.

At the University of Chicago, Veblen soon established a reputation both for eccentricity and for enormous erudition. His socks were held up by safety pins, but he was reputed to be fluent in twenty-six languages. He gained attention also by publishing a series of brilliant essays.

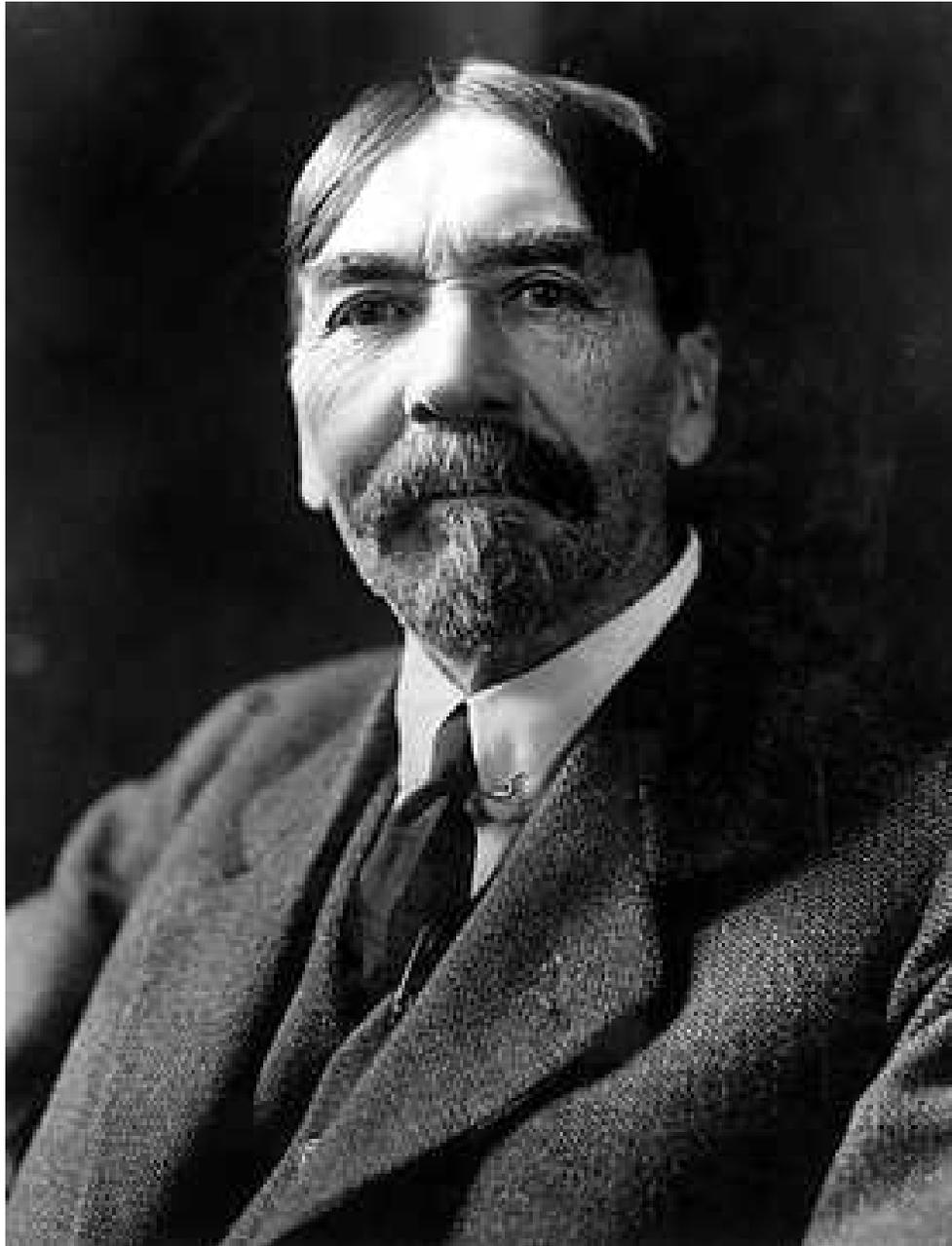


Figure 10.13: **Thorstein Veblen (1857-1929).**

In 1899, Veblen “fluttered the doves of the East” by publishing a book entitled *The Theory of the Leisure Class*. It was part economics, part anthropology, and part social satire. Nothing of the kind had ever been seen in the field of economics. Until that moment it had been universally assumed that human economic behavior is rational. Veblen’s detached and surgically sharp intelligence exposed it as being very largely irrational.

According to Thorstein Veblen, ancient tribal instincts and attitudes motivate us today, just as they motivated our primitive ancestors. Veblen speaks of a predatory phase of primitive society where the strongest fighters were able to subjugate others. This primitive class structure was based on violence, and, according to Veblen, the attitudes associated with it persist today.

For example, Veblen noted that male members of the leisure class liked to go about with walking sticks. Why? Because, answers Veblen, it is “an advertisement that the bearer’s hands are employed otherwise than in useful effort.” Also, a walking stick is a weapon: “The handling of so tangible and primitive a means of offense is very comforting to anyone who is gifted with even a moderate share of ferocity”.

Even in modern society, Veblen says, we have an admiration for those who succeed in obtaining power and money through predatory means, and this admiration makes honest and useful work seem degraded. “During the predatory culture”, Veblen wrote, “labour comes to be associated in men’s habits of thought with weakness and subjugation to a master. It is therefore a mark of inferiority, and therefore comes to be accounted to be unworthy of man in his best estate. By virtue of this tradition, labour is felt to be debasing, and this tradition has never died out. On the contrary, with the advance of social differentiation it has acquired the axiomatic force of ancient and unquestioned prescription.”

“In order to gain and hold the esteem of men it is not sufficient merely to possess wealth or power. The wealth or power must be put in evidence, for esteem is awarded only on evidence. It is felt by all persons of refined taste that a spiritual contamination is inseparable from certain offices that are conventionally required of servants. Vulgar surroundings, mean (that is to say, inexpensive) habitations, and vulgarly productive occupations are unhesitatingly condemned and avoided. They are incompatible with life on a satisfactory spiritual plane - with ‘high thinking’.”

“...The performance of labour has been accepted as a conventional evidence of inferior force, therefore it comes by itself, by a mental shortcut, to be regarded as intrinsically base.”

“The normal and characteristic occupations of the [leisure] class are... government, war, sports, and devout observances... At this as at any other cultural stage, government and war are, at least in part, carried out for the pecuniary gain of those who engage in them, but it is gain obtained by the honourable method of seizure and conversion.”

Veblen also remarks that “It is true of dress even in a higher degree than of most items of consumption, that people will undergo a very considerable degree of privation in the comforts or the necessities of life in order to afford what is considered a decent amount of wasteful consumption; so that it is by no means an uncommon occurrence, in an inclement climate, for people to go ill clad in order to appear well dressed.”

The sensation caused by the publication of Veblen’s book, and the fact

that his phrase, “conspicuous consumption”, has become part of our language, indicate that his theory did not completely miss its mark. In fact, modern advertisers seem to be following Veblen’s advice: Realizing that much of the output of our economy will be used for the purpose of establishing the social status of consumers, advertising agencies hire psychologists to appeal to the consumer’s longing for a higher social position.

10.5 Gandhi as an economist; merit and goods are not connected

If humans are to achieve a stable society in the distant future, it will be necessary for them to become modest in their economic behavior and peaceful in their politics. For both modesty and peace, Gandhi is useful as a source of ideas.

Mohandas Karamchand Gandhi was born in 1869 in Porbandar, India. His family belonged to the Hindu caste of shopkeepers. (In Gujarati “Gandhi” means “grocer”.) However, the family had risen in status, and Gandhi’s father, grandfather, and uncle had all served as prime ministers of small principalities in western India.

In 1888, Gandhi sailed for England, where he spent three years studying law at the Inner Temple in London. Before he left India, his mother had made him take a solemn oath not to touch women, wine, or meat. He thus came into contact with the English vegetarians, who included Sir Edward Arnold (translator of the Bhagavad Gita), the Theosophists Madame Blavatsky and Annie Besant, and the Fabians. Contact with this idealistic group of social critics and experimenters helped to cure Gandhi of his painful shyness, and it also developed his taste for social reform and experimentation.

Gandhi’s exceptionally sweet and honest character won him many friends in England, and he encountered no racial prejudice at all. However, when he traveled to Pretoria in South Africa a few years later, he experienced racism in its worst form. Although he was meticulously well dressed in an English frock coat, and in possession of a first-class ticket, Gandhi was given the choice between traveling third class or being thrown off the train. (He chose the second alternative.) Later in the journey he was beaten by a coach driver because he insisted on his right to sit as a passenger rather than taking a humiliating position on the footboard of the coach.

The legal case which had brought Gandhi to South Africa was a dispute between a wealthy Indian merchant, Dada Abdullah Seth, and his relative, Seth Tyeb (who had refused to pay a debt of 40,000 pounds, in those days a huge sum). Gandhi succeeded in reconciling these two relatives, and he persuaded them to settle their differences out of court. Later he wrote about this experience:

“Both were happy with this result, and both rose in public estimation. My joy was boundless. I had learnt the true practice of law. I had learnt to find out the better side of human nature and to enter men’s hearts. I realized that the true function of a lawyer was to unite parties riven asunder. The lesson was so indelibly burnt into me that a large part

of my time during my twenty years of practice as a lawyer was occupied in bringing about compromises of hundreds of cases. I lost nothing thereby - not even money, certainly not my soul.”

Gandhi was about to return to India after the settlement of the case, but at a farewell party given by Abdullah Seth, he learned of a bill before the legislature which would deprive Indians in South Africa of their right to vote. He decided to stay and fight against the bill.

Gandhi spent the next twenty years in South Africa, becoming the leader of a struggle for the civil rights of the Indian community. In this struggle he tried “...to find the better side of human nature and to enter men’s hearts.” Gandhi’s stay in England had given him a glimpse of English liberalism and English faith in just laws. He felt confident that if the general public in England could be made aware of gross injustices in any part of the British Empire, reform would follow. He therefore organized non-violent protests in which the protesters sacrificed themselves so as to show as vividly as possible the injustice of an existing law. For example, when the government ruled that Hindu, Muslim and Parsi marriages had no legal standing, Gandhi and his followers voluntarily went to prison for ignoring the ruling.

Gandhi used two words to describe this form of protest: “satyagraha” (the force of truth) and “ahimsa” (non-violence). Of these he later wrote: “I have nothing new to teach the world. Truth and non-violence are as old as the hills. All that I have done is to try experiments in both on as vast a scale as I could. In so doing, I sometimes erred and learnt by my errors. Life and its problems have thus become to me so many experiments in the practice of truth and non-violence.”

In his autobiography, Gandhi says: “Three moderns have left a deep impression on my life and captivated me: Raychandbhai (the Indian philosopher and poet) by his living contact; Tolstoy by his book ‘The Kingdom of God is Within You’; and Ruskin by his book ‘Unto This Last’.”

Ruskin’s book, “Unto This Last”, which Gandhi read in 1904, is a criticism of modern industrial society. Ruskin believed that friendships and warm interpersonal relationships are a form of wealth that economists have failed to consider. He felt that warm human contacts are most easily achieved in small agricultural communities, and that therefore the modern tendency towards centralization and industrialization may be a step backward in terms of human happiness. While still in South Africa, Gandhi founded two religious Utopian communities based on the ideas of Tolstoy and Ruskin. Phoenix Farm (1904) and Tolstoy Farm (1910). At this time he also took an oath of chastity (“bramacharya”), partly because his wife was unwell and he wished to protect her from further pregnancies, and partly in order to devote himself more completely to the struggle for civil rights.

Because of his growing fame as the leader of the Indian civil rights movement in South Africa, Gandhi was persuaded to return to India in 1914 and to take up the cause of Indian home rule. In order to re-acquaint himself with conditions in India, he traveled tirelessly, now always going third class as a matter of principle.

During the next few years, Gandhi worked to reshape the Congress Party into an organization which represented not only India’s Anglicized upper middle class but also the millions of uneducated villagers who were suffering under an almost intolerable burden of

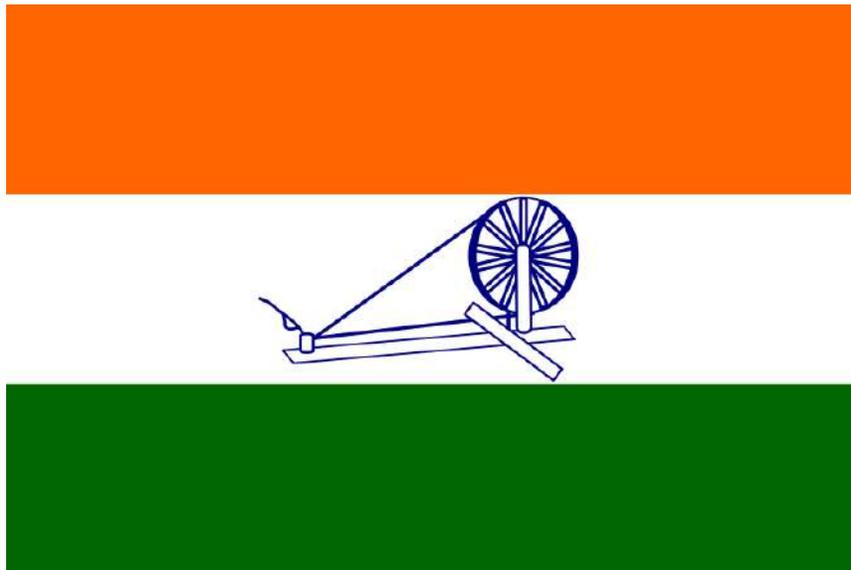


Figure 10.14: **Gandhi’s spinning wheel was incorporated into the flag of the Congress Party and later into the national flag of an independent India.**

poverty and disease. In order to identify himself with the poorest of India’s people, Gandhi began to wear only a white loincloth made of rough homespun cotton. He traveled to the remotest villages, recruiting new members for the Congress Party, preaching non-violence and “firmness in the truth”, and becoming known for his voluntary poverty and humility. The villagers who flocked to see him began to call him “Mahatma” (Great Soul).

Disturbed by the spectacle of unemployment and poverty in the villages, Gandhi urged the people of India to stop buying imported goods, especially cloth, and to make their own. He advocated the re-introduction of the spinning wheel into village life, and he often spent some hours spinning himself. The spinning wheel became a symbol of the Indian independence movement, and was later incorporated into the Indian flag.

The movement for boycotting British goods was called the “Swadeshi movement”. The word Swadeshi derives from two Sanskrit roots: *Swa*, meaning self, and *Desh*, meaning country. Gandhi described Swadeshi as “a call to the consumer to be aware of the violence he is causing by supporting those industries that result in poverty, harm to the workers and to humans or other creatures.”

Gandhi tried to reconstruct the crafts and self-reliance of village life that he felt had been destroyed by the colonial system. “I would say that if the village perishes India will perish too”, he wrote, “India will be no more India. Her own mission in the world will get lost. The revival of the village is only possible when it is no more exploited. Industrialization on a mass scale will necessarily lead to passive or active exploitation of the villagers as problems of competition and marketing come in. Therefore we have to concentrate on the village being self-contained, manufacturing mainly for use. Provided this character of the village industry is maintained, there would be no objection to villagers

using even the modern machines that they can make and can afford to use. Only they should not be used as a means of exploitation by others.”

“You cannot build nonviolence on a factory civilization, but it can be built on self-contained villages... Rural economy as I have conceived it, eschews exploitation altogether, and exploitation is the essence of violence... We have to make a choice between India of the villages that are as ancient as herself and India of the cities which are a creation of foreign domination...”

“Machinery has its place; it has come to stay. But it must not be allowed to displace necessary human labour. An improved plow is a good thing. But if by some chances, one man could plow up, by some mechanical invention of his, the whole of the land of India, and control all the agricultural produce, and if the millions had no other occupation, they would starve, and being idle, they would become dunces, as many have already become. There is hourly danger of many being reduced to that unenviable state.”

In these passages we see Gandhi not merely as a pioneer of nonviolence; we see him also as an economist. Faced with misery and unemployment produced by machines, Gandhi tells us that social goals must take precedence over blind market mechanisms. If machines are causing unemployment, we can, if we wish, and use labor-intensive methods instead. With Gandhi, the free market is not sacred - we can do as we wish, and maximize human happiness, rather than maximizing production and profits.

Gandhi also organized many demonstrations whose purpose was to show the British public that although the British raj gave India many benefits, the toll exacted was too high, not only in terms of money, but also in terms of India's self-respect and self-sufficiency. All of Gandhi's demonstrations were designed to underline this fact. For example, in 1930 Gandhi organized a civil-disobedience campaign against the salt laws. The salt laws gave the Imperial government a monopoly and prevented Indians from making their own salt by evaporating sea water. The majority of Indians were poor farmers who worked long hours in extreme heat, and salt was as much a necessity to them as bread. The tax on salt was essentially a tax on the sweat of the farmers.

Before launching his campaign, Gandhi sent a polite letter to the Viceroy, Lord Irwin, explaining his reasons for believing that the salt laws were unjust, and announcing his intention of disregarding them unless they were repealed. Then, on March 12 1930, Gandhi and many of his followers, accompanied by several press correspondents, started on a march to the sea to carry out their intention of turning themselves into criminals by making salt. Every day, Gandhi led the procession about 12 miles, stopping at villages in the evenings to hold prayer meetings. Many of the villagers joined the march, while others cast flower petals in Gandhi's path or sprinkled water on his path to settle the dust.

On April 5 the marchers arrived at the sea, where they spent the night in prayer on the beach. In the morning they began to make salt by wading into the sea, filling pans with water, and letting it evaporate in the sun. Not much salt was made in this way, but Gandhi's action had a strong symbolic power. A wave of non-violent civil disobedience demonstrations swept over India, so extensive and widespread that the Imperial government, in danger of losing control of the country, decided to arrest as many of the demonstrators as possible. By midsummer, Gandhi and a hundred thousand of his followers were in prison,

but nevertheless the civil disobedience demonstrations continued.

In January, 1931, Gandhi was released from prison and invited to the Viceroy's palace to talk with Lord Irwin. They reached a compromise agreement: Gandhi was to call off the demonstrations and would attend a Round Table Conference in London to discuss Indian home rule, while Lord Irwin agreed to release the prisoners and would change the salt laws so that Indians living near to the coast could make their own salt.

