

Connecting the dots

Systems thinking and the state of the world

The great challenge of our time, as we mentioned in our previous chapter, is to build and nurture sustainable communities and societies, designed in such a way that our activities do not interfere with nature's inherent ability to sustain life. The first step in this endeavor is to understand the principles of organization that nature's ecosystems have evolved to sustain the web of life; we need to become, as it were, ecologically literate.

We also emphasized in the previous chapter that the basic principles of ecology – interdependence, the cyclical nature of ecological processes, flexibility, diversity, etc. – are basic systemic properties of all living systems. This is why the systemic understanding of life not only holds great intellectual fascination but is also tremendously important from a practical point of view. It is the cognitive foundation of our endeavor to move toward a sustainable future.

17.1 Interconnectedness of world problems

Once we become ecologically literate, once we understand the processes and patterns of relationships that enable ecosystems to sustain life, we will also understand the many ways in which our human civilization, especially since the Industrial Revolution, has ignored these ecological patterns and processes and has interfered with them. And we will realize that these interferences are the fundamental causes of many of our current world problems.

When we look at the state of the world today, what is most evident is the fact that the major problems of our time – energy, the environment, climate change, food security, financial security – cannot be understood in isolation. They are systemic problems, meaning that they are all interconnected and interdependent. One of the most detailed documentations of the fundamental interconnectedness of world problems is the recent book by Lester Brown, *Plan B* (Brown, 2008; see also Brown, 2009, 2011a). Lester Brown, founder of the Worldwatch Institute and, more recently, of the World Policy Institute, has been for many years one of the most authoritative environmental thinkers. In this book, he demonstrates with impeccable clarity how the vicious circle of demographic pressure and poverty leads to the depletion of resources – falling water tables, shrinking forests, collapsing fisheries, eroding soils, and so on – and how this resource depletion, exacerbated by climate change,

produces failing states whose governments can no longer provide security for their citizens, some of whom in sheer desperation turn to terrorism.

As we mentioned in the Preface to this book, all these problems, ultimately, must be seen as just different facets of one single crisis, which is largely a crisis of perception. It derives from the fact that most people in our society, and especially our large social institutions, subscribe to the concepts of an outdated worldview, a perception of reality inadequate for dealing with our overpopulated, globally interconnected world.

Plan B is Lester Brown's "road map for saving civilization." It is the alternative to business as usual (Plan A), which leads to disaster. The main message of the book is that there *are* solutions to the major problems of our time – some of them even simple. But they require a radical shift in our perceptions, our thinking, our values. Since they are systemic problems, they require systemic solutions; and since the only viable solutions are those that are ecologically sustainable, they must incorporate the basic principles of ecology, or principles of sustainability.

To discuss the fundamental interconnectedness of today's global problems, we have designed a conceptual map, based on Brown's Plan B, which shows their complex interconnections (Figure 17.1). We shall begin with a brief overview of the entire conceptual map and will then, in the following sections, discuss the major problem areas in more detail before we turn to the corresponding systemic solutions.

The fundamental dilemma underlying the major problems of our time seems to be the illusion that unlimited growth is possible on a finite planet. This, in turn, reflects the clash between linear thinking and the nonlinear patterns in our biosphere – the ecological networks and cycles that constitute the web of life. This highly nonlinear global network contains countless feedback loops through which the planet balances and regulates itself. Our current economic system, by contrast, is fueled by materialism and greed that do not seem to recognize any limits.

There are actually three kinds of growth that have severe impacts on our natural environment and our well-being: economic growth, corporate growth, and population growth. The illusion of the viability of unlimited growth is maintained by economists who refuse to include the social and environmental costs of economic activities in their theories (see Section 3.5). Consequently, there are huge differences between market prices and true costs, as, for example, for fossil fuels. As Nicholas Stern, former chief economist of the World Bank, pointed out in his groundbreaking study on the costs of climate change, this amounts to a massive market failure (Stern, 2006).

Economic and corporate growth are pursued by global capitalism, the dominant economic system today. At the center of the global economy is a network of financial flows, which has been designed without any ethical framework. In fact, social inequality and social exclusion are inherent features of economic globalization, widening the gap between the rich and the poor and increasing world poverty.