The salt march was typical of Gandhi's non-violent methods. Throughout the demonstrations he tried to maintain a friendly attitude towards his opponents, avoiding escalation of the conflict. Thus at the end of the demonstrations, the atmosphere was one in which a fair compromise solution could be reached. Whenever he was in prison, Gandhi regarded his jailers as his hosts. Once, when he was imprisoned in South Africa, he used the time to make a pair of sandals, which he sent to General Smuts, the leader of the South African government. Thus Gandhi put into practice the Christian principle, "Love your enemies; do good to them that hate you."

Gandhi's importance lies in the fact that he was a major political leader who sincerely tried to put into practice the ethical principles of religion. In his autobiography Gandhi says: "I can say without the slightest hesitation, and yet with all humility, that those who say that religion has nothing to do with politics do not know what religion means."

Gandhi believed that human nature is essentially good, and that it is our task to find and encourage whatever is good in the character of others. During the period when he practiced as a lawyer, Gandhi's aim was "to unite parties riven asunder," and this was also his aim as a politician. In order for reconciliation to be possible in politics, it is necessary to avoid escalation of conflicts. Therefore Gandhi used non-violent methods, relying only on the force of truth. "It is my firm conviction," he wrote, "that nothing can be built on violence."

To the insidious argument that "the end justifies the means," Gandhi answered firmly: "They say 'means are after all means'. I would say 'means are after all everything'. As the means, so the end. Indeed the Creator has given us control (and that very limited) over means, none over end. ... The means may be likened to a seed, and the end to a tree; and there is the same inviolable connection between the means and the end as there is between the seed and the tree. Means and end are convertible terms in my philosophy of life." In other words, a dirty method produces a dirty result; killing produces more killing; hate leads to more hate. But there are positive feedback loops as well as negative ones. A kind act produces a kind response; a generous gesture is returned; hospitality results in reflected hospitality. Hindus and Buddhists call this principle "the law of karma".

Gandhi believed that the use of violent means must inevitably contaminate the end achieved. Because Gandhi's methods were based on love, understanding, forgiveness and reconciliation, the non-violent revolution which he led left very little enmity in its wake. When India finally achieved its independence from England, the two countries parted company without excessive bitterness. India retained many of the good ideas which the English had brought - for example the tradition of parliamentary democracy - and the two countries continued to have close cultural and economic ties.

Mahatma Gandhi was assassinated by a Hindu extremist on January 30,

1948. After his death, someone collected and photographed all his worldly goods. These consisted of a pair of glasses, a pair of sandals and a white homespun loincloth. Here, as in the Swadeshi movement, we see Gandhi as a pioneer of economics. He deliberately reduced his possessions to an absolute minimum in order to demonstrate that there is no connection between personal merit and material goods. Like Veblen, Mahatma Gandhi told us that we must stop using material goods as a means of social competition. We must start to judge people not by what they have, but by what they are.

10.6 The counter-culture; stepping off the treadmill

Say's Law ("Supply creates its own demand"), was proposed by the French economist Jean-Baptiste Say (1767-1832). Say's basis for this proposition was the assumption that a consumer's desire for goods is infinite. He combined this assumption with the observation that the wages paid for the production of goods will provide money enough to buy back the goods, even if the amount involved increases without limit. Comforted by Say's "law", and by the observation that people in industrial societies do indeed consume far more than they actually need, economists continue to pursue economic growth as though it were the Holy Grail. We do indeed devote much of our efforts to "making the earth bald before her time".

As things are today, the advertising industry, which is part of the mainstream culture, whips demand towards ever higher levels by exploiting our tendency to use material goods for the purpose of social competition. Meanwhile, a small but significant counter-culture has realized that unlimited economic growth will lead to ecological disaster unless we stop in time.

In the 1960's, a counter-culture developed in the United States, partly as a reaction against the Vietnam War and partly as a reaction against consumerism. It seemed to young people that they were being offered a possession-centered way of life that they did not want, and that they were being asked to participate in a war that they thought was immoral.

In 1964, a free speech movement began on the campus of the University of California in Berkeley. Students demanded that the university administration should lift a ban that it had imposed on on-campus political activities. Student movements elsewhere in the United States and in Europe echoed the Berkeley protests throughout the late 1960's and early 1970's.

Mario Savo, one of the leaders of the Berkeley free speech movement, compared the Establishment to an enormous anti-human machine: "There is a time when the operation of the machine becomes so odious, makes you so sick at heart, that you can't take part; you can't even passively take part, and you've got to put your bodies upon the gears and upon the wheels, upon the levers, upon all the apparatus, and you've got to make it stop. And you've got to indicate to the people who run it, to the people who own it, that unless you're free, the machine will be prevented from working at all."

The Greening of America, by Charles Reich, describes the youth-centered counter-culture: “Industrialism produced a new man...”, Reich wrote, “one adapted to the demands of the machine. In contrast, today’s emerging consciousness seeks a new knowledge of what it means to be human, in order that the machine, having been built, may now be turned to human ends; in order that man once more can become a creative force, renewing and creating his own life and thus giving life back to society.”

Suggestions for further reading

1. R. Tilman, *The Intellectual Legacy of Thorstein Veblen: Unresolved Issues*, Greenwood Press, (1996).
2. R. Tilman, *Thorstein Veblen and His Critics, 1891-1963*, Princeton University Press, (1992).
3. K. McCormick, *Veblen in Plain English*, Cambria Press, (2006).
4. J. Dorfman, *Thorstein Veblen and His America*, Harvard University Press, (1934).
5. J. Homer, ed., *The Gandhi Reader: A Sourcebook of his Life and Writings*, Grove Press, New York, (1956).
6. G. Sharp, *Gandhi as a Political Strategist, with Essays on Ethics and Politics*, Extending Horizon Books, Boston, (1979).
7. J.V. Bondurant, *Conquest of Violence: The Gandhian Philosophy of Conflict*, Princeton University Press, (1988).
8. L. Fischer, *The Essential Gandhi: An Anthology of his Writings on His Life, Work and Ideas*, Vintage, New York, (2002).
9. M.K. Gandhi, *Hind Swaraj and Other Writings*, edited by A.J. Parel, Cambridge Texts in Modern Politics, (2006).
10. C. Bode, *Best of Thoreau’s Journals*, Southern Illinois University Press, (1967).
11. J. Meyerson et al., *The Cambridge Companion to Henry David Thoreau*, Cambridge University Press, (1995).
12. W. Howarth, *The Book of Concord: Thoreau’s Life as a Writer*, Viking Press, (1982).
13. W. Harding, *Days of Henry Thoreau*, Princeton University Press, (1982).
14. T. Roszak, *The Making of a Counter Culture*, (1970).
15. E. Nelson, *The British Counterculture 1966-1973*, Macmillan, London, (1989).
16. G. McKay, *Senseless Acts of Beauty: Cultures of Resistance since the Sixties*, Verso, London, (1996).
17. K. Goffman, *Counterculture Through the Ages*, Villard Books, (2004).
18. Brundtland Commission, *Our Common Future*, Oxford University Press, (1987).
19. G.O. Barney, , *The Unfinished Agenda: The Citizen’s Policy Guide to Environmental Issues*, Thomas Y. Crowell, New York, (1977).
20. R.E. Benedick, *Ozone Diplomacy: New Directions in Safeguarding the Planet*, Harvard University Press, Cambridge, (1991).
21. T. Berry, *The Dream of the Earth*, Sierra Club Books, San Francisco, (1988).
22. L.R. Brown, *The Twenty-Ninth Day*, W.W. Norton, New York, (1978).

23. M.E. Clark, *Ariadne's Thread: The Search for New Modes of Thinking*, St. Martin's Press, New York, (1989).
24. W.C. Clark and others, *Managing Planet Earth*, Special Issue, *Scientific American*, September, (1989).
25. B. Commoner, *The Closing Circle: Nature, Man and Technology*, Bantam Books, New York, (1972).
26. Council on Environmental Quality and U.S. Department of State, *Global 2000 Report to the President: Entering the Twenty-First Century*, Technical Report, Volume 2, U.S. Government Printing Office, Washington D.C., (1980).
27. J.C.I. Dooge et al. (editors), *Agenda of Science for Environment and Development into the 21st Century*, Cambridge University Press, (1993).
28. E. Eckholm, *The Picture of Health: Environmental Sources of Disease*, New York, (1976).
29. Economic Commission for Europe, *Air Pollution Across Boundaries*, United Nations, New York, (1985).
30. P.R. Ehrlich, A.H. Ehrlich and J. Holdren, *Ecoscience: Population, Resources, Environment*, W.H. Freeman, San Francisco, (1977)
31. P.R. Ehrlich and A.H. Ehrlich, *Extinction*, Victor Gollancz, London, (1982).
32. P.R. Ehrlich and A.H. Ehrlich, *Healing the Planet*, Addison Wesley, Reading MA, (1991).
33. C. Flavin, *Slowing Global Warming: A Worldwide Strategy*, Worldwatch Paper 91, Worldwatch Institute, Washington D.C., (1989).
34. H.F. French, *Clearing the Air: A Global Agenda*, Worldwatch Paper 94, Worldwatch Institute, Washington D.C., (1990).
35. H.F. French, *After the Earth Summit: The Future of Environmental Governance*, Worldwatch Paper 107, Worldwatch Institute, Washington D.C., (1992).
36. G. Hagman and others, *Prevention is Better Than Cure*, Report on Human Environmental Disasters in the Third World, Swedish Red Cross, Stockholm, Stockholm, (1986).
37. G. Hardin, "The Tragedy of the Commons", *Science*, December 13, (1968).
38. P.W. Hemily and M.N. Ozdas (eds.) *Science and Future Choice*, Clarendon, Oxford, (1979).
39. IUCN, UNEP, WWF, *Caring for the Earth*, Earthscan Publications, London, (1991).
40. L. Rosen and R. Glasser (eds.), *Climate Change and Energy Policy*, Los Alamos National Laboratory, AIP, New York, (1992).
41. J.J. MacKenzie and M.T. El-Ashry, *Ill Winds: Airborne Pollution's Toll on Trees and Crops*, World Resources Institute, Washington D.C., (1988).
42. J.T. Mathews (editor), *Preserving the Global Environment: The Challenge of Shared Leadership*, W.W. Norton, New York, (1991).
43. J. McCormick, *Acid Earth*, International Institute for Environment and Development, London, (1985).
44. N. Myers, *The Sinking Ark*, Pergamon, New York, (1972).

45. N. Myers, *Conservation of Tropical Moist Forests*, National Academy of Sciences, Washington D.C., (1980).
46. D.W. Orr, *Ecological Literacy*, State University of New York Press, Albany, (1992).
47. D.C. Pirages and P.R. Ehrlich, *Ark II: Social Responses to Environmental Imperatives*, W.H. Freeman, San Francisco, (1974).
48. J. Rotblat (ed.), *Shaping Our Common Future: Dangers and Opportunities (Proceedings of the Forty-Second Pugwash Conference on Science and World Affairs)*, World Scientific, London, (1994).
49. J.C. Ryan, *Life Support: Conserving Biological Diversity*, Worldwatch Paper 108, Worldwatch Institute, Washington D.C., (1992).
50. S.F. Singer, *Global Effects of Environmental Pollution*, Springer Verlag, New York, (1971).
51. B. Stokes, *Local Responses to Global Problems: A Key to Meeting Basic Human Needs*, Worldwatch Paper 17, Worldwatch Institute, Washington D.C., (1978).
52. L. Timberlake, *Only One Earth: Living for the Future*, BBC/ Earthscan, London, (1987).
53. UNEP, *Environmental Data Report*, Blackwell, Oxford, (published annually).
54. UNESCO, *International Coordinating Council of Man and the Biosphere*, MAB Report Series No. 58, Paris, (1985).
55. P.M. Vitousek, P.R. Ehrlich, A.H. Ehrlich and P.A. Matson, *Human Appropriation of the Products of Photosynthesis*, *Bioscience*, 34, 368-373, (1986).
56. B. Ward and R. Dubos, *Only One Earth*, Penguin Books Ltd., (1973).
57. P. Weber, *Abandoned Seas: Reversing the Decline of the Oceans*, Worldwatch Paper 116, Worldwatch Institute, Washington D.C., (1993).
58. E.O. Wilson (ed.), *Biodiversity*, National Academy Press, Washington D.C., (1988).
59. E.O. Wilson, *The Diversity of Life*, Allen Lane, The Penguin Press, London, (1992).
60. G. Woodwell (ed.), *The Earth in Transition: Patterns and Processes of Biotic Impoverishment*, Cambridge University Press, (1990).
61. World Commission on Environment and Development, *Our Common Future*, Oxford University Press, (1987).
62. World Resources Institute (WRI), *Global Biodiversity Strategy*, The World Conservation Union (IUCN), United Nations Environment Programme (UNEP), (1992).

Chapter 11

EXTINCTION EVENTS AND FEEDBACK LOOPS

Introduction

Scientists warn that if the transition to renewable energy does not happen within very few decades, there is a danger that we will reach a tipping point beyond which feedback loops, such as the albedo effect and the methane hydrate feedback loop, will take over and produce an out-of-control and fatal increase in global temperature.

In 2012, the World Bank issued a report warning that without quick action to curb CO₂ emissions, global warming is likely to reach 4 °C during the 21st century. This is dangerously close to the temperature which initiated the Permian-Triassic extinction event: 6 °C above normal. During the Permian-Triassic extinction event, which occurred 252 million years ago, 96% of all marine species were wiped out, as well as 70% of all terrestrial vertebrates.¹

¹<http://science.nationalgeographic.com/science/prehistoric-world/permian-extinction/>
<http://www.worldbank.org/en/news/feature/2012/11/18/Climate-change-report-warns-dramatically-warmer-world-this-century>

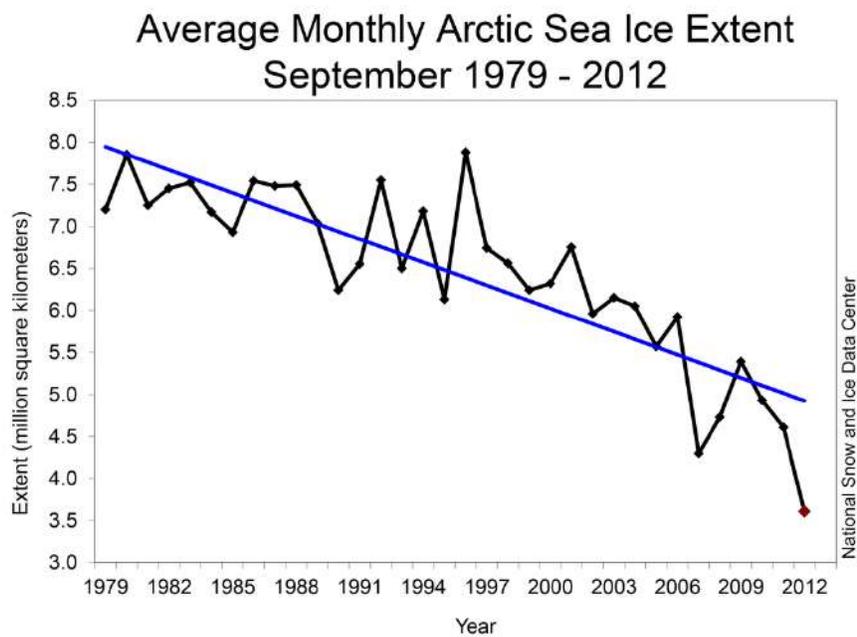


Figure 11.1: Monthly September ice extent for 1979 to 2012 shows a decline of **13.0%** per decade. One can also see that the straight line does not really fit the data, which more nearly resemble a downward curve will that reach zero in the period 2016-2019. Source: National Snow and Ice Data Center. Wikimedia Commons

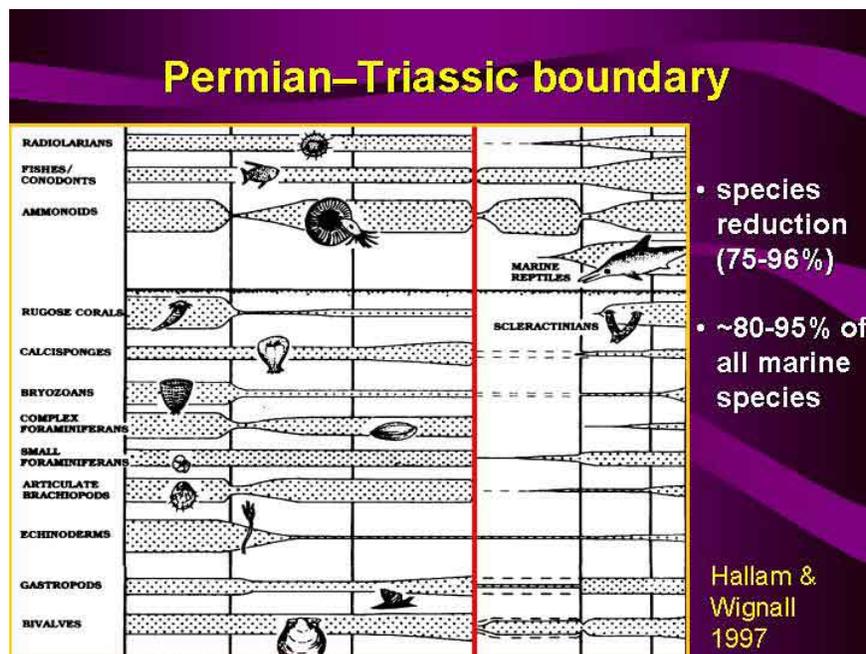


Figure 11.2: Loss of species caused by the Permian-Triassic extinction event. Unless quick steps are taken to lower our greenhouse gas emissions, we may cause a similar extinction event, which will threaten the survival of our own species. Source: Australian Frontiers of Science, www.sciencearchive.org.au

11.1 A warning from the World Bank

In 2012, the World Bank issued a report warning that without quick action to curb CO₂ emissions, global warming is likely to reach 4 °C during the 21st century. This is dangerously close to the temperature which initiated the Permian-Triassic extinction event: 6 °C above normal. During the Permian-Triassic extinction event, which occurred 252 million years ago, 96% of all marine species were wiped out, as well as 70% of all terrestrial vertebrates.²

The 4°C scenarios are devastating: the inundation of coastal cities; increasing risks for food production potentially leading to higher malnutrition rates; many dry regions becoming dryer, wet regions wetter; unprecedented heat waves in many regions, especially in the tropics; substantially exacerbated water scarcity in many regions; increased frequency of high-intensity tropical cyclones; and irreversible loss of biodiversity, including coral reef systems.