In this new economy, capital works in real time, moving continually through global financial networks. These movements are facilitated by the "free-trade" rules, designed to support continuing corporate growth. Economic and corporate growth are pursued relentlessly by

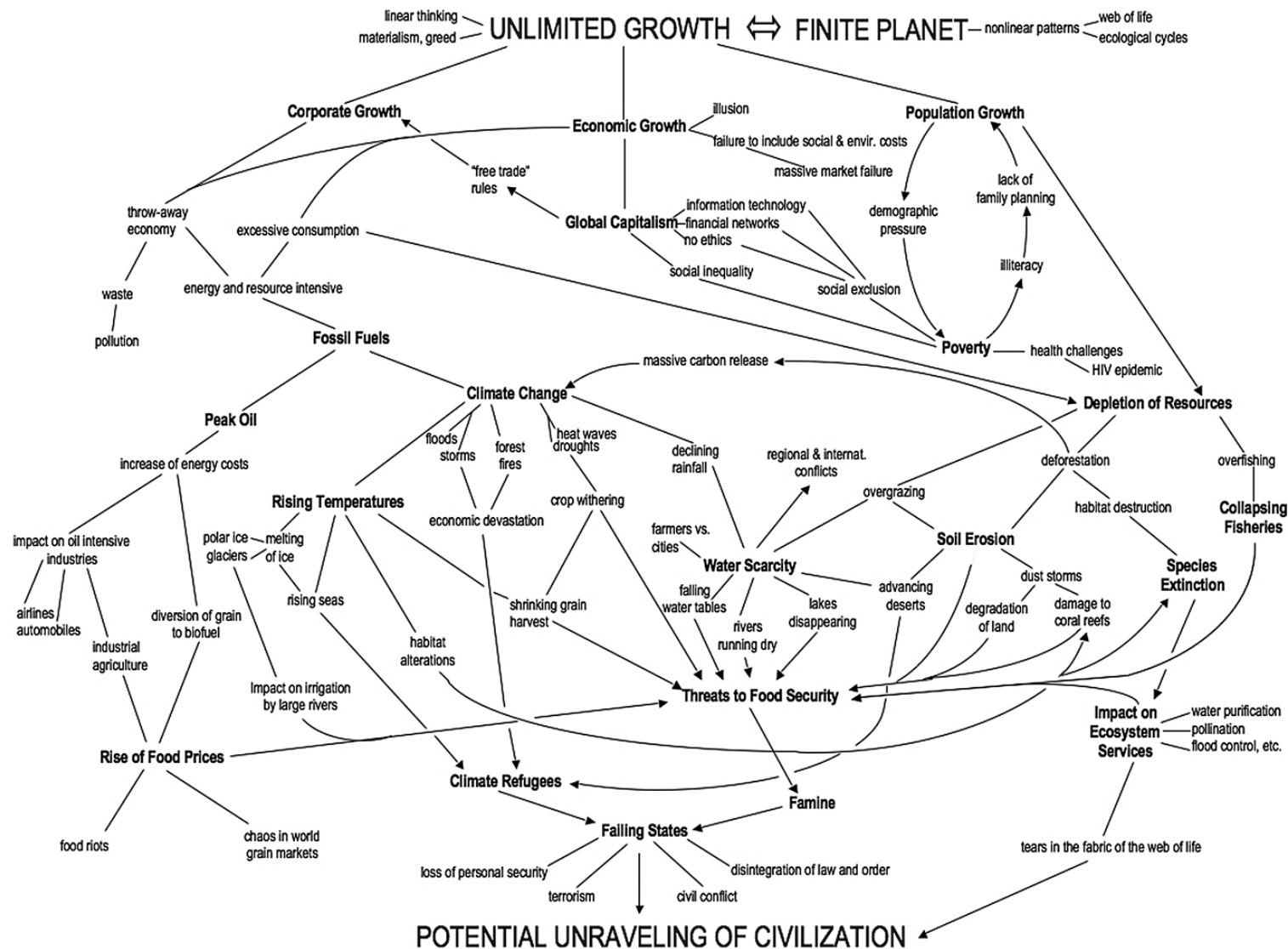


Figure 17.1 Interconnectedness of world problems (based on Brown, 2008).

promoting excessive consumption and a throw-away economy that is energy and resource intensive, generating waste and pollution, and depleting the Earth's natural resources.

Population growth and poverty form a vicious circle, or self-amplifying feedback loop. Rapid population growth reduces the available cropland and water supplies per person. The resulting poverty, often coupled with illiteracy, in turn increases the demographic pressure, as illiterate women typically have less access to family planning and thus have much larger families than literate women. The results of this mutual reinforcement of demographic pressure and poverty are the growing health challenges of the HIV epidemic and other infectious diseases, on the one hand, and further depletion of resources on the other hand.

Excessive consumption and waste in industrialized countries and rapid population growth in many developing countries combine to exert severe pressures on our natural resources, leading to overgrazing, deforestation, and overfishing. The results are well known – falling water tables, rivers running dry, lakes disappearing, shrinking forests, collapsing fisheries, eroding soils, grasslands turning into deserts – all of which are severe threats to food security.

Water scarcity has led to intense conflicts between farmers and cities, with farmers usually losing out, in addition to many political stresses in regional and international conflicts. Soil erosion results not only in the decline of soil fertility but also in an increasing number of dust storms that can travel for thousands of miles and cause further degradation of land, as well as damage to coral reefs.

Deforestation, especially in the tropical rainforests, results in the destruction of habitats of numerous plant and animal species, and consequently in their extinction. Indeed, we are now in the early stages of a massive species extinction which, for the first time in the history of the planet, is not caused by natural phenomena but by human behavior (see Section 16.3). As various forms of life disappear, so do the services they provide – water purification, pollination, flood control, etc. If the loss of these priceless ecosystem services continues, it could tear huge gaps in the fabric of the web of life.

All of these environmental problems are exacerbated by global climate change, caused by our energy-intensive and fossil-fuel-based technologies. This is aggravated by deforestation through the release of massive amounts of carbon into the atmosphere. Climate change manifests itself in increased floods, destructive storms, and forest fires, which cause economic devastation and give rise to large numbers of climate refugees. Other manifestations of climate change are severe heat waves and droughts that lead to crop withering, thus shrinking grain harvests and further threatening food security. In many regions of the world, the resulting decline of rainfall intensifies an already severe water scarcity.

Rising temperatures cause not only shrinking grain harvests but also the melting of ice – both glaciers and polar ice – and consequently the rise of sea levels. The shrinking of glaciers severely impacts the irrigation of rice and wheat fields by large rivers fed by those glaciers. These effects are additional huge threats to food security. Rising seas could potentially result in millions of climate refugees in the coming years. And finally, rising global temperatures alter many habitats and threaten the extinction of species living in them.

The excessive dependence on fossil fuels not only causes global warming but has also brought us close to “peak oil”: after oil production reaches its peak, it will decrease worldwide, extraction of the remaining reserves will be more and more costly, and hence the price of oil will continue to rise. Most affected are the oil-intensive segments of the global economy, in particular the automobile industry, the airline industry, and industrial agriculture. Thus food prices are rising with rising oil prices, further threatening food security. There is now a serious risk that rising grain prices will lead to chaos in world grain markets and to food riots in low- and middle-income countries that import grain.

The search for alternative energy sources has recently led to increased production of ethanol and other biofuels, and since the fuel value of grain is higher on the markets than its food value, more and more grain is diverted from food to producing fuels. At the same time, the price of grain is moving up toward the oil-equivalent value.

The fact that the price of grain is now keyed to the price of oil is only possible because our global economic system has no ethical dimension. In such a system, as Brown (2008) points out, the question, “Should we use grain to fuel cars or to feed people?”, has a clear answer. The market says, “Let’s fuel the cars.” This is even more perverse in view of the fact that the entire ethanol production in the USA could be replaced by raising average fuel efficiency by 20%, as could easily be done with the technologies available today.

Lester Brown’s analysis makes it abundantly clear that virtually all our environmental problems are threats to our food security – water scarcity, soil erosion, collapsing fisheries, extreme climate events, and, most recently, the rise of food prices due to rising energy costs and increasing diversion of grains to biofuel. In addition, increased fuel consumption accelerates global warming, which results in crop losses in heat waves, and from the loss of glaciers that feed rivers essential to irrigation. When we think systemically and understand how all these processes are interrelated, we realize that the vehicles we drive, and other consumer choices we make, have a major impact on the food supply to large populations in other parts of the world.

As a result of these multiple threats to food security, world hunger is now on the rise again after a long steady decline. This worldwide famine and the large numbers of climate refugees have resulted in increasing numbers of failing states, characterized by the disintegration of law and order and the rise of civil conflict. The governments of these states can no longer provide security for their citizens. With increasing numbers of failing states, and ever increasing tears in the fabric of the web of life, caused by continuing species extinction, civilization itself could begin to unravel.