And most importantly, a 4°C world is so different from the current one that it comes with high uncertainty and new risks that threaten our ability to anticipate and plan for future adaptation needs. The lack of action on climate change not only risks putting prosperity out of reach of millions of people in the developing world, it threatens to roll back decades of sustainable development. It is clear that we already know a great deal about the threat before us. The science is unequivocal that humans are the cause of global warming, and major changes are already being observed: global mean warming is 0.8°C above pre industrial levels; oceans have warmed by 0.09°C since the 1950s and are acidifying; sea levels rose by about 20 cm since pre-industrial times and are now rising at 3.2 cm per decade; an exceptional number of extreme heat waves occurred in the last decade; major food crop growing areas are increasingly affected by drought.

Despite the global community's best intentions to keep global warming below a 2°C increase above pre-industrial climate, higher levels of warming are increasingly likely. Scientists agree that countries' current United Nations Framework Convention on Climate Change emission pledges and commitments would most likely result in 3.5 to 4°C warming. And the longer those pledges remain unmet, the more likely a 4°C world becomes.

Data and evidence drive the work of the World Bank Group. Science reports, including those produced by the Intergovernmental Panel on Climate Change, informed our decision to ramp up work on these issues, leading to, a World Development Report on climate change designed to improve our understanding of the implications of a warming planet; a Strategic Framework on Development and Climate Change, and a report on Inclusive Green Growth. The World Bank is a leading advocate for ambitious action on climate change, not only because it is a moral imperative, but because it makes good economic sense.

But what if we fail to ramp up efforts on mitigation? What are the implications of a 4°C world? We commissioned this report from the Potsdam Institute for Climate Impact

²<http://science.nationalgeographic.com/science/prehistoric-world/permian-extinction/>
<http://www.worldbank.org/en/news/feature/2012/11/18/Climate-change-report-warns-dramatically-warmer-world-this-century>

Research and Climate Analytics to help us understand the state of the science and the potential impact on development in such a world.

It would be so dramatically different from today's world that it is hard to describe accurately; much relies on complex projections and interpretations. We are well aware of the uncertainty that surrounds these scenarios and we know that different scholars and studies sometimes disagree on the degree of risk. But the fact that such scenarios cannot be discarded is sufficient to justify strengthening current climate change policies. Finding ways to avoid that scenario is vital for the health and welfare of communities around the world. While every region of the world will be affected, the poor and most vulnerable would be hit hardest. A 4°C world can, and must, be avoided.

The World Bank Group will continue to be a strong advocate for international and regional agreements and increasing climate financing. We will redouble our efforts to support fast growing national initiatives to mitigate carbon emissions and build adaptive capacity as well as support inclusive green growth and climate smart development. Our work on inclusive green growth has shown that, through more efficiency and smarter use of energy and natural resources, many opportunities exist to drastically reduce the climate impact of development, without slowing down poverty alleviation and economic growth.

This report is a stark reminder that climate change affects everything. The solutions don't lie only in climate finance or climate projects. The solutions lie in effective risk management and ensuring all our work, all our thinking, is designed with the threat of a 4°C degree world in mind. The World Bank Group will step up to the challenge.

11.2 Permian-Triassic extinction event

The geological record shows five major extinction events.

- Ordovician-Silurian Extinction. around 439 million years ago.
- Late Devonian Extinction. 375-360 million years ago.
- Permian-Triassic extinction. 352 million years ago.
- Triassic-Jurassic extinction, 201 million years ago.
- Cretaceous-Paleogene extinction, 66 million years ago.

The most devastating of these was the Permian-Triassic extinction, which occurred 252 million years ago.³ In the Permian-Triassic extinction, 96% of all marine species and 76% of all terrestrial vertebrates disappeared forever. The cause of this extremely severe

³ <https://www.thomhartmann.com/bigpicture/last-hours-climate-change>
The Last Hours of Humanity: Warming the World To Extinction (book), by Thom Hartmann
<https://www.amazon.com/Last-Hours-Humanity-Warming-Extinction/dp/1629213640>
<http://www.mediaite.com/online/leonardo-dicaprio-boosts-thom-hartmann-apocalyptic-global-warming-film-last-hours/>

event is disputed, but according to one of the most plausible theories it was triggered by a massive volcanic eruption in Siberia, which released enormous amounts of CO₂ into the earth's atmosphere.

The region where massive volcanic eruptions are known to have occurred 252 million years ago called the "Siberian Traps". (The "Traps" part of the name comes from the fact that many of the volcanic rock formations in the region resemble staircases. The Swedish word for staircase is "trappe".) The eruptions continued for about a million years.

Today the area covered is about 2 million square kilometers, roughly equal to western Europe in land area. Estimates of the original coverage are as high as 7 million square kilometers. The original volume of lava is estimated to range from 1 to 4 million cubic kilometers.

The CO₂ released by the Siberian Traps eruption is believed to have caused a global temperature increase of 6°C, and this was enough to trigger the methane-hydrate feedback loop, which will be discussed below, The earth's temperature is thought to have continued to rise for 85,000 years, finally reaching 15° above normal.

11.3 The Holocene (Anthropocene) extinction

We are now living in the midst of a sixth, human-caused, mass extinction. How severe it becomes is up to us.

Recently a group of scientists stated that the scope of human impact on planet Earth is so great that the *Anthropocene* warrants a formal place in the Geological Time Scale.

In a statement issued by University of Leicester Press Office on 2 October 2017, professor Jan Zalasiewicz from the University of Leicester's School of Geography, Geology, and the Environment said: "Our findings suggest that the Anthropocene should follow on from the Holocene Epoch that has seen 11.7 thousand years of relative environmental stability, since the retreat of the last Ice Age, as we enter a more unstable and rapidly evolving phase of our planet's history,"⁴

"We conclude that human impact has now grown to the point that it has changed the course of Earth history by at least many millennia, in terms of the anticipated long-term climate effects (e.g. postponement of the next glacial maximum: see Ganopolski et al., 2016; Clark et al., 2016), and in terms of the extensive and ongoing transformation of the biota, including a geologically unprecedented phase of human-mediated species invasions, and by species extinctions which are accelerating (Williams et al., 2015, 2016)."

The report stated that defining characteristics of the period include "marked acceleration of rates of erosion and sedimentation; large-scale chemical perturbations to the cycles of carbon, nitrogen, phosphorus and other elements; the inception of significant change in global climate and sea level; and biotic changes including unprecedented levels of species invasions across the Earth. Many of these changes are geologically long-lasting, and some are effectively irreversible."

⁴<http://www2.le.ac.uk/offices/press/press-releases/2017/october/significant-scale-of-human-impact-on-planet-has-changed-course-of-earth2019s-history-scientists-suggest>

Loss of biodiversity

Tropical rain forests are the most biologically diverse places in the world. This is because they have not been affected by the periods of glaciation that have periodically destroyed the forests of temperate and boreal regions. The destruction of species-rich tropical rain forests is one of the mechanisms driving the present high rate of species loss.

According to a recent article published in *The Guardian*⁵ “Conservation experts have already signalled that the world is in the grip of the “sixth great extinction” of species, driven by the destruction of natural habitats, hunting, the spread of alien predators and disease, and climate change.

“The IUCN⁶ created shock waves with its major assessment of the world’s biodiversity in 2004, which calculated that the rate of extinction had reached 100-1,000 times that suggested by the fossil records before humans.

“No formal calculations have been published since, but conservationists agree the rate of loss has increased since then, and Stuart said it was possible that the dramatic predictions of experts like the renowned Harvard biologist E O Wilson, that the rate of loss could reach 10,000 times the background rate in two decades, could be correct.”

A recent article by Profs. Gerardo Ceballos, Paul R. Ehrlich and Rodolfo Dirzo in the *Proceedings of the National Academy of Sciences* was entitled “Biological Annihilation via the Ongoing Sixth Mass Extinction Signaled by Vertebrate Population Losses and Declines”.

The Abstract of the paper reads as follows: “The population extinction pulse we describe here shows, from a quantitative viewpoint, that Earth’s sixth mass extinction is more severe than perceived when looking exclusively at species extinctions. Therefore, humanity needs to address anthropogenic population extirpation and decimation immediately. That conclusion is based on analyses of the numbers and degrees of range contraction (indicative of population shrinkage and/or population extinctions according to the International Union for Conservation of Nature) using a sample of 27,600 vertebrate species, and on a more detailed analysis documenting the population extinctions between 1900 and 2015 in 177 mammal species. We find that the rate of population loss in terrestrial vertebrates is extremely high, even in ‘species of low concern.’ In our sample, comprising nearly half of known vertebrate species, 32% (8,851/27,600) are decreasing; that is, they have decreased in population size and range. In the 177 mammals for which we have detailed data, all have lost 30% or more of their geographic ranges and more than 40% of the species have experienced severe population declines (>80% range shrinkage). Our data indicate that beyond global species extinctions Earth is experiencing a huge episode of population declines and extirpations, which will have negative cascading consequences on ecosystem functioning and services vital to sustaining civilization. We describe this as a ‘biological annihilation’ to highlight the current magnitude of Earth’s ongoing sixth major extinction event.”

⁵<https://www.theguardian.com/environment/2010/mar/07/extinction-species-evolve>

⁶International Union for the Conservation of Nature

11.4 Global warming and atmospheric water vapor

A feedback loop is a self-re-enforcing trend. One of the main positive feedback loops in global warming is the tendency of warming to increase the atmospheric saturation pressure for water vapor, and hence amount of water vapor in the atmosphere, which in turn leads to further warming, since water vapor is a greenhouse gas.

Wikipedia's article on greenhouse gases states that, "Water vapor accounts for the largest percentage of the greenhouse effect, between 36% and 66% for clear sky conditions and between 66% and 85% when including clouds."

11.5 The albedo effect

Albedo is defined to be the fraction of solar energy (shortwave radiation) reflected from the Earth back into space. It is a measure of the reflectivity of the earth's surface. Ice, especially with snow on top of it, has a high albedo: most sunlight hitting the surface bounces back towards space.

Loss of sea ice

Especially in the Arctic and Antarctic regions, there exists a dangerous feedback loop involving the albedo of ice and snow. As is shown in Figure 4.1, Arctic sea ice is rapidly disappearing. It is predicted that during the summers, the ice covering arctic seas may disappear entirely during the summers. As a consequence, incoming sunlight will encounter dark light-absorbing water surfaces rather than light-reflecting ice and snow.

This effect is self-re-enforcing. In other words, it is a feedback loop. The rising temperatures caused by the absorption of more solar radiation cause the melting of more ice, and hence even more absorption of radiation rather than reflection, still higher temperatures, more melting, and so on.

The feedback loop is further strengthened by the fact that water vapor acts like a greenhouse gas. As polar oceans become exposed, more water vapor enters the atmosphere, where it contributes to the greenhouse effect and rising temperatures.

Darkened snow on Greenland's icecap

Greenland's icecap is melting, and as it melts, the surface becomes darker and less reflective because particles of soot previously trapped in the snow and ice become exposed. This darkened surface absorbs an increased amount of solar radiation, and the result is accelerated melting.

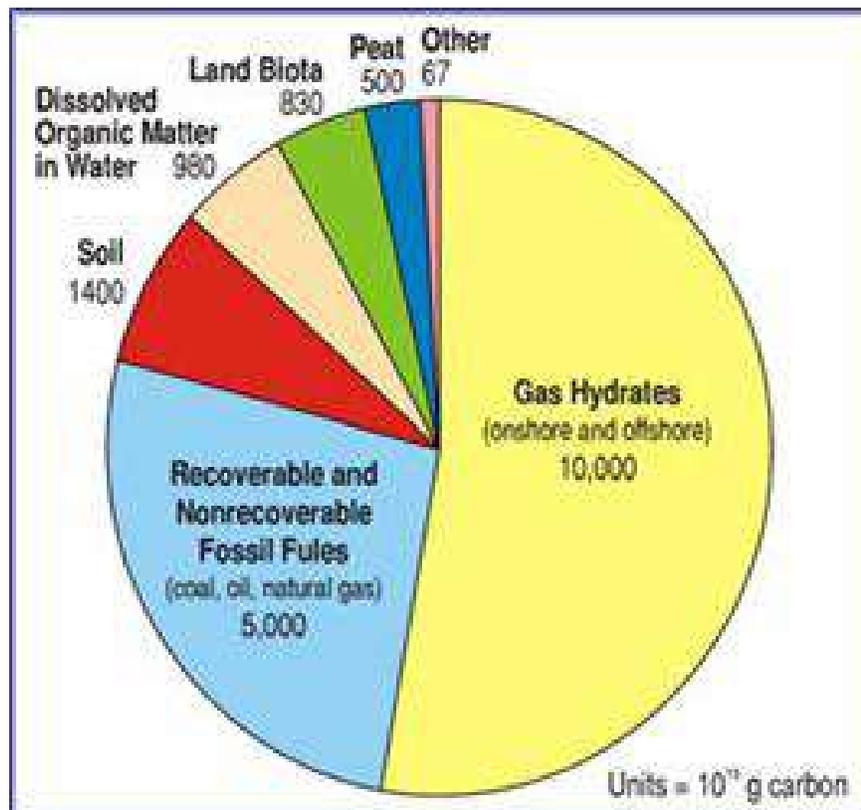


Figure 11.3: The worrying thing about the methane/hydrate feedback loop is the enormous amount of carbon in the form of hydrate crystals, 10,000 gigatons most of it on the continental shelves of oceans. This greater than the amount of carbon in all other forms that might potentially enter the earth's atmosphere.



Figure 11.4: When ocean temperatures rise, methane hydrate crystals become unstable, and methane gas bubbles up to ocean surfaces.

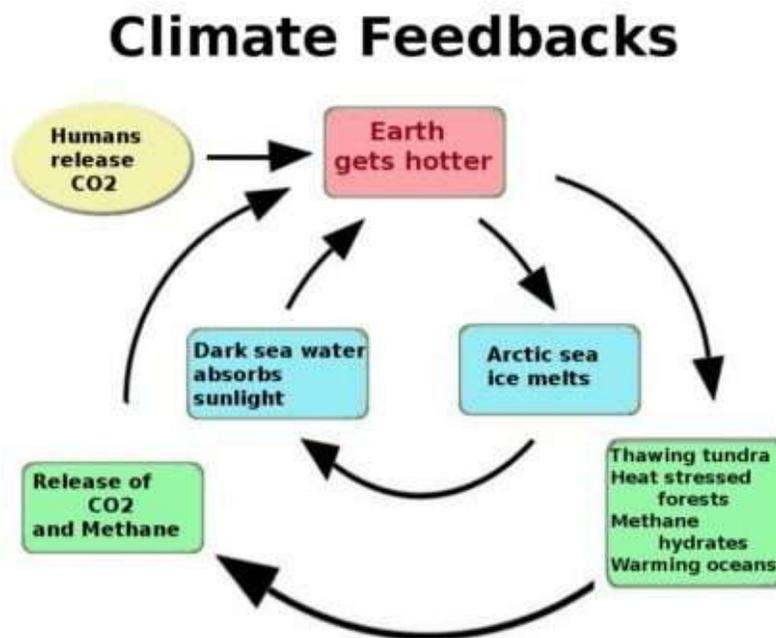


Figure 11.5: This diagram shows two important feedback loops, one involving the albedo effect, and the other involving methane hydrates.

11.6 The methane hydrate feedback loop

If we look at the distant future, by far the most dangerous feedback loop involves methane hydrates or methane clathrates. When organic matter is carried into the oceans by rivers, it decays to form methane. The methane then combines with water to form hydrate crystals, which are stable at the temperatures and pressures which currently exist on ocean floors. However, if the temperature rises, the crystals become unstable, and methane gas bubbles up to the surface. Methane is a greenhouse gas which is 70 times as potent as CO₂.

The worrying thing about the methane hydrate deposits on ocean floors is the enormous amount of carbon involved: roughly 10,000 gigatons. To put this huge amount into perspective, we can remember that the total amount of carbon in world CO₂ emissions since 1751 has only been 337 gigatons.

A runaway, exponentially increasing, feedback loop involving methane hydrates could lead to one of the great geological extinction events that have periodically wiped out most of the animals and plants then living. This must be avoided at all costs.

11.7 A feedback loop from warming of soils

On October 6, 2017, the journal *Science* published an article entitled *Long-term pattern and magnitude of soil carbon feedback to the climate system in a warming world*⁷. The lead author, Jerry Melillo, is an ecologist working at the Marine Biological Laboratory, Woods Hole Massachusetts. In an interview with *Newsweek*, he said: “This self-reinforcing feedback is potentially a global phenomenon with soils, and once it starts it may be very difficult to turn off. It’s that part of the problem that I think is sobering... We think that one of the things that may be happening is both a reorganization of the microbial community structure and its functional capacity,”

The study reported on three decades of observations of heated sections of a forest owned by Harvard University. The heated sections were 5°C warmer than control sections.

11.8 Drying of forests and forest fires

According to a recent article in *Nature*⁸, “Across the American west, the area burned each year has increased significantly over the past several decades, a trend that scientists attribute both to warming and drying and to a century of wildfire suppression and other human activities. Allen suggests that the intertwined forces of fire and climate change will take ecosystems into new territory, not only in the American west but also elsewhere around the world. In the Jemez, for example, it could transform much of the ponderosa pine (*Pinus ponderosa*) forest into shrub land. ‘We’re losing forests as we’ve known them

⁷J.M. Melillo et al., *Long-term pattern and magnitude of soil carbon feedback to the climate system in a warming world*, *Science*, Vol. 358, pp. 101-105, (2017).

⁸<http://www.nature.com/news/forest-fires-burn-out-1.11424>

for a very long time,' says Allen. 'We're on a different trajectory, and we're not yet sure where we're going.'

"All around the American west, scientists are seeing signs that fire and climate change are combining to create a 'new normal'. Ten years after Colorado's largest recorded fire burned 56,000 hectares southwest of Denver, the forest still has not rebounded in a 20,000-hectare patch in the middle, which was devastated by an intense crown fire. Only a few thousand hectares, which the US Forest Service replanted, look anything like the ponderosa-pine stands that previously dominated the landscape."

11.9 Tipping points and feedback loops

A tipping point is usually defined as the threshold for an abrupt and irreversible change⁹. To illustrate this idea, we can think of a book lying on a table. If we gradually push the book towards the edge of the table, we will finally reach a point after which more than half of the weight of the book will not be supported by the table. When this "tipping point" is passed the situation will suddenly become unstable, and the book will fall to the floor. Analogously, as the earth's climate gradually changes, we may reach tipping points. If we pass these points, sudden instabilities and abrupt climatic changes will occur.

Greenland ice cores supply a record of temperatures in the past, and through geological evidence we have evidence of sea levels in past epochs. These historical records show that abrupt climatic changes have occurred in the past.

Timothy Michael Lenton, FRS, Professor of Climate Change and Earth System Science at the University of Exeter, lists the following examples of climatic tipping points:

- Boreal forest dieback
- Amazon rainforest dieback
- Loss of Arctic and Antarctic sea ice (Polar ice packs) and melting of Greenland and Antarctic ice sheets
- Disruption to Indian and West African monsoon
- Formation of Atlantic deep water near the Arctic ocean, which is a component process of the thermohaline circulation.
- Loss of permafrost, leading to potential Arctic methane release and clathrate gun effect

It can be seen from this list that climate tipping points are associated with feedback loops. For example, the boreal forest dieback and the Amazon rainforest dieback tipping points are associated with the feedback loop involving the drying of forests and forest fires,

⁹Other definitions of tipping points are possible. A few authors define these as points beyond which change is inevitable, emphasizing that while inevitable, the change may be slow.

while the tipping point involving loss of Arctic and Antarctic sea ice is associated with the Albedo effect feedback loop. The tipping point involving loss of permafrost is associated with the methane hydrate feedback loop.

Once a positive feedback loop starts to operate in earnest, change may be abrupt.

Suggestions for further reading

1. Ehrlich P-R (1995) *The scale of the human enterprise and biodiversity loss*, in *Extinction Rates*, eds Lawton JH, May RM (Oxford Univ Press, Oxford, UK), pp 214-226.
2. Dirzo R, et al. (2014) *Defaunation in the Anthropocene*. *Science* **345**:401-406.
3. Young HS, McCauley DJ, Galletti M, Dirzo R (2016) *Patterns, causes, and consequences of Anthropocene defaunation*. *Annu Rev Ecol Evol Syst* **47**:433-458.
4. World Wide Fund for Nature (2016) *Living Planet Report 2016. Risk and resilience in a new era*. (WWF International, Gland, Switzerland), 2017.
5. Maxwell SL, Fuller RA, Brooks TM, Watson JEM (2016) *Biodiversity: The ravages of guns, nets and bulldozers*. *Nature* **536**:143-145.
6. Laliberte AS, Ripple WJ (2004) *Range contractions of North American carnivores and ungulates*. *BioScience* **54**:123-138.
7. Worm B, Tittensor DP (2011) *Range contraction in large pelagic predators*. *Proc Natl Acad Sci USA* **108**:11942-11947.
8. Ripple WJ, et al. (2014) *Status and ecological effects of the world's largest carnivores*. *Science* **343**:1241484.
9. Barnosky AD, et al. (2011) *Has the Earth's sixth mass extinction already arrived?* *Nature* **471**:51-57.
10. Ceballos G, Garcia A, Ehrlich PR (2010) *The sixth extinction crisis: Loss of animal populations and species*. *J. Cosmology* **8**:1821-1831.
11. Ceballos G, et al. (2015) *Accelerated modern human-induced species losses: Entering the sixth mass extinction*. *Sci Adv* **1**:e1400253.
12. Wake DB, Vredenburg VT (2008) *Colloquium paper: Are we in the midst of the sixth mass extinction? A view from the world of amphibians*. *Proc Natl Acad Sci USA* **105**:11466-11473.
13. McCallum ML (2015) *Vertebrate biodiversity losses point to a sixth mass extinction*. *Biol Conserv* **24**:2497-2519.
14. Pimm SL, et al. (2014) *The biodiversity of species and their rates of extinction, distribution, and protection*. *Science* **344**:1246752.
15. McCauley DJ, et al. (2015) *Marine defaunation: Animal loss in the global ocean*. *Science* **347**:1255641.
16. Collen B, Böhm M, Kemp R, Baillie J (2012) *Spineless: Status and Trends of the World's Invertebrates* (Zoological Society of London, London). Red List
17. Daily G (1997) *Nature's Services: Societal Dependence on Natural Ecosystems*. (Island Press, Covello, CA).
18. Naeem S, Duffy JE, Zavaleta E (2012) *The functions of biological diversity in an age of extinction*. *Science* **336**:1401-1406.

19. Estes JA, et al. (2011) *Trophic downgrading of planet Earth*. Science **333**:301-306.
20. Brosi BJ, Briggs HM (2013) *Single pollinator species losses reduce floral fidelity and plant reproductive function*. Proc Natl Acad Sci USA **110**:13044-13048.
21. Briggs JC (2014) *Global biodiversity gain is concurrent with decreasing population sizes*. Biodiver J **5**:447-452.
22. Hooper DU, et al. (2012) A global synthesis reveals biRed Listodiversity loss as a major driver of ecosystem change. Nature **486**:105-108. Red List
23. Ehrlich PR (2014) *The case against de-extinction: It's a fascinating but dumb idea*. Yale Environment 360 (Yale University, New Haven, CT). Available at bit.ly/1gAIuJF. Accessed JunStudiese 10, 2017.
24. Hobbs RJ, Mooney HA (1998) *Broadening the extinction debate: Population deletions and additions in California and Western Australia*. Conserv Biol **12**:271-283. Studies
25. Hughes JB, Daily GC, Ehrlich PR (1997) *Population diversity: Its extent and extinction*. Science **278**:689-692.
26. Ceballos G, Ehrlich PR (2002) Mammal population losses and the extinction crisis. Science **296**:904-907.
27. Gaston KJ, Fuller RA (2008) *Commonness, population depletion and conservation biology*. Trends Ecol Evol **23**:14-19.
28. International Union of Conservation of Nature (2015) *The IUCN Red List of Threatened Species, Version 2015.2* (IUCN, 2015). Available at www.iucnredlist.org. Accessed February 10, 2016. Revised January 10, 2017.
29. Durant SM, et al. (2017) *The global decline of cheetah *Acinonyx jubatus* and what it means for conservation*. Proc Natl Acad Sci USA **114**:528-533.
30. Henschel P, et al. (2014) *The lion in West Africa is critically endangered*. PLoS One **9**:e83500.
31. Challender D, et al. (2016) *On scaling up pangolin conservation*. Traffic Bulletin **28**: 19-21.
32. Fennessy J, et al. (2016) *Multi-locus analyses reveal four giraffe species instead of one*. Curr Biol **26**:2543-2549.
33. Butchart S, Dunn E (2003) *Using the IUCN Red List criteria to assess species with declining populations*. Conserv Biol **17**:1200-1202.
34. Gaston K, Blackburn T (2008) *Pattern and Process in Macroecology* (Blackwell Publishing, Hoboken, NJ). Red List
35. Thomas JA (2016) ECOLOGY. Butterfly communities under threat. Science **353**:216-218.
36. Régnier C, et al. (2015) *Mass extinction in poorly known taxa*. Proc Natl Acad Sci USA **112**:7761-7766.25.
37. Hughes JB, Daily GC, Ehrlich PR (1997) *Population diversity: Its extent and extinction*. Science **278**:689-692.
38. Ceballos G, Ehrlich PR (2002) *Mammal population losses and the extinction crisis*. Science **296**:904-907.
39. Cardinale BJ, et al. (2012) *Biodiversity loss and its impact on humanity*. Nature **486**: 59-67.

40. Hurlbert AH, Jetz W (2007) *Species richness, hotspots, and the scale dependence of range maps in ecology and conservation*. Proc Natl Acad Sci USA **104**:13384-13389.
41. Peterson AT, Navarro-Sigüenza AG, Gordillo A (2016) *Assumption- versus data-based approaches to summarizing species' ranges*. Conserv Biol, 10.1111/cobi.12801.
42. Martnez-Ramos M, Ortz-Rodrguez I, Pinero D, Dirzo R, Sarukhn J (2016) *Humans disrupt ecological processes within tropical rainforest reserves*. Proc Natl Acad Sci USA **113**:5323-5328.
43. Camargo-Sanabria AA, Mendoza E, Guevara R, Martnez-Ramos M, Dirzo R (2015) *Experimental defaunation of terrestrial mammalian herbivores alters tropical rainforest understorey diversity*. Proc Biol Sci **282**:20142580.
44. Petipas RH, Brody AK (2014) *Termites and ungulates affect arbuscular mycorrhizal richness and infectivity in a semiarid savanna*. Botany **92**:233-240.
45. Wardle DA, et al. (2004) *Ecological linkages between aboveground and belowground biota*. Science **304**:1629-1633.
46. Ceballos G, Ehrlich AH, Ehrlich PR (2015) *The Annihilation of Nature: Human Extinction of Birds and Mammals*, (Johns Hopkins Univ Press, Baltimore).
47. Knoll AH (2015) *Life on a Young Planet: The First Three Billion Years of Evolution on Earth*, (Princeton Univ Press, Princeton, NJ).
48. Barnosky AD, et al. (2014) *Introducing the scientific consensus on maintaining humanity's life support systems in the 21st century: Information for policy makers*. The Anthropocene Review **1**:78-109.
49. Ceballos G, Ehrlich PR, Sobern J, Salazar I, Fay JP (2005) *Global mammal conservation: What must we manage?* Science **309**:603-607.
50. Brown IL, Ehrlich PR (1980) *Population biology of the checkerspot butterfly, Euphydryas chalcedona structure of the Jasper Ridge colony*. Oecologia **47**:239-251.
51. Environmental Systems Research Institute (2011) *Release 10. Documentation Manual*, (Environmental Systems Research Institute, Redlands, CA).
52. Balling, R. C. 1988. *The climate impact of Sonoran vegetation discontinuity*. Climate Change **13**: 99-109.
53. Balling, R. C. 1991. *Impact of desertification on regional and global warming*. Bulletin of the American Meteorological Society **72**: 232-234.
54. Barigozzi, C. (ed.). 1986. *The Origin and Domestication of Cultivated Plants*. Amsterdam: Elsevier.
55. Botkin, D. B. 1989. *Science and the global environment*. In: D. B. Botkin et al., *Global Change*. New York: Academic Press, pp. 1-14.
56. Bryson, R. 1972. *Climate modification by air pollution*. In: N. Polunin (ed.), **The Environmental Future**. London: Macmillan, pp. 133-174.
57. Dregne, H. E., M. Kassas, and B. Rozanov. 1991. *A new assessment of the world status of desertification*. Desertification Control Bulletin, no. **20**: 6-18.
58. FAO (Food and Agriculture Organization). 1991. *Protection of land resources: Deforestation* UNCED Prepcomm., 2nd session, Doc. A/CONF. 15/PC/27.
59. Hare, F. K. and L. A. J. Ogallo. 1993. *Climate Variation, Drought and Desertification*. WMO-No. 653. Geneva: WMO.

60. Houghton, J. T., B. A. Callander, and S. K. Varney (eds.). 1992. *Climate Change 1992. The Supplementary Report to the IPCC Scientific Assessment*. (Cambridge: Cambridge University Press).
61. Hulme, M. and M. Kelly. 1993. *Exploring the links between desertification and climate change*. *Environment* **35(6)**: 5-11, 39-45.
62. Jackson, R. D. and S. B. Idso. 1975. *Surface albedo and desertification*. *Science* **189**: 1012-1013.
63. Matthews, E. 1983. *Global vegetation and land use: New high-resolution databases for climatic studies*. *Journal of Climate and Meteorology* **22**: 474-487.
64. Schlesinger, W. H., et al. 1990. *Biological feedback in global desertification*. *Science* **247**: 1043-1048.
65. Turner, B. L., et al. 1990. "Two types of global environmental changes: Definitional and special-scale issues in their human dimensions." *Global Environmental Change* 1: 14-22.
66. UNESCO. 1960. *Medicinal plants of arid zones*. *Arid Zone Research* 13.
67. Vavilov, N. I. 1949. *The Origin, Variation, Immunity and Breeding of Cultivated Plants*. Waltham, Mass.: Chronica Botanica

Chapter 12

IT WOULD BE WISE TO HEED WARNINGS FROM THE POLES

12.1 A British-US expedition studies Thwaites Glacier melting

Scientists from the multi-million-dollar expedition bored 2,000 feet through the ice to measure the water temperature at the point where the glacier leaves dry land and starts to float on the ocean. They found water temperatures more than 2 degrees C above the freezing point. “That is really bad”, said David Holland, a New York University glaciologist, “That’s not a sustainable situation for that glacier.”

The scientists already knew that the Thwaites Glacier was losing massive amounts of ice - more than 600 billion tons over the past several decades - but until now the mechanism had not been confirmed directly. “The biggest thing to say at the moment is, indeed, there is very warm water there, and clearly, it could not have been there forever, or the glacier could not be there,” Holland said.

Melting of the Thwaites Glacier could potentially unleash more than ten feet of sea level rise, threatening coastal cities and low-lying countries around the world.

12.2 Thwaites Glacier could shatter like a windscreen

Recently diagonal cracks have been observed in Antarctica’s Thwaites Glacier, and scientists fear that the glacier could shatter into many pieces, like the windscreen of an automobile.

Here are some quotations from a January 1, 2022 article by Ella Gilbert, of the University of Reading:

“The massive Thwaites glacier in West Antarctica contains enough ice to

raise global sea levels by 65cm if it were to completely collapse. And, worryingly, recent research suggests that its long-term stability is doubtful as the glacier hemorrhages more and more ice.

Adding 65cm to global sea levels would be coastline-changing amounts. For context, there's been around 20cm of sea-level rise since 1900, an amount that is already forcing coastal communities out of their homes and exacerbating environmental problems such as flooding, saltwater contamination and habitat loss.

“But the worry is that Thwaites, sometimes called the doomsday glacier because of its keystone role in the region, might not be the only glacier to go. Were it to empty into the ocean, it could trigger a regional chain reaction and drag other nearby glaciers in with it, which would mean several meters of sea-level rise. That's because the glaciers in West Antarctica are thought to be vulnerable to a mechanism called Marine Ice Cliff Instability or MICI, where retreating ice exposes increasingly tall, unstable ice cliffs that collapse into the ocean.

“A sea level rise of several meters would inundate many of the world's major cities - including Shanghai, New York, Miami, Tokyo, and Mumbai. It would also cover huge swathes of land in coastal regions and largely swallow up low-lying island nations like Kiribati, Tuvalu, and the Maldives.”

12.3 100.4 degrees Fahrenheit north of the Arctic Circle

The Arctic is heating more than twice as fast as the remainder of the world. The World Meteorological Organization has confirmed a new high temperature Arctic record: 100.4 degrees Fahrenheit, recorded in the Siberian town of Verkhoyansk, 70 kilometers north of the Arctic Circle. The reading, taken on June 20, 2020, has now been officially confirmed by the World Meteorological Organization. A spokesman commented that “the temperature is more befitting for the Mediterranean than the Arctic”.

According to data taken from the Russian Forestry Agency, Siberia's wildfires were the worst since records began, destroying an area of more than 46 million Acres (18.6 million hectares) of Russian forest in 2021 alone. The smoke from the enormous infernos even travelled as far as the North Pole. Black soot from the wildfires settles on Arctic snow, making it reflect less and absorb more heat. Another feedback loop is caused by the CO₂ released by Arctic wildfires, which contributes to further warming and more fires.



Figure 12.1: An Arctic wildfire. Layers of peat are burning, and the carbon stored in the peat is being released into the atmosphere.

12.4 166 billion tons of Greenland's ice lost in 2021

According to a report from Polar Portal,

“2021 is the 25th year in a row in which Greenland’s ice sheet lost more mass during the course of the melting season than it gained during the winter...”

The Polar Portal is a Danish service that monitors the Greenland ice sheet. According to their report, the ice sheet lost about 166 billion tonnes of ice during the 12-month period that ended in August, 2021.

12.5 The threat of catastrophic destabilization

A new report has been issued by the Potsdam Institute for Climate Impact Research, which is located at the Free University of Berlin. According to the lead author, Niklas Boers,

“Our results suggest there will be substantially enhanced melting in the future - which is quite worrying... [The] mechanism is long known, and it is one of the prime suspects for the detected destabilization of the central-western parts of the Greenland ice sheet. But we cannot exclude that other feedbacks, for example related to the albedo of the ice sheet, play an important role too,..We urgently need to better understand the interplay of the different positive and negative feedback mechanisms that determine the current stability and the future evolution of the ice sheet”



Figure 12.2: Unstable cliffs of ice on the coast of Greenland.

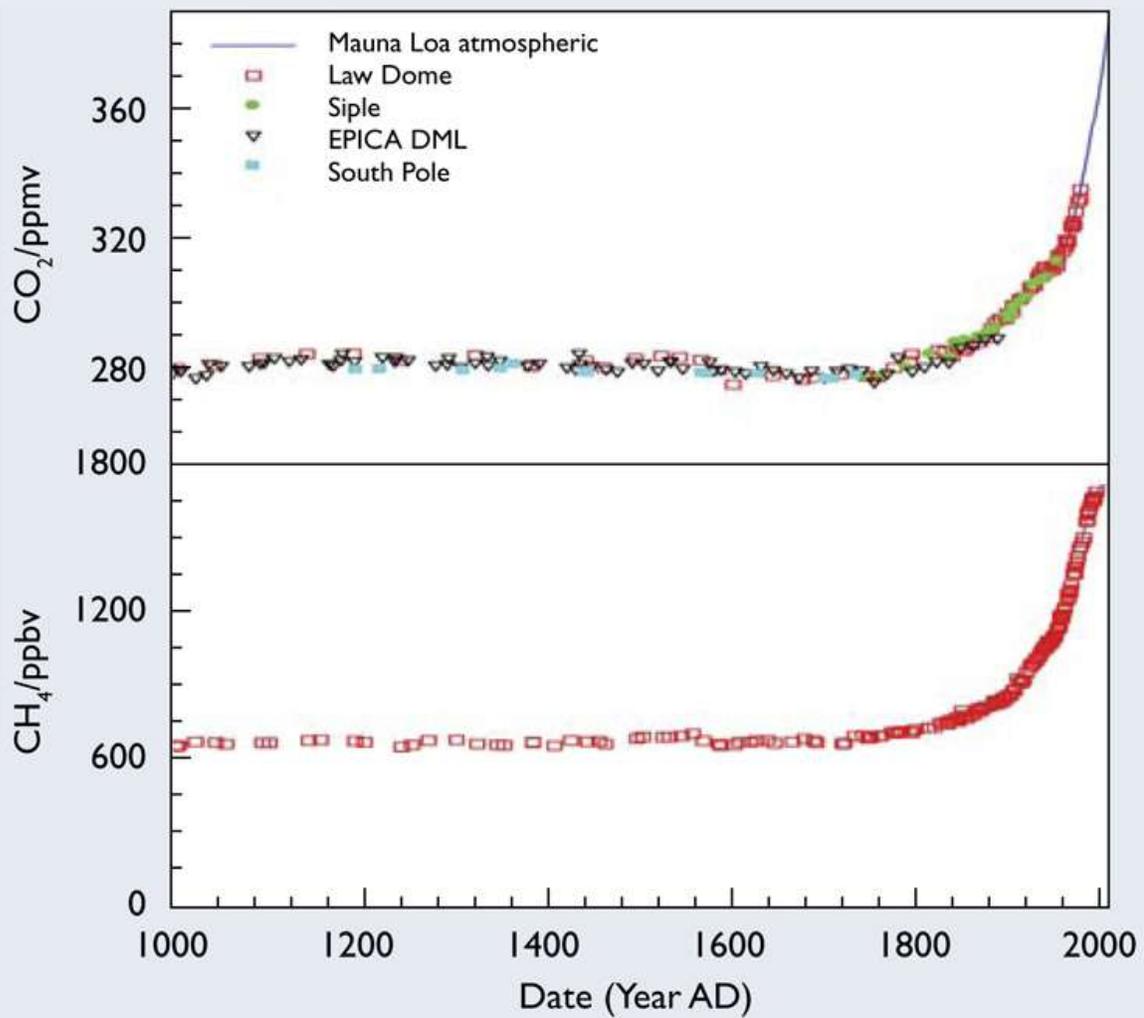
12.6 Facts from the British Antarctic Survey

Here are some quotations and figures from an article on ice cores published by the British Antarctic Survey¹:

“Ice cores provide direct information about how greenhouse gas concentrations have changed in the past, and they also provide direct evidence that the climate can change abruptly under some circumstances. However, they provide no direct analogue for the future because the ice core era contains no periods with concentrations of CO₂ comparable to those of the next century.”