17.2 The illusion of perpetual growth

The obsession of politicians and economists with unlimited economic growth must be seen as one of the root causes, if not *the* root cause, of our global multifaceted crisis. As we discussed in Section 3.5.2, the goal of virtually all national economies is to achieve unlimited growth, even though the absurdity of such an enterprise on a finite planet should be obvious to all.

As the energy analyst and educator Richard Heinberg argues eloquently in his recent book, *The End of Growth*, the world is now colliding with three fundamental barriers to continuing economic expansion (Heinberg, 2011). The first is the depletion of important natural resources, and in particular the declining access to cheap and abundant fossil fuels, the situation also known as “peak oil.” The second barrier is the proliferation of harmful environmental impacts arising from the extraction and use of resources, resulting in ever-increasing costs from both the impacts themselves and from efforts to avert them. The most catastrophic of these environmental impacts are the multiple global manifestations of climate change, which we shall discuss in more detail in Section 17.3.5.

The third barrier to perpetual growth is more abstract but no less severe: it is a financial barrier. As Heinberg explains in great detail, we have created a global monetary and financial system that requires growth. Economic activities are driven by money entering the economy through loans, and the interest on these loans can only be paid if the economy continues to grow. However, when economic growth collides with the two natural barriers of peak oil and climate collapse, financial systems built on expectations of perpetual growth are bound to fail, generating the multiple symptoms we have come to know only too well – massive unpaid debts, high rates of unemployment, chain reactions of defaults and bankruptcies, and so on.

Heinberg argues persuasively that resource depletion, environmental impacts, and systemic financial and monetary failures are now combining to make the resumption of conventional economic growth a near impossibility, and that policymakers who insist on pursuing the ideology of perpetual growth are really fleeing from reality.

The clear recognition of this dilemma is hampered by the fact that most economists use inadequate economic indicators. As we discussed in Section 3.5, countries measure their wealth in terms of their gross domestic product (GDP), a crude indicator resulting from adding up indiscriminately all economic activities associated with monetary values, while ignoring the many important nonmonetary aspects of the economy. The unlimited growth of GDP through the continuing accumulation of material goods is pursued relentlessly by virtually all economists and politicians, and is celebrated as the sign of a “healthy” economy. The problem that growth can also be harmful or pathological, like the growth of cancer, is rarely addressed; nor is the dilemma that unlimited material growth on a finite planet can only lead to disaster.

Indeed, it is evident from our graph in Figure 17.1 that undifferentiated economic growth is the root cause of our mountains of solid waste, our polluted cities, the depletion of our natural resources, and the energy crisis; and, because the continuing expansion of production is driven mainly by fossil fuels, it is also the root cause of the multiple disasters arising from peak oil and climate change.

This fatal dynamic is increasingly being recognized today. In a joint paper prepared for the Rio+20 Earth Summit in June 2012, the eighteen past winners of the Blue Planet Prize – the unofficial “Nobel Prize” for the environment – write: “The perpetual growth myth . . . promotes the impossible idea that indiscriminate economic growth is the cure for all the world’s problems, while it is actually the disease that is at the root of our

unsustainable global practices” (see Brundtland *et al.*, 2012, p. 41); the authors include Paul Ehrlich, James Hansen, Amory Lovins, James Lovelock, Karl-Henrik Robèrt, and Nicholas Stern).

17.2.1 *From quantitative to qualitative growth*

It seems, then, that our key challenge is to shift from an economic system based on the notion of unlimited growth to one that is both ecologically sustainable and socially just. From the perspective of the systems view of life, “no growth” cannot be the answer. Growth is a central characteristic of all life. A society, or economy, that does not grow will die sooner or later. Growth in nature, however, is not linear and unlimited. While certain parts of organisms, or ecosystems, grow, others decline, releasing and recycling their components, which become resources for new growth.

This kind of balanced, multifaceted growth is well known to biologists and ecologists. Capra and Henderson (2009) have proposed to call it “qualitative growth” to contrast it to the concept of quantitative growth used by today’s economists. The recognition of the fallacy of the conventional concept of economic growth, the two authors suggest, is the first essential step in overcoming our economic crisis. In the words of social-change activist Frances Moore Lappé (2009):

Since what we call ‘growth’ is largely waste, let’s call it that! Let’s call it an economics of waste and destruction. Let’s define growth as that which enhances life – as generation and regeneration – and declare that what our planet most needs is more of it.