- **Ice core.** Cylinder of ice drilled out of an ice sheet or glacier. Most ice core records come from Antarctica and Greenland.
- **Ice cores contain information about past temperature, and about many other aspects of the environment.**
- **Atmospheric carbon dioxide levels are now 40% higher than before the industrial revolution. This increase is due to fossil fuel usage and deforestation.**
- **The magnitude and rate of the recent increase are almost certainly unprecedented over the last 800,000 years.**
- **Methane also shows a huge and unprecedented increase in concentration over the last two centuries.**

¹<https://www.bas.ac.uk/data/our-data/publication/ice-cores-and-climate-change/>

Fig. 2: CO_2 and CH_4 over the last 1,000 years⁽¹⁻⁴⁾Figure 12.3: CO_2 and CH_4 over the last 1,000 years.

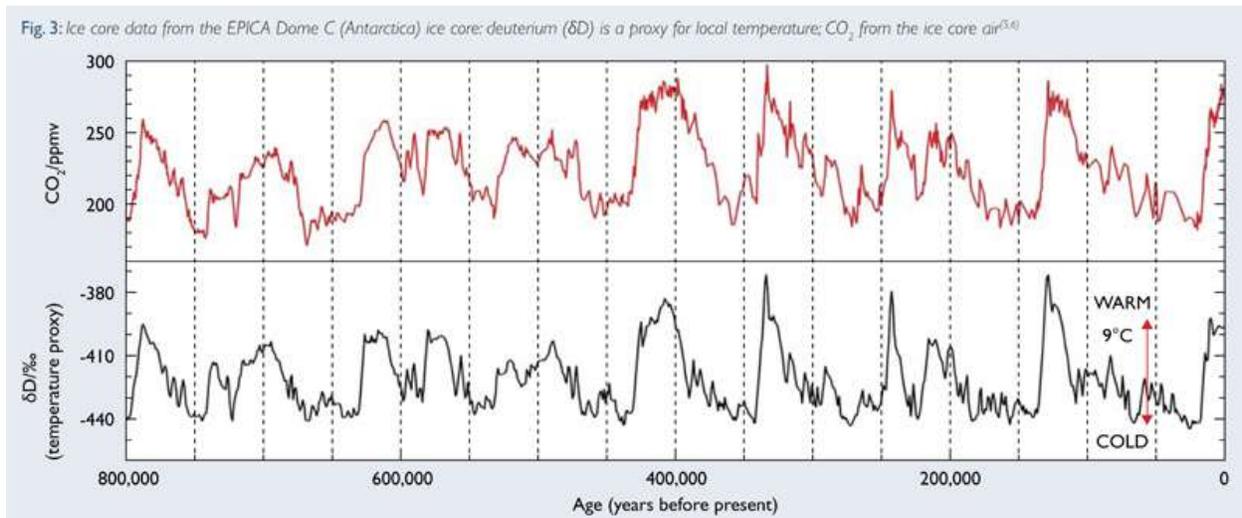


Figure 12.4: Ice core data from the EPICA Dome C (Antarctica) ice core: deuterium (D) is a proxy for local temperature; CO_2 from the ice core air. It can be seen that the temperature and the CO_2 concentration are closely correlated.

Fig. 4: Close-up of deuterium (temperature proxy) and CO_2 from the EPICA Dome C ice core over the warming from the last glacial period⁽⁷⁾

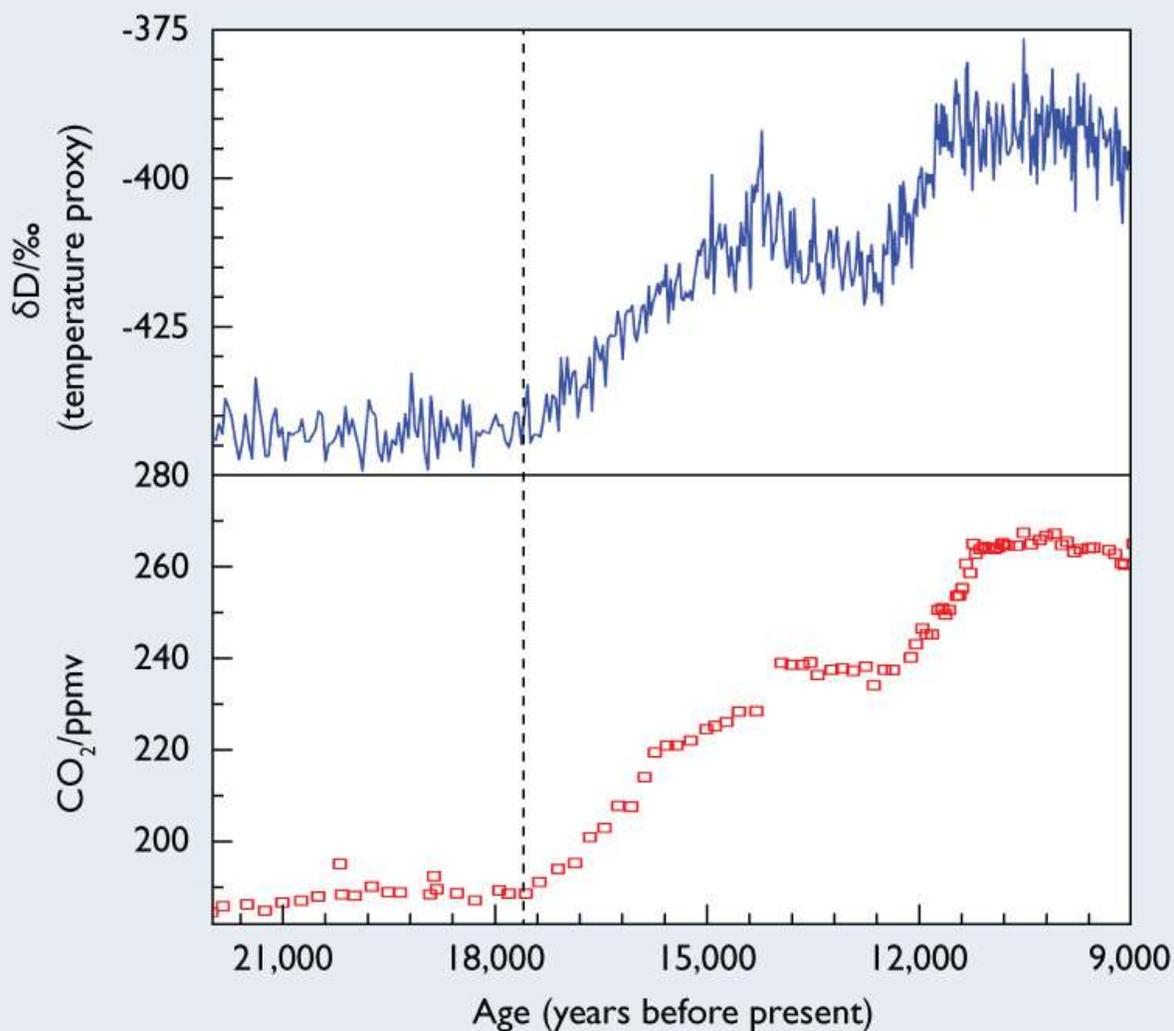


Figure 12.5: Close-up of deuterium (temperature proxy) and CO_2 from the EPICA Dome C ice core over the warming from the last glacial period.

12.7 Wikipedia's article on ice cores

The Wikipedia article, *Ice core*, gives the following description of how isotope analysis can be used to deduce the temperature at which the ancient snow fell before turning to ice:

“The isotopic composition of the oxygen in a core can be used to model the temperature history of the ice sheet. Oxygen has three stable isotopes, ^{16}O , ^{17}O and ^{18}O . The ratio between ^{18}O and ^{16}O indicates the temperature when the snow fell...

“Hydrogen ratios can also be used to calculate a temperature history. Deuterium (^2H , or D) is heavier than hydrogen (^1H) and makes water more likely to condense and less likely to evaporate.”

“

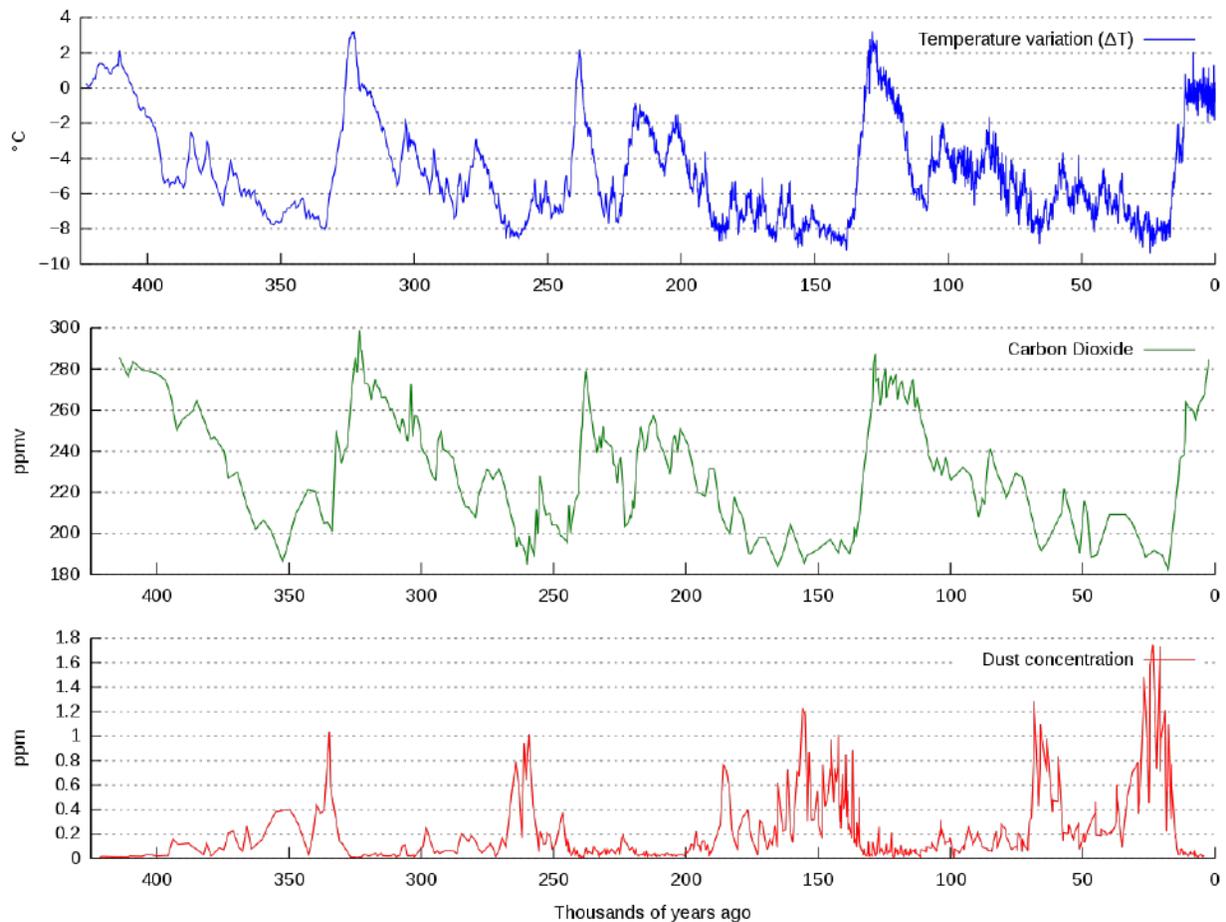


Figure 12.6: Graph of CO₂ (green), reconstructed temperature (blue) and dust (red) from the Vostok ice core for the past 420,000 years. Notice the strong correlation between CO₂ concentration and temperature. The dust content is helpful in determining the age of the core samples. The figure is taken from the Wikipedia article.

Chapter 13

SOME RECENT DEVELOPMENTS

13.1 António Guterres comments on the newest IPCC report

Here is an article published on May 1, 2022 in Janta Weekly, by courtesy of the United Nations:

The United Nations Secretary-General called the latest report of the Intergovernmental Panel on Climate Change “a litany of broken climate promises” showing the world is “on a fast track to climate disaster.”

In a video message, António Guterres said the report “is a file of shame, cataloguing the empty pledges that put us firmly on track towards an unlivable world.” According to the new publication, the planet is on a pathway to global warming of more than double the 1.5-degree limit agreed in Paris. “Some government and business leaders are saying one thing - but doing another. Simply put, they are lying. And the results will be catastrophic,” said Guterres.

The UN chief remembered the last UN Climate Conference, COP26, that happened in Glasgow in November 2021, saying the international community left the meeting “with a naïve optimism, based on new promises and commitments.” Despite those efforts, Guterres said, the main problem - the enormous, growing emissions gap - was all but ignored. To keep the 1.5-degree limit agreed in Paris within reach, the world needs to cut global emissions by 45 per cent this decade.

Despite this target, current climate pledges would mean a 14 per cent increase in emissions. Guterres noted that “climate activists are sometimes depicted as dangerous radicals”, but, for him, “the truly dangerous radicals are the countries that are increasing the production of fossil fuels.” “Investing in new fossil fuels infrastructure is moral and economic madness. Such investments will soon be stranded assets - a blot on the landscape, and a blight on



Figure 13.1: United Nations Secretary General António Guterres.

investment portfolios,” he warned.

Today’s report is focused on mitigation, and sets out viable, financially sound options in every sector that can keep the possibility of limiting warming to 1.5 degrees alive. First and foremost, the international community must triple the speed of the shift to renewable energy.

The Secretary-General noted that in most cases, renewables are already far cheaper. According to him, the shift also means “governments ending the funding of coal, not just abroad, but at home.” It means climate coalitions, made up of developed countries, multilateral development banks, private financial institutions, and corporations, supporting major emerging economies in making this shift.

Noting that “leaders must lead”, but that everyone can do their part, Guterres said the world owes “a debt to young people, civil society and indigenous communities for sounding the alarm and holding leaders accountable.”

The UN chief stressed that today’s report comes at a time of global turbulence, with inequalities at unprecedented levels and the recovery from the COVID-19 pandemic is scandalously uneven.

On top of that, inflation is rising, and the war in Ukraine is causing food and energy prices to skyrocket. But, according to Guterres, increasing fossil fuel production will only make matters worse. Instead, he said, “a shift to renewables will mend our broken global energy mix and offer hope to millions of people suffering climate impacts today.”

13.2 Only rapid action can avert worst marine extinction in 250 million years

Here are some excerpts from an article by Jake Johnson, published in Common Dreams on April 29, 2022:

Research published Thursday in the journal *Science* warns that runaway global warming driven by carbon dioxide emissions has put marine life at risk of the most catastrophic mass extinction since the “Great Dying” 250 million years ago, when 90% of all ocean species were wiped out.

Using models of varying emissions scenarios, Princeton University scientists Curtis Deutsch and Justin Penn found that the continued burning of fossil fuels and “business-as-usual global temperature increases” are likely to result, by 2300, in mass extinctions of marine systems “on par with past great extinctions.”

“With accelerating greenhouse gas emissions, species losses from warming and oxygen depletion alone become comparable to current direct human impacts within a century and culminate in a mass extinction rivaling those in Earth’s past,” the researchers write. “Polar species are at highest risk of extinction, but local biological richness declines more in the tropics.”

While their findings are dire, Deutsch and Penn go out of their way to emphasize that the new research should be a catalyst for “rapid action,” not despair.

“Reversing greenhouse gas emissions trends would diminish extinction risks by more than 70%, preserving marine biodiversity accumulated over the past 50 million years of evolutionary history,” they write.

Speaking to the *New York Times*, Deutsch and Penn explained that the decision to underscore the possibility of averting the most cataclysmic extinction scenario was an active one, leading to a last-minute change in the study’s pre-publication headline: “Marine Extinction Risk From Climate Warming.”...

At the COP26 climate summit in Glasgow late last year, nations adopted a pact stressing the “importance of protecting, conserving and restoring nature and ecosystems, including... marine ecosystems.”

But climate advocates were dismayed by how little concrete action the gathering spurred, given the enormous consequences of failing to slash carbon emissions worldwide....

13.3 Record heat wave in India and Pakistan

Here are some excerpts from an article in *Grist* by Environmental Justice Fellow Julia Kane, published on May 4, 2022:

A record-shattering heat wave is devastating parts of India and Pakistan, putting more than a billion people at risk and unleashing a surge of related problems. For decades, experts have warned that climate change would make heat waves like this more frequent and more intense - a prediction now playing out in real time.

Last month, northwest and central India experienced the hottest April since record-keeping began 122 years ago. On May 1, the temperature in Nawabshah, Pakistan, climbed to 121.1 degrees Fahrenheit, likely the hottest temperature recorded so far this year in the northern hemisphere. Other cities and towns across the region also suffered through record-breaking temperatures.

“This heatwave is definitely unprecedented,” Chandni Singh, a lead author for the Intergovernmental Panel on Climate Change, or IPCC, and a senior researcher at the Indian Institute for Human Settlements, told CNN. “We have seen a change in its intensity, its arrival time, and duration. This is what climate experts predicted and it will have cascading impacts on health.”

In the western Indian state of Gujarat, “we are getting many patients who have suffered heat stroke or other heat-related problems,” Mona Desai, former president of Ahmedabad Medical Association, told Reuters. She said that more than half of the patients were children - an age group particularly vulnerable to extreme heat - who were experiencing vomiting, diarrhea, abdominal issues, weakness, and other symptoms...

The extreme heat has decimated agricultural areas, reducing yield from wheat crops by up to 50 percent in some areas and killing off nearly all fruit harvests in others. “We don’t know what to do,” Haji Ghulam Sarwar Shahwani, a farmer who grows apples, told *The Guardian*. “Farmers have lost billions because of this weather. We are suffering and we can’t afford it.”...

The most recent IPCC report warned that the world must make “rapid and deep” cuts to emissions – achievable only if we immediately phase out fossil fuels - in order to stave off even worse consequences of climate change. Sherry Rehman [Pakistan’s Minister for Climate Change] told *The Guardian* that she hopes this deadly heat wave will serve as a wake-up call. “Climate and weather events are here to stay and will in fact only accelerate in their scale and intensity if global leaders don’t act now,” she said.

13.4 Human activity has altered 70% of the earth’s land, and degraded 40% of it

Here is an excerpt from an article by Aruna Chandrasekhar, Daisy Dunne and Giuliana Viglione, published in *Truthout* on April 29, 2022:

Humans have had an unprecedented impact on land - with vast consequences

13.4. HUMAN ACTIVITY HAS ALTERED 70% OF THE EARTH'S LAND, AND DEGRADED 40% OF



Figure 13.2: Smoke rises from an illegally lit fire in the Amazon rainforest reserve south of Novo Progresso in the state of Pará, Brazil, on August 15, 2020.

for climate change, food systems and biodiversity, a major new UN report concludes.

It says that human activities have already altered 70% of the Earth's land surface, degrading up to 40% of it. Four of the nine "planetary boundaries" - limits on how humans can safely use Earth's resources - have already been exceeded.

Food systems - a catch-all term to describe the way humans produce, process, transport and consume food - are the largest culprit when it comes to land degradation, the report says. They account for 80% of deforestation, 29% of greenhouse gas emissions and the leading share of biodiversity loss.

The degradation of land is perpetuated by steep inequalities, it adds. It notes that 70% of the world's agricultural land is controlled by just 1% of farms, primarily large agribusinesses.

The report, from the United Nations Convention to Combat Desertification (UNCCD), urges world leaders to adopt a "crisis footing" to solve land degradation. The authors warn that "at no other point in modern history has humanity faced such an array of familiar and unfamiliar risks and hazards".

It projects that, if "business as usual" continues to 2050, an additional 16 million square kilometers (km²) - an area almost the size of South America - could be degraded

13.5 WHO estimates 15 million COVID-19 deaths worldwide

The World Health Organization (WHO) recently estimated that the COVID-19 pandemic has now caused roughly 15 million excess deaths worldwide. This figure includes both direct and indirect effects of the pandemic. For example, it includes deaths from other diseases that could have been avoided had health services not been overburdened with COVID-19 cases.

Meanwhile pharmaceutical firms in wealthy countries are making huge profits on vaccines, and refusing to allow their patented vaccines to be produced in generic form in poorer countries. Seen from a global perspective, this selfishness is extremely harmful, because the pandemic is not over until it is over everywhere. New and more dangerous variants of the virus can develop in poor countries where the pandemic is still raging, and these dangerous variants can then spread rapidly to all the nations of the world.

Chapter 14

WE MUST ACHIEVE WISDOM

14.1 We need wisdom before it is too late

Our species urgently needs wisdom to save us from the danger that our arrogance and folly have created. Can we not try to save ourselves by actually becoming *Homo sapiens*?

Our present situation is this:

The future looks extremely dark because of human folly, especially the long-term future. The greatest threats are catastrophic climate change and thermonuclear war, but a large-scale global famine also has to be considered.

We give our children loving care, but it makes no sense do so and at the same time to neglect to do all that is within our power to ensure that they and their descendants will inherit an earth in which they can survive. We also have a responsibility to all the other living organisms with which we share the gift of life.

Inaction is not an option. We have to act with courage and dedication, even if the odds are against success, because the stakes are so high. The mass media could mobilize us to action, but they have failed in their duty. Our educational system could also wake us up and make us act, but it too has failed us. The battle to save the earth from human greed and folly has to be fought in the alternative media. Hence this book, and hence urgent the tone of this final chapter.

We need a new economic system, a new society, a new social contract, a new way of life. Here are the great tasks that history has given to our generation: We must achieve a steady-state economic system. We must restore democracy. We must decrease economic inequality. We must break the power of corporate greed. We must leave fossil fuels in the ground. We must stabilize and ultimately reduce the global population. We must eliminate the institution of war. And finally, we must develop a more mature ethical system to match our new technology.



Figure 14.1: **Nicholas Georgescu-Roegen: He showed that our present economic system is not cyclic but unidirectional, since it involves the irreversible degradation of non-renewable resources.**

14.2 We must achieve a steady-state economic system

A steady-state economic system is necessary because neither population growth nor economic growth can continue indefinitely on a finite earth. No one can maintain that exponential industrial growth is sustainable in the long run except by refusing to look more than a short distance into the future.

Of course, it is necessary to distinguish between industrial growth, and growth of culture and knowledge, which can and should continue to grow. Qualitative improvements in human society are possible and desirable, but resource-using and pollution-producing industrial growth is reaching its limits, both because of ecological constraints and because of the exhaustion of petroleum, natural gas and other non-renewable resources, such as metals. The threat of catastrophic climate change makes it imperative for us to stop using fossil fuels within very few decades.

Our present economic system is unidirectional and entropic: Low-entropy resources are converted into high-entropy waste, a unidirectional process. By contrast, to be sustainable in the long run, a process must be cyclic, like the growth and regeneration of a forest.

Georgescu-Roegen's list of desiderata remains valid today: We need drastic cuts in weapons production, thereby releasing productive forces for more constructive purposes. We need immediate aid to underdeveloped countries and gradual decrease in population to a level that can be maintained by organic agriculture. We also need avoidance, and strict regulation if necessary, of wasteful energy use. Finally, we need to abandon our attachment to extravagant gadgetry and fashion, and we must cure ourselves of workaholic habits by re-balancing the time spent on work and leisure.

Today, the distinguished economist Herman Daly (a student of Georgescu-Roegen) con-



Figure 14.2: **Herman E. Daly: A student of Georgescu-Roegen the distinguished economist, Prof. H.E. Daly calls for a transition to a steady-state economic system, in which processes would be cyclic and sustainable.**

tinues to write perceptive articles and books documenting the need for a steady-state economy. Among his books, the following are noteworthy: “Steady-State Economics” (1977); “For the Common Good” (1989, with John B. Cobb, Jr.); “Valuing the Earth” (1993, with Kenneth Townsend); “Beyond Growth” (1996); “Ecological Economics and the Ecology of Economics” (1999); “Local Politics of Global Sustainability” (2000, with Thomas Prugh and Robert Costanza), and “Ecological Economics: Principles and Applications” (2003, with Joshua Farley.¹

14.3 We must restore democracy

It is obvious, almost by definition, that excessive governmental secrecy and true democracy are incompatible. If the people of a country have no idea what their government is doing, they cannot possibly have the influence on decisions that the word “democracy” implies.

Governmental secrecy is not something new. Secret diplomacy contributed to the outbreak of World War I, and the secret Sykes-Picot Agreement later contributed to the bitterness of conflicts in the Middle East. However, in recent years, governmental secrecy has grown enormously.

The revelations of Edward Snowden have shown that the number of people involved in secret operations of the United States government is now as large as the entire population of Norway: roughly 5 million. The influence of this dark side of government has become

¹<http://steadystate.org/category/herman-daly/>
https://en.wikipedia.org/wiki/Herman_Daly
<http://grist.org/article/bank/>
<http://www.donellameadows.org/wp-content/userfiles/Limits-to-Growth-digital-scan-version.pdf>
<http://www.clubofrome.org/?p=326>



Figure 14.3: **Edward Snowden.**

so great that no president is able to resist it.

Many modern governments have become very expert in manipulating public opinion through mass media. They only allow the public to hear a version of the “news” that has been handed down by powerholders. Of course, people can turn to the alternative media that are available on the Internet. But on the whole, the vision of the world presented on television screens and in major newspapers is the “truth” that is accepted by the majority of the public, and it is this picture of events that influences political decisions. Censorship of the news by the power elite is a form of secrecy, since it withholds information that is needed for a democracy to function properly.

Snowden has already said most of what he has to say. Nevertheless, Washington was willing to break international law and the rules of diplomatic immunity by forcing its European allies to ground the plane of Bolivian President Evo Morales following a rumor that Snowden was on board. This was not done to prevent Snowden from saying more, but with the intention of making a gruesome example of him, as a warning to other whistleblowers.

In a democracy, the power of judging and controlling governmental policy is supposed to be in the hands of the people. It is completely clear that if the people do not know what their government is doing, then they cannot judge or control governmental policy, and democracy has been abolished. There has always been a glaring contradiction between democracy and secret branches of the government, such as the CIA, which conducts its assassinations and its dirty wars in South America and elsewhere without any public knowledge or control.

The gross, wholesale electronic spying on citizens revealed by Snowden seems to be specifically aimed at eliminating democracy. It is aimed at instilling universal fear and conformity, fear of blackmail and fear of being out of step, so that the public will not dare to oppose whatever the government does, no matter how criminal or unconstitutional.

We must restore democracy wherever it has been replaced by oligarchy. When we do so, we will free ourselves from many evils, including excessive economic inequality, violation of civil rights, and the suffering produced by perpetual wars.



Figure 14.4: **We must decrease economic inequality.**

14.4 We must decrease economic inequality

In his Apostolic Exhortation, “*Evangelii Gaudium*”, Pope Francis said: “In our time humanity is experiencing a turning-point in its history, as we can see from the advances being made in so many fields. We can only praise the steps being taken to improve people’s welfare in areas such as health care, education and communications. At the same time we have to remember that the majority of our contemporaries are barely living from day to day, with dire consequences. A number of diseases are spreading. The hearts of many people are gripped by fear and desperation, even in the so-called rich countries. The joy of living frequently fades, lack of respect for others and violence are on the rise, and inequality is increasingly evident. It is a struggle to live and, often, to live with precious little dignity.”

“This epochal change has been set in motion by the enormous qualitative, quantitative, rapid and cumulative advances occurring in the sciences and in technology, and by their instant application in different areas of nature and of life. We are in an age of knowledge and information, which has led to new and often anonymous kinds of power.”

“Just as the commandment ‘Thou shalt not kill’ sets a clear limit in order to safeguard the value of human life, today we also have to say ‘thou shalt not’ to an economy of exclusion and inequality. Such an economy kills. How can it be that it is not a news item when an elderly homeless person dies of exposure, but it is news when the stock market loses two points? This is a case of exclusion. Can we continue to stand by when food is thrown away while people are starving? This is a case of inequality. Today everything comes under the laws of competition and the survival of the fittest, where the powerful feed upon the powerless. As a consequence, masses of people find themselves excluded and marginalized: without work, without possibilities, without any means of escape.”

“In this context, some people continue to defend trickle-down theories which assume that economic growth, encouraged by a free market, will inevitably succeed in bringing about greater justice and inclusiveness in the world. This opinion, which has never been confirmed by the facts, expresses a crude and naive trust in the goodness of those wielding economic power and in the sacralized workings of the prevailing economic system. Meanwhile, the excluded are still waiting.”

In a recent speech, Senator Bernie Sanders quoted Pope Francis extensively and added: “We have a situation today, Mr. President, incredible as it may sound, where the wealthiest 85 people in the world own more wealth than the bottom half of the world’s population.”²

The social epidemiologist Prof. Richard Wilkinson, has documented the ways in which societies with less economic inequality do better than more unequal societies in a number of areas, including increased rates of life expectancy, mathematical performance, literacy, trust, social mobility, together with decreased rates of infant mortality, homicides, imprisonment, teenage births, obesity and mental illness, including drug and alcohol addiction.³ We must also remember that according to the economist John A. Hobson, the basic problem that led to imperialism was an excessively unequal distribution of incomes in the industrialized countries. The result of this unequal distribution was that neither the rich nor the poor could buy back the total output of their society. The incomes of the poor were insufficient, and rich were too few in number.

14.5 We must break the power of corporate greed

When the United Nations was established in 1945, the purpose of the organization was to abolish the institution of war. This goal was built into many of the articles of the UN Charter. Accordingly, throughout the world, many War Departments were renamed and became Departments of Defense. But the very name is a lie. In an age of nuclear threats and counter-threats, populations are by no means protected. Ordinary citizens are just hostages in a game for power and money. It is all about greed.

Why is war continually threatened? Why is Russia threatened? Why is war with Iran threatened? Why fan the flames of conflict with China? Is it to “protect” civilians?

²https://www.youtube.com/watch?v=9_LJpN893Vg
<https://www.oxfam.org/en/tags/inequality>
https://www.oxfam.org/sites/www.oxfam.org/files/file_attachments/cr-even-it-up-extreme-inequality-291014-en.pdf

³<https://www.youtube.com/watch?v=cZ7LzE3u7Bw>
https://en.wikipedia.org/wiki/Richard_G._Wilkinson



Figure 14.5: We must break the power of corporate greed.



Figure 14.6: Greed is driving us towards disaster.

Absolutely not! In a thermonuclear war, hundreds of millions of civilians would die horribly everywhere in the world, also in neutral countries. What is really being protected are the profits of arms manufacturers. As long as there are tensions; as long as there is a threat of war, military budgets are safe; and the profits of arms makers are safe. The people in several “democracies”, for example the United States, do not rule at the moment. Greed rules.

As Institute Professor Noam Chomsky of MIT has pointed out, greed and lack of ethics are built into the structure of corporations. By law, the Chief Executive Officer of a corporation must be entirely motivated by the collective greed of the stockholders. He must maximize profits. If the CEO abandons this single-minded chase after corporate profits for ethical reasons, or for the sake of humanity or the biosphere or the future, he (or she) must, by law, be fired and replaced.

Occasionally, for the sake of their public image, corporations seem to do something for other motives than their own bottom line, but it is usually window dressing. For example, Shell claims to be supporting research on renewable energy. Perhaps there is indeed a small renewable energy laboratory somewhere in that vast corporation; but the real interest of the organization is somewhere else. Shell is sending equipment on a large scale to drill for more and more environment-destroying oil in the Arctic.⁴

⁴<http://www.countercurrents.org/avery170715.htm>
<http://human-wrongs-watch.net/2015/06/25/militarisms-hostages/>
<https://www.youtube.com/watch?v=FJUA4cm0Rck>

14.6 We must leave fossil fuels in the ground

The threat of catastrophic climate change requires prompt and dedicated action by the global community. Unless we very quickly make the transition from fossil fuels to 100% renewable energy, we will reach a tipping point after which uncontrollable feedback loops could take over, leading to a human-caused 6th geological extinction event. This might even be comparable to the Permian-Triassic event, during which 96% of all marine species and 70% of terrestrial vertebrates became extinct.

New hope that such a catastrophe for human civilization and the biosphere can be avoided comes from two recently-released documents: The Encyclical “*Laudato Si*” by Pope Francis, and the statistics on the rate of growth of renewable energy newly released by the Earth Policy Institute.

Arctic sea-ice is melting at an increasingly rapid rate, because of several feedback loops. One of these feedback loops, called the albedo effect, is due to the fact that white snow-covered sea-ice in the Arctic reflects sunlight, while dark water absorbs it, raising the temperature and leading to more melting.

Another feedback loop is due to the fact that rising temperatures mean that more water is evaporated. The water vapor in the atmosphere acts like a greenhouse gas, and raises the temperature still further.

If we consider long-term effects, by far the most dangerous of the feedback loops is the melting of methane hydrate crystals and the release of methane into the atmosphere, where its effects as a greenhouse gas are roughly twenty times great as those of CO₂.

When organic matter is carried into the oceans by rivers, it decays to form methane. The methane then combines with water to form hydrate crystals, which are stable at the temperatures which currently exist on ocean floors. However, if the temperature rises, the crystals become unstable, and methane gas bubbles up to the surface.

The worrying thing about methane hydrate deposits on ocean floors is the enormous amount of carbon involved: roughly 10,000 gigatons. To put this huge amount into perspective, we can remember that the total amount in world CO₂ emissions since 1751 has been only 337 gigatons.

Despite the worrying nature of the threats that we are facing, there are reasons for hope. One of the greatest of these is the beautiful, profound and powerful encyclical that has just been released by Pope Francis.⁵

Pope Francis tells us that the dictates of today’s economists are not sacred: In the future, if we are to survive, economics must be given both a social conscience and an ecological conscience. Nor are private property and profits sacred. They must be subordinated to the common good, and the preservation of our global commons. Less focus on material goods need not make us less happy. The quality of our lives can be increased, not decreased, if we give up our restless chase after power and wealth, and derive more of our pleasures from art, music and literature, and from conversations with our families and

⁵http://w2.vatican.va/content/francesco/en/encyclicals/documents/papa-francesco_20150524_enciclica-laudato-si.html



Figure 14.7: **We must leave fossil fuels in the ground.**

friends.

Another reason for hope can be found in the extremely high present rate of growth of renewable energy, and in the remarkable properties of exponential growth. According to figures recently released by the Earth Policy Institute,⁶ the global installed photovoltaic capacity is currently able to deliver 242,000 megawatts, and it is increasing at the rate of 27.8% per year. Wind energy can now deliver 370,000 megawatts, and it is increasing at the rate of roughly 20% per year.

Because of the astonishing properties of exponential growth, we can calculate that if these growth rates are maintained, renewable energy can give us 24.8 terawatts within only 15 years! This is far more than the world's present use of all forms of energy.

All of us must still work with dedication to provide the political will needed to avoid catastrophic climate change. However, the strong and friendly voice of Pope Francis, and the remarkable rate of growth of renewable energy can guide our work, and can give us hope and courage.

The award-winning author and activist Naomi Klein has emphasized that the climate crisis changes everything. Environmentalists and antiwar activists must unite! We need a new economic system! The people of the world don't want climate change; they want system change!⁷

⁶<http://www.earth-policy.org/books/tgt>

⁷<https://www.transcend.org/tms/2015/03/naomi-klein-the-economic-system-we-have-created-global-warming/>

<http://thischangeseverything.org/naomi-klein/>

<http://eruditio.worldacademy.org/issue-5/article/urgent-need-renewable-energy>

<http://www.worldbank.org/en/news/feature/2012/11/18/Climate-change-report-warns-dramatically-warmer-world-this-century>

<https://www.youtube.com/watch?v=sRGVTK-AAvw>

<https://www.youtube.com/watch?v=MVwmi7HCmSI>

<https://www.youtube.com/watch?v=AjZaFjXfLec>

<https://www.youtube.com/watch?v=m6pFDu7ILV4>

<https://www.youtube.com/watch?v=MVwmi7HCmSI>

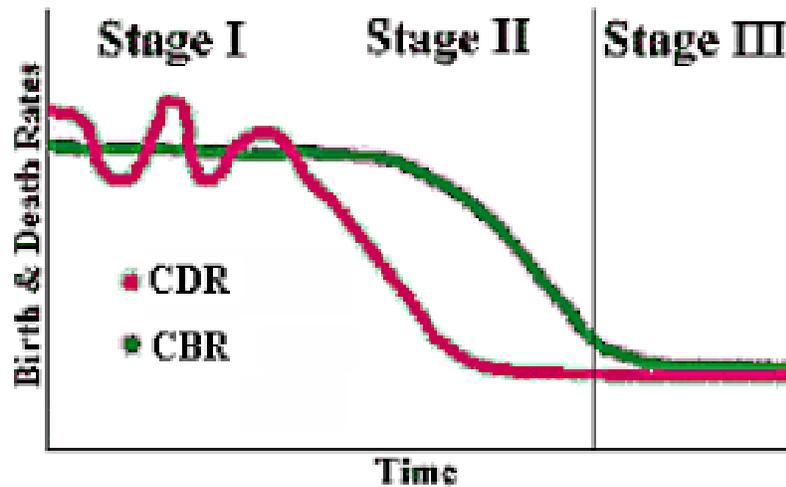


Figure 14.8: We must stabilize, and ultimately reduce, global population. If we are to avoid a large-scale famine, all countries must pass through the demographic transition.

14.7 We must stabilize, and ultimately reduce, global population

According to the World Resources Institute and the United Nations Environment Programme, “It is estimated that since World War II, 1.2 billion hectares...[of agricultural land] has suffered at least moderate degradation as a result of human activity. This is a vast area, roughly the size of China and India combined.” This area is 27% of the total area currently devoted to agriculture 5 . The report goes on to say that the degradation is greatest in Africa.

David Pimental and his associates at Cornell University pointed out in 1995 that “Because of erosion-associated loss of productivity and population growth, the per capita food supply has been reduced over the past 10 years and continues to fall. The Food and Agricultural Organization reports that the per capita production of grains which make up 80% of the world’s food supply, has been declining since 1984.”

Pimental et al. add that “Not only is the availability of cropland per capita decreasing as the world population grows, but arable land is being lost due to excessive pressure on the environment. For instance, during the past 40 years nearly one-third of the world’s cropland (1.5 billion hectares) has been abandoned because of soil erosion and degradation. Most of the replacement has come from marginal land made available by removing forests. Agriculture accounts for 80% of the annual deforestation.”

The phrase “developing countries” is more than a euphemism; it expresses the hope that with the help of a transfer of technology from the industrialized nations, all parts of

the world can achieve prosperity. An important factor that prevents the achievement of worldwide prosperity is population growth.

In the words of Dr. Halfdan Mahler, former Director General of the World Health Organization, "Country after country has seen painfully achieved increases in total output, food production, health and educational facilities and employment opportunities reduced or nullified by excessive population growth."

The growth of population is linked to excessive urbanization, infrastructure failures and unemployment. In rural districts in the developing countries, family farms are often divided among a growing number of heirs until they can no longer be subdivided. Those family members who are no longer needed on the land have no alternative except migration to overcrowded cities, where the infrastructure is unable to cope so many new arrivals. Often the new migrants are forced to live in excrement-filled makeshift slums, where dysentery, hepatitis and typhoid are endemic, and where the conditions for human life sink to the lowest imaginable level. In Brazil, such shanty towns are called "favelas".

If modern farming methods are introduced in rural areas while population growth continues, the exodus to cities is aggravated, since modern techniques are less labor-intensive and favor large farms. In cities, the development of adequate infrastructure requires time, and it becomes a hopeless task if populations are growing rapidly. Thus, population stabilization is a necessary first step for development.

It can be observed that birth rates fall as countries develop. However, development is sometimes blocked by the same high birth rates that economic progress might have prevented. In this situation (known as the "demographic trap"), economic gains disappear immediately because of the demands of an exploding population.

For countries caught in the demographic trap, government birth control programs are especially important, because one cannot rely on improved social conditions to slow birth rates. Since health and lowered birth rates should be linked, it is appropriate that family-planning should be an important part of programs for public health and economic development.

A recent study conducted by Robert F. Lapham of Demographic Health Surveys and W. Parker Maudlin of the Rockefeller Foundation has shown that the use of birth control is correlated both with socio-economic setting and with the existence of strong family-planning programs. The implication of this study is that even in the absence of increased living standards, family planning programs can be successful, provided they have strong government support.

Education of women and higher status for women are vitally important measures, not only for their own sake, but also because in many countries these social reforms have proved to be the key to lower birth rates. As Sir Partha Dasgupta of Cambridge University has pointed out, the changes needed to break the cycle of overpopulation and poverty are all desirable in themselves. Besides education and higher status for women, they include state-provided social security for old people, provision of water supplies near to dwellings, provision of health services to all, abolition of child labor and general economic development. The money required to make these desirable changes is a tiny fraction of the amount that is currently wasted on war.

In order to avoid a catastrophic future famine, it is vitally important that all of the countries of the world should quickly pass through a demographic transition from a situation characterized by high birth rates and high death rates to a new equilibrium, where low death rates are balanced by low birth rates.

14.8 We must eliminate the institution of war

The problem of achieving internal peace over a large geographical area is not insoluble. It has already been solved. There exist today many nations or regions within each of which there is internal peace, and some of these are so large that they are almost worlds in themselves. One thinks of China, India, Brazil, Australia, the Russian Federation, the United States, and the European Union. Many of these enormous societies contain a variety of ethnic groups, a variety of religions and a variety of languages, as well as striking contrasts between wealth and poverty. If these great land areas have been forged into peaceful and cooperative societies, cannot the same methods of government be applied globally?

But what are the methods that nations use to achieve internal peace? Firstly, every true government needs to have the power to make and enforce laws that are binding on individual citizens. Secondly the power of taxation is a necessity. Thirdly, within their own territories, almost all nations have more military power than any of their subunits. For example, the US Army is more powerful than the State Militia of Illinois.

This unbalance of power contributes to the stability of the Federal Government of the United States. When the FBI wanted to arrest Al Capone, it did not have to bomb Chicago. Agents just went into the city and arrested the gangster. Even if Capone had been enormously popular in Illinois, the the government of the state would have realized in advance that it had no chance of resisting the US Federal Government, and it still would have allowed the “Feds” to make their arrest. Similar considerations hold for almost all nations within which there is internal peace. It is true that there are some nations within which subnational groups have more power than the national government, but these are frequently characterized by civil wars.

Of the large land areas within which internal peace has been achieved, the European Union differs from the others because its member states still maintain powerful armies. The EU forms a realistic model for what can be achieved globally in the near future by reforming and strengthening the United Nations. In the distant future, however, we can imagine a time when a world federal authority will have much more power than any of its member states, and when national armies will have only the size needed to maintain local order.

Today there is a pressing need to enlarge the size of the political unit from the nation-state to the entire world. The need to do so results from the terrible dangers of modern weapons and from global economic interdependence. The progress of science has created this need, but science has also given us the means to enlarge the political unit: Our almost miraculous modern communications media, if properly used, have the power to weld all of

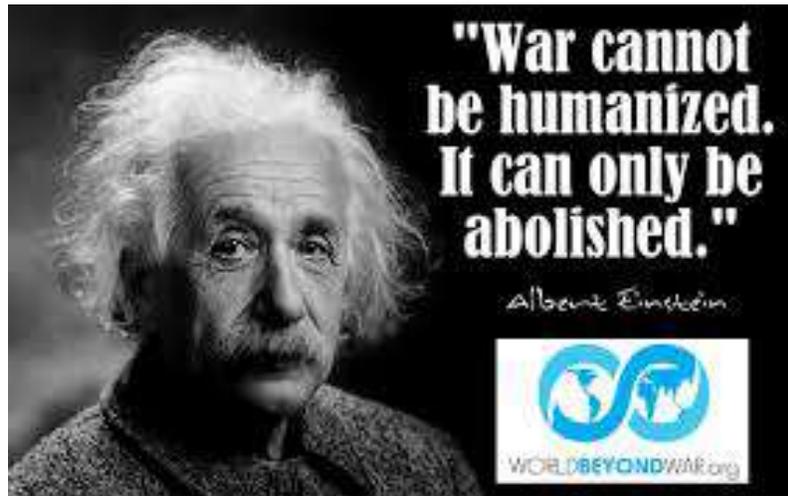


Figure 14.9: We must abolish the institution of war.

humankind into a single supportive and cooperative society.

14.9 Educational reforms

Educational reforms are urgently needed, particularly in the teaching of history. As it is taught today, history is a chronicle of power struggles and war, told from a biased national standpoint. Our own race or religion is superior; our own country is always heroic and in the right.

We urgently need to replace this indoctrination in chauvinism by a reformed view of history, where the slow development of human culture is described, giving adequate credit to all those who have contributed. Our modern civilization is built on the achievements of ancient cultures. China, India, Mesopotamia, ancient Egypt, Greece, the Islamic world, Christian Europe, and Jewish intellectual traditions all have contributed. Potatoes, corn and squash are gifts from the American Indians. Human culture, gradually built up over thousands of years by the patient work of millions of hands and minds, should be presented to students of history as a precious heritage - far too precious to be risked in a thermonuclear war.

In the teaching of science too, reforms are needed. Graduates in science and technology should be conscious of their responsibilities. They must resolve never to use their education in the service of war, or in any way which might be harmful to society or to the environment.

In modern societies, mass media play an extremely important role in determining behavior and attitudes. This role can be a negative one when the media show violence and enemy images, but if used constructively, the mass media can offer a powerful means for creating international understanding. If it is indeed true that tribalism is part of human nature, it is extremely important that the mass media be used to the utmost to overcome the barriers between nations and cultures. Through increased communication, the world's peoples can learn to accept each other as members of a single family.

Finally, let us turn to religion, with its enormous influence on human thought and behavior. Christianity, for example, offers a strongly stated ethic, which, if practiced, would make war impossible. In Mathew, the following passage occurs: "Ye have heard it said: Thou shalt love thy neighbor and hate thy enemy. But I say unto you: Love your enemies, bless them that curse you, do good to them that hate you, and pray for them that spitefully use you and persecute you."

This seemingly impractical advice, that we should love our enemies, is in fact of the greatest practicality, since acts of unilateral kindness and generosity can stop escalatory cycles of revenge and counter-revenge such as those which characterize the present conflict in the Middle East and the recent troubles of Northern Ireland. However, Christian nations, while claiming to adhere to the ethic of love and forgiveness, have adopted a policy of "massive retaliation", involving systems of thermonuclear missiles whose purpose is to destroy as much as possible of the country at which the retaliation is aimed. It is planned that entire populations shall be killed in a "massive retaliation", innocent children along with the guilty politicians. The startling contradiction between what the Christian nations profess and what they do was obvious even before the advent of nuclear weapons, at the time when Leo Tolstoy, during his last years, was exchanging letters with a young Indian

lawyer in South Africa. In one of his letters to Gandhi, Tolstoy wrote:

“...The whole life of the Christian peoples is a continuous contradiction between that which they profess and the principles on which they order their lives, a contradiction between love accepted as the law of life, and violence, which is recognized and praised, acknowledged even as a necessity...”

“This year, in the spring, at a Scripture examination at a girls’ high school in Moscow, the teacher and the bishop present asked the girls questions on the Commandments, and especially on the sixth. After a correct answer, the bishop generally put another question, whether murder was always in all cases forbidden by God’s law; and the unhappy young ladies were forced by previous instruction to answer ‘Not always’ - that murder was permitted in war and in the execution of criminals. Still, when one of these unfortunate young ladies (what I am telling is not an invention but a fact told to me by an eye witness) after her first answer, was asked the usual question, if killing was always sinful, she, agitated and blushing, decisively answered ‘Always’, and to the usual sophisms of the bishop, she answered with decided conviction that killing was always forbidden in the Old Testament and forbidden by Christ, not only killing but every wrong against a brother. Notwithstanding all his grandeur and arts of speech, the bishop became silent and the girl remained victorious.”

As everyone knows, Gandhi successfully applied the principle of non-violence to the civil rights struggle in South Africa, and later to the political movement, which gave India its freedom and independence. The principle of non-violence was also successfully applied by Martin Luther King, and by Nelson Mandela. It is perhaps worthwhile to consider Gandhi’s comment on the question of whether the end justifies the means: “The means may be likened to a seed”, Gandhi wrote, “and the end to a tree; and there is the same inviolable connection between the means and the end as there is between the seed and the tree.” In other words, a dirty method produces a dirty result; killing produces more killing; hate leads to more hate. Everyone who reads the newspapers knows that this is true. But there are positive feedback loops as well as negative ones. A kind act produces a kind response; a generous gesture is returned; hospitality results in reflected hospitality. Buddhists call this principle of reciprocity “the law of karma”.

The religious leaders of the world have the opportunity to contribute importantly to the solution of the problem of war. They have the opportunity to powerfully support the concept of universal human brotherhood, to build bridges between religious groups, to make intermarriage across ethnic boundaries easier, and to soften the distinctions between communities. If they fail to do this, they will have failed humankind at a time of crisis.

It is useful to consider the analogy between the institution of war and the institution of slavery. We might be tempted to say, “There has always been war, throughout human history; and war will always continue to exist.” As an antidote for this kind of pessimism, we can think of slavery, which, like war, has existed throughout most of recorded history. The cultures of ancient Egypt, Greece and Rome were all based on slavery, and, in more recent times, 13 million Africans were captured and forced into a life of slavery in the New World. Slavery was as much an accepted and established institution as war is today. Many people made large profits from slavery, just as arms manufacturers today make enormous

profits. Nevertheless, in spite of the weight of vested interests, slavery has now been abolished throughout most of the world.

Today we look with horror at drawings of slave ships, where human beings were packed together like cord-wood; and we are amazed that such cruelty could have been possible. Can we not hope for a time when our descendants, reading descriptions of the wars of the twentieth century, will be equally amazed that such cruelty could have been possible? If we use them constructively, the vast resources now wasted on war can initiate a new era of happiness and prosperity for the Family of man. It is within our power to let this happen. The example of the men and women who worked to rid the world of slavery can give us courage as we strive for a time when war will exist only as a dark memory fading into the past.

14.10 Culture, education and human solidarity

Cultural and educational activities have a small ecological footprint, and therefore are more sustainable than pollution-producing, fossil-fuel-using jobs in industry. Furthermore, since culture and knowledge are shared among all nations, work in culture and education leads societies naturally towards internationalism and peace.

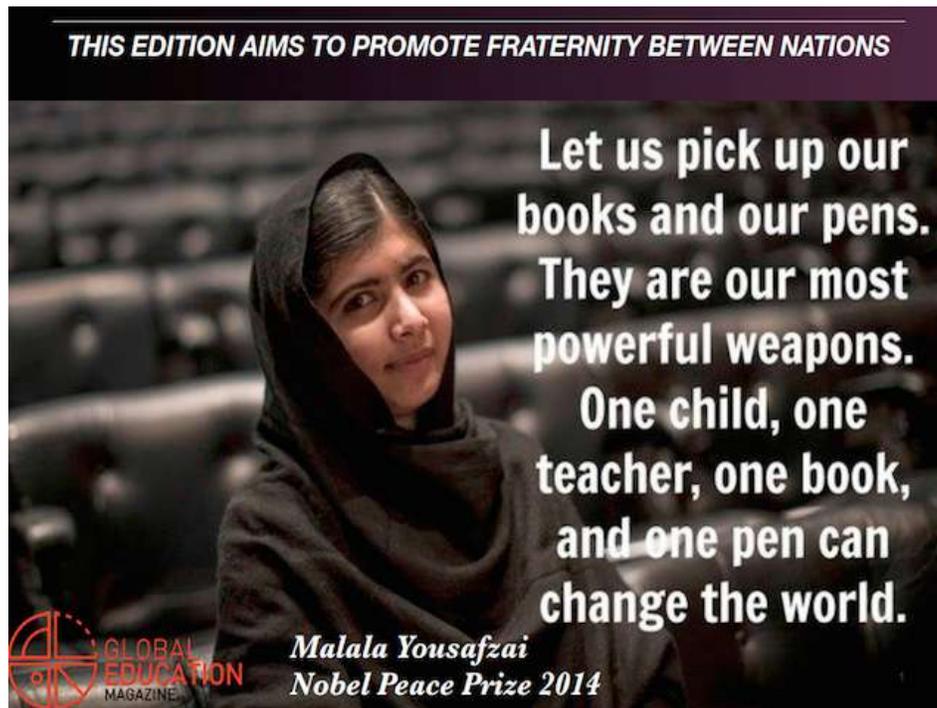
Economies based on a high level of consumption of material goods are unsustainable and will have to be abandoned by a future world that renounces the use of fossil fuels in order to avoid catastrophic climate change, a world where non-renewable resources such as metals will become increasingly rare and expensive. How then can full employment be maintained?

The creation of renewable energy infrastructure will provide work for a large number of people; but in addition, sustainable economies of the future will need to shift many workers from jobs in industry to jobs in the service sector. Within the service sector, jobs in culture and education are particularly valuable because they will help to avoid the disastrous wars that are currently producing enormous human suffering and millions of refugees, wars that threaten to escalate into an all-destroying global thermonuclear war.⁸

Human nature has two sides: It has a dark side, to which nationalism and militarism appeal; but our species also has a genius for cooperation, which we can see in the growth of culture. Our modern civilization has been built up by means of a worldwide exchange of ideas and inventions. It is built on the achievements of many ancient cultures. China, Japan, India, Mesopotamia, Egypt, Greece, the Islamic world, Christian Europe, and the Jewish intellectual traditions all have contributed. Potatoes, corn, squash, vanilla, chocolate, chilli peppers, and quinine are gifts from the American Indians.⁹

We need to reform our educational systems, particularly the teaching of history. As it is taught today, history is a chronicle of power struggles and war, told from a biased national standpoint. We are taught that our own country is always heroic and in the right. We

⁸<http://www.fredsakademiet.dk/library/need.pdf>
<http://eruditio.worldacademy.org/issue-5/article/urgent-need-renewable-energy>
⁹<http://eruditio.worldacademy.org/article/evolution-cooperation>



urgently need to replace this indoctrination in chauvinism by a reformed view of history, where the slow development of human culture is described, giving credit to all who have contributed. When we teach history, it should not be about power struggles. It should be about how human culture was gradually built up over thousands of years by the patient work of millions of hands and minds. Our common global culture, the music, science, literature and art that all of us share, should be presented as a precious heritage - far too precious to be risked in a thermonuclear war.

We have to extend our loyalty to the whole of the human race, and to work for a world not only free from nuclear weapons, but free from war. A war-free world is not utopian but very practical, and not only practical but necessary. It is something that we can achieve and must achieve. Today there are large regions, such as the European Union, where war would be inconceivable. What is needed is to extend these.

Nor is a truly sustainable economic system utopian or impossible. To achieve it, we should begin by shifting jobs to the creation of renewable energy infrastructure, and to the fields of culture and education. By so doing we will support human solidarity and avoid the twin disasters of catastrophic war and climate change.

14.11 Construction versus destruction

It is often said that ethical principles cannot be derived from science, that they must come from somewhere else. Nevertheless, when nature is viewed through the eyes of modern science, we obtain some insights which seem almost ethical in character. Biology at the

molecular level has shown us the complexity and beauty of even the most humble living organisms, and the interrelatedness of all life on earth. Looking through the eyes of contemporary biochemistry, we can see that even the single cell of an amoeba is a structure of miraculous complexity and precision, worthy of our respect and wonder.

Knowledge of the second law of thermodynamics, the statistical law favoring disorder over order, reminds us that life is always balanced like a tight-rope walker over an abyss of chaos and destruction. Living organisms distill their order and complexity from the flood of thermodynamic information which reaches the earth from the sun. In this way, they create local order; but life remains a fugitive from the second law of thermodynamics. Disorder, chaos, and destruction remain statistically favored over order, construction, and complexity.

It is easier to burn down a house than to build one, easier to kill a human than to raise and educate one, easier to force a species into extinction than to replace it once it is gone, easier to burn the Great Library of Alexandria than to accumulate the knowledge that once filled it, and easier to destroy a civilization in a thermonuclear war than to rebuild it from the radioactive ashes. Knowing this, we can form an almost ethical insight: To be on the side of order, construction, and complexity, is to be on the side of life. To be on the side of destruction, disorder, chaos and war is to be against life, a traitor to life, an ally of death. Knowing the precariousness of life, knowing the statistical laws that favor disorder and chaos, we should resolve to be loyal to the principle of long continued construction upon which life depends.

War is based on destruction, destruction of living persons, destruction of homes, destruction of infrastructure, and destruction of the biosphere. If we are on the side of life, if we are not traitors to life and allies of death, we must oppose the institution of war. We must oppose the military-industrial complex. We must oppose the mass media when they whip up war-fever. We must oppose politicians who vote for obscenely enormous military budgets at a time of financial crisis. We must oppose the planned illegal and insane Israeli attack of Iran, which threatens to lead to a world-destroying conflict. We must oppose these things by working with dedication, as though our lives depended on it. In fact, they do.



Figure 14.10: The second law of thermodynamics tells us that disorder is statistically favored over order, and that life is always balancing above a sea of chaos. It is easier to burn down a house than to build one, easier to burn down the Great Library at Alexandria than to accumulate the knowledge that once filled it, and easier to start a thermonuclear war than to rebuild civilization from the radioactive ashes.

14.12 New ethics to match new technology

Modern science has, for the first time in history, offered humankind the possibility of a life of comfort, free from hunger and cold, and free from the constant threat of death through infectious disease. At the same time, science has given humans the power to obliterate their civilization with nuclear weapons, or to make the earth uninhabitable through overpopulation and pollution.

The question of which of these paths we choose is literally a matter of life or death for ourselves and our children. Will we use the discoveries of modern science constructively, and thus choose the path leading towards life? Or will we use science to produce more and more lethal weapons, which sooner or later, through a technical or human failure, may result in a catastrophic nuclear war? Will we thoughtlessly destroy our beautiful planet through unlimited growth of population and industry? The choice among these alternatives is ours to make. We live at a critical moment of history, a moment of crisis for civilization.

No one living today asked to be born at such a moment, but by an accident of birth, history has given us an enormous responsibility, and two daunting tasks: If civilization is to survive, we must not only stabilize the global population but also, even more importantly, we must eliminate the institution of war. We face these difficult tasks with an inherited emotional nature that has not changed much during the last 40,000 years. Furthermore, we



Figure 14.11: **We must develop a new system of ethics to match our advanced technology.**

face the challenges of the 21st century with an international political system based on the anachronistic concept of the absolutely sovereign nation-state. However, the human brain has shown itself to be capable of solving even the most profound and complex problems. The mind that has seen into the heart of the atom must not fail when confronted with paradoxes of the human heart.

We must replace the old world of international anarchy, chronic war and institutionalized injustice, by a new world of law. The United Nations Charter, the Universal Declaration of Human Rights and the International Criminal Court are steps in the right direction, but these institutions need to be greatly strengthened and reformed.¹⁰

¹⁰<http://www.countercurrents.org/zuesse050815.htm>
<https://www.youtube.com/watch?t=16&v=hDsPWmioSHg>
<http://www.commondreams.org/views/2014/04/14/us-oligarchy-not-democracy-says-scientific-study>
<http://www.treehugger.com/renewable-energy/striking-chart-showing-solar-power-will-take-over-world.html>
<http://www.countercurrents.org/richard120815.htm>
http://priceofoil.org/content/uploads/2015/08/OCI-Untouchable_Arctic_FINAL.pdf
<http://priceofoil.org/2015/08/13/untouchable-the-climate-case-against-arctic-drilling/>
<http://www.commondreams.org/views/2015/08/14/untouchable-climate-case-against-arctic-drilling>
https://www.youtube.com/watch?t=124&v=9_LJpN893Vg
<http://americamagazine.org/content/all-things/which-candidate-quotes-pope-most>
<http://www.truth-out.org/news/item/32336-our-united-states-of-indebtedness>
<http://www.commondreams.org/news/2015/08/17/ahead-australia-visit-naomi-klein-brands-pm-abbott-climate-villain>
http://www.footprintnetwork.org/ecological_footprint_nations/
<http://ecowatch.com/2015/08/16/earth-overshoot-day/2/>
<http://www.commondreams.org/news/2015/08/18/islamic-declaration-blasts-short-sighted-capitalism->

We also need a new global ethic, where loyalty to one's family and nation is supplemented by a higher loyalty to humanity as a whole. The Nobel laureate biochemist Albert Szent-Györgyi once wrote:

"The story of man consists of two parts, divided by the appearance of modern science.... In the first period, man lived in the world in which his species was born and to which his senses were adapted. In the second, man stepped into a new, cosmic world to which he was a complete stranger.... The forces at man's disposal were no longer terrestrial forces, of human dimension, but were cosmic forces, the forces which shaped the universe. The few hundred Fahrenheit degrees of our flimsy terrestrial fires were exchanged for the ten million degrees of the atomic reactions which heat the sun."

"This is but a beginning, with endless possibilities in both directions; a building of a human life of undreamt of wealth and dignity, or a sudden end in utmost misery. Man lives in a new cosmic world for which he was not made. His survival depends on how well and how fast he can adapt himself to it, rebuilding all his ideas, all his social and political institutions."

"...Modern science has abolished time and distance as factors separating nations. On our shrunken globe today, there is room for one group only: the Family of man."

Suggestions for further reading

1. Herman Daly, *Steady-State Economics: Second Edition with New Essays*, Island Press, (1991).
2. Herman Daly, *Economics in a Full World*, Scientific American, Vol. 293, Issue 3, September, (2005).
3. Herman Daly and John Cobb, *For the Common Good*, Beacon Press, Boston, (1989).
4. E.O. Wilson, *The Diversity of Life*, Allen Lane, The Penguin Press, (1992).
5. Lester R. Brown et. al., *Saving the Planet. How to Shape an Environmentally Sustainable Global Economy*, W.W. Norton, New York, (1991).
6. Muhammad Yunus, *Banker to the Poor; Microcredit and the Battle Against World Poverty*, (2003).
7. UN Global Compact, <http://www.unglobalcompact.org> (2007).
8. UN Millennium Development Goals <http://www.un.org/millenniumgoals/> (2007).
9. Amartya Sen, *Poverty and Famine; An Essay on Entitlement and Deprivation*, Oxford University Press, (1981).
10. Amartya Sen, *Development as Freedom*, Oxford University Press, (1999).
11. Amartya Sen, *Inequality Reexamined*, Harvard University Press, (1992).

demands-action-climate

<http://islamicclimatedeclaration.org/islamic-declaration-on-global-climate-change/>

<http://ecowatch.com/2015/06/29/dalai-lama-pope-encyclical/>

<http://www.theguardian.com/music/2015/jun/28/dalai-lama-glastonbury-verdict-isis-unthinkable>

<http://ecowatch.com/2015/07/02/naomi-klein-people-planet-first/>

12. Paul F. Knitter and Chandra Muzaffar, editors, *Subverting Greed; Religious Perspectives on the Global Economy*, Orbis Books, Maryknoll, New York, (2002).
13. Edy Korthals Altes, *The Contribution of Religions to a Just and Sustainable Economic Development*, in F. David Peat, editor, *The Pari Dialogues, Volume 1*, Pari Publishing, (2007).
14. Hendrik Opdebeeck, *Globalization Between Market and Democracy*, in F. David Peat, editor, *The Pari Dialogues, Volume 1*, Pari Publishing, (2007).
15. Paul Hawken *The Ecology of Commerce; A Declaration of Sustainability*, Collins Business, (2005).
16. Luther Standing Bear, *Land of the Spotted Eagle*, Houghton Mifflin, (1933).
17. T. Gyatso, HH the Dalai Lama, *Ancient Wisdom, Modern World: Ethics for the New Millennium*, Abacus, London, (1999).
18. T. Gyatso, HH the Dalai Lama, *How to Expand Love: Widening the Circle of Loving Relationships*, Atria Books, (2005).
19. J. Rotblat and D. Ikeda, *A Quest for Global Peace*, I.B. Tauris, London, (2007).
20. M. Gorbachev and D. Ikeda, *Moral Lessons of the Twentieth Century*, I.B. Tauris, London, (2005).
21. D. Krieger and D. Ikeda, *Choose Hope*, Middleway Press, Santa Monica CA 90401, (2002).
22. P.F. Knitter and C. Muzaffar, eds., *Subverting Greed: Religious Perspectives on the Global Economy*, Orbis Books, Maryknoll, New York, (2002).
23. S. du Boulay, *Tutu: Voice of the Voiceless*, Eerdmans, (1988).
24. Earth Charter Initiative, www.earthcharter.org, *The Earth Charter*
25. P.B. Corcoran, ed., *The Earth Charter in Action*, KIT Publishers, Amsterdam, (2005).
26. R. Costanza, ed., *Ecological Economics: The Science and Management of Sustainability*, Colombia University Press, New York, (1991).
27. A. Peccei, *The Human Quality*, Pergamon Press, Oxford, (1977).
28. A. Peccei, *One Hundred Pages for the Future*, Pergamon Press, New York, (1977).
29. E. Pestel, *Beyond the Limits to Growth*, Universe Books, New York, (1989).
30. B. Broms, *United Nations*, Suomalainen Tiedeakatemia, Helsinki, (1990).
31. S. Rosenne, *The Law and Practice at the International Court*, Dordrecht, (1985).
32. S. Rosenne, *The World Court - What It Is and How It Works*, Dordrecht, (1995).
33. J. D'Arcy and D. Harris, *The Procedural Aspects of International Law (Book Series), Volume 25*, Transnational Publishers, Ardsley, New York, (2001).
34. H. Cullen, *The Collective Complaints Mechanism Under the European Social Charter*, European Law Review, Human Rights Survey, p. 18-30, (2000).
35. S.D. Bailey, *The Procedure of the Security Council*, Oxford, (1988).
36. R.A. Akindale, *The Organization and Promotion of World Peace: A Study of Universal-Regional Relationships*, Univ. Toronto Press, Toronto, Ont., (1976).
37. J.S. Applegate, *The UN Peace Imperative*, Vantage Press, New York, (1992).
38. S.E. Atkins, *Arms Control, Disarmament, International Security and Peace: An Annotated Guide to Sources, 1980-1987*, Clio Press, Santa Barbara, CA, (1988).

39. N. Ball and T. Halevy, *Making Peace Work: The Role of the International Development Community*, Overseas Development Council, Washington DC, (1996).
40. F. Barnaby, Ed., *The Gaia Peace Atlas: Survival into the Third Millennium*, Doubleday, New York, (1988)
41. J.H. Barton, *The Politics of Peace: An Evaluation of Arms Control*, Stanford Univ. Press, Stanford, CA, (1981).
42. W. Bello, *Visions of a Warless World*, Friends Committee on National Education Fund, Washington DC, (1986).
43. A. Boserup and A. Mack, *Abolishing War: Cultures and Institutions; Dialogue with Peace Scholars Elise Boulding and Randall Forsberg*, Boston Research Center for the Twenty-first Century, Cambridge, MA, (1998).
44. E. Boulding et al., *Bibliography on World Conflict and Peace*, Westview Press, Boulder, CO, (1979).
45. E. Boulding et al., Eds., *Peace, Culture and Society: Transnational Research Dialogue*, Westview Press, Boulder, CO, (1991).
46. A.T. Bryan et al., Eds., *Peace, Development and Security in the Caribbean*, St. Martins Press, New York, (1988).
47. A.L. Burns and N. Heathcote, *Peace-Keeping by UN Forces from Suez to Congo*, Praeger, New York, (1963).
48. F. Capra and C. Spretnak, *Green Politics: The Global Promise*, E.P. Dutton, New York, (1986).
49. N. Carstarphen, *Annotated Bibliography of Conflict Analysis and Resolution*, Inst. for Conflict Analysis and Resolution, George Mason Univ., Fairfax, VA, (1997).
50. N. Chomsky, *Peace in the Middle East? Reflections on Justice and Nationhood*, Vintage Books, New York, (1974).
51. G. Clark and L. Sohn, *World Peace Through World Law*, World Without War Pubs., Chicago, IL, (1984).
52. K. Coates, *Think Globally, Act Locally: The United Nations and the Peace Movements*, Spokesman Books, Philadelphia, PA, (1988).
53. G. De Marco and M. Bartolo, *A Second Generation United Nations: For Peace and Freedom in the 20th Century*, Columbia Univ. Press, New York, (1997).
54. F.M. Deng and I.W. Zartman, Eds., *Conflict Resolution in Africa*, Brookings Institution, Washington, DC, (1991).
55. W. Desan, *Let the Future Come: Perspectives for a Planetary Peace*, Georgetown Univ. Press, Washington, DC, (1987).
56. D. Deudney, *Whole Earth Security. A Geopolitics of Peace*, Worldwatch paper 55. Worldwatch Institute, Washington, DC, (1983).
57. A.J. Donovan, *World Peace? A Work Based on Interviews with Foreign Diplomats*, A.J. Donovan, New York, (1986).
58. R. Duffey, *International Law of Peace*, Oceania Pubs., Dobbs Ferry, NY, (1990).
59. L.J. Dumas, *The Socio-Economics of Conversion From War to Peace*, M.E. Sharpe, Armonk, NY, (1995).

60. W. Durland, *The Illegality of War*, National Center on Law and Pacifism, Colorado Springs, CO, (1982).
61. F. Esack, *Qur'an, Liberation and Pluralism: An Islamic Perspective on Interreligious Solidarity Against Oppression*, Oxford Univ. Press, London, (1997).
62. I. Hauchler and P.M. Kennedy, Eds., *Global Trends: The World Almanac of Development and Peace*, Continuum Pubs., New York, (1995).
63. H.B. Hollins et al., *The Conquest of War: Alternative Strategies for Global Security*, Westview Press, Boulder, CO, (1989).
64. H.J. Morgenthau, *Peace, Security and the United Nations*, Ayer Pubs., Salem, NH, (1973).
65. C.C. Moskos, *Peace Soldiers: The Sociology of a United Nations Military Force*, Univ. of Chicago Press, Chicago, IL, (1976).
66. L. Pauling, *Science and World Peace*, India Council for Cultural Relations, New Delhi, India, (1967).
67. C. Peck, *The United Nations as a Dispute Resolution System: Improving Mechanisms for the Prevention and Resolution of Conflict*, Kluwer, Law and Tax, Cambridge, MA, (1996).
68. D. Pepper and A. Jenkins, *The Geography of Peace and War*, Basil Blackwell, New York, (1985).
69. J. Perez de Cuellar, *Pilgrimage for Peace: A Secretary General's Memoir*, St. Martin's Press, New York, (1997).
70. R. Pickus and R. Woito, *To End War: An Introduction to the Ideas, Books, Organizations and Work That Can Help*, World Without War Council, Berkeley, CA, (1970).
71. S.R. Ratner, *The New UN Peacekeeping: Building Peace in Lands of Conflict after the Cold War*, St. Martins Press, New York, (1995).
72. I.J. Rikhye and K. Skjelsbaek, Eds., *The United Nations and Peacekeeping: Results, Limitations and Prospects: The Lessons of 40 Years of Experience*, St. Martins Press, New York, (1991).
73. J. Rotblat, Ed., *Scientists in Quest for Peace: A History of the Pugwash Conferences*, MIT Press, Cambridge, MA, (1972).
74. J. Rotblat, Ed., *Scientists, The Arms Race, and Disarmament*, Taylor and Francis, Bristol, PA, (1982).
75. J. Rotblat, Ed., *Striving for Peace, Security and Development in the World*, World Scientific, River Edge, NJ, (1991).
76. J. Rotblat, Ed., *Towards a War-Free World*, World Scientific, River Edge, NJ, (1995).
77. J. Rotblat, Ed., *Nuclear Weapons: The Road to Zero*, Westview, Boulder, CO, (1998).
78. J. Rotblat and L. Valki, Eds., *Coexistence, Cooperation and Common Security*, St. Martins Press, New York, (1988).
79. United Nations, *Peaceful Settlement of Disputes between States: A Select Bibliography*, United Nations, New York, (1991).

80. United States Arms Control and Disarmament Agency, *Arms Control and Disarmament Agreements: Texts and Histories of Negotiations*, USACDA, Washington, DC, (updated annually)
81. D. Fahrni, *An Outline History of Switzerland - From the Origins to the Present Day*, Pro Helvetia Arts Council of Switzerland, Zurich, (1994).

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