This notion of “growth which enhances life” is what is meant by qualitative growth – growth that enhances the quality of life. In living organisms, ecosystems, and societies, qualitative growth includes an increase of complexity, sophistication, and maturity. Unlimited quantitative growth on a finite planet is clearly unsustainable, but qualitative economic growth can be sustained if it involves a dynamic balance between growth, decline, and recycling, and if it also includes the inner growth of learning and maturing.

The focus on qualitative growth is fully consistent with the systems view of life. As we have emphasized several times in this book, this new science of life is essentially a science of qualities. This is relevant in particular to the understanding of ecological sustainability, since the basic principles of ecology – principles like interdependence or the cyclical nature of ecological processes – are expressed in terms of patterns of relationships, or qualities.

In fact, the new systemic conception of life makes it possible to formulate a scientific concept of quality. It seems that there are two different meanings of the term – one objective and the other subjective. In the objective sense, the qualities of a complex system refer to properties of the system that none of its parts exhibit. Quantities like mass or energy tell us about the properties of the parts, and their sum total is equal to the corresponding property of the whole – e.g., the total mass or energy. Qualities like stress or health, by contrast, cannot be expressed as the sum of properties of the parts. Qualities arise from processes

and patterns of relationships among the parts. Hence, we cannot understand the nature of complex systems such as organisms, ecosystems, societies, and economies if we try to describe them in purely quantitative terms. Quantities can be measured; qualities need to be mapped (see Section 4.3).

With the recent emphasis on complexity, networks, and patterns of organization, the attention of scientists in the life sciences has begun to shift from quantities to qualities, and there has been a corresponding conceptual shift in mathematics. In fact, this began in physics during the 1960s with the strong emphasis on symmetry (see Section 8.4.3), which is a quality, and it intensified during the subsequent decades with the development of complexity theory, or nonlinear dynamics, which is a mathematics of patterns and relationships. The strange attractors of chaos theory and the fractals of fractal geometry are visual patterns representing the qualities of complex systems (see Sections 6.3 and 6.4).

In the human realm, the notion of quality always seems to include references to human experiences, which are subjective aspects. This should not be surprising. Since all qualities arise from processes and patterns of relationships, they will necessarily include subjective elements if these processes and relationships involve human beings.

For example, the quality of a person's health can be assessed in terms of objective factors, but it includes a subjective experience of well-being as a significant element (see Section 15.2). Similarly, the quality of a human relationship derives largely from subjective mutual experiences. To describe and explain the qualities of such subjective experiences within a scientific framework is known as the "hard problem" of consciousness studies, as we discussed in Chapter 12.

These considerations imply that, to properly assess the health of an economy, we need qualitative indicators of poverty, health, equity, education, social inclusion, and the state of the natural environment – none of which can be reduced to money coefficients or aggregated into a simple number. Indeed, several economic indicators of this kind have recently been proposed. They include the United Nations (UN) Human Development Index (HDI), launched in 1990, and the Calvert–Henderson Quality of Life Indicators, which assess twelve criteria and use monetary coefficients only where appropriate (see Capra and Henderson, 2009).

17.2.2 Growth and development

A few years after the concept of ecological sustainability was introduced by Lester Brown (1981), it was taken up by the UN in the so-called Brundtland Report (see Section 16.3). There, however, the term "sustainable" was coupled with "development," and this notion of "sustainable development" has been widely used ever since, unfortunately often without the ecological context that would give it its proper meaning.

The whole concept of "sustainable development" is rather problematic because, like "growth," "development" is used today in two quite different senses – one qualitative and the other quantitative. For biologists, development is a fundamental property of life. According to the theory of autopoiesis, a living organism continually responds to environmental

influences with structural changes and over time will form its own, individual pathway of development (see Section 7.4). The fundamental dynamic underlying this process is the spontaneous emergence of order at critical points of instability. As we emphasized in our discussion of self-organization and emergence (Section 8.3), creativity – the generation of new forms – has been recognized in the systems view of life as a key property of all living systems. Life continually reaches out to create novelty.

This systemic understanding of development implies a sense of multifaceted unfolding; of living organisms, ecosystems, or human communities moving toward reaching their full potential. Most economists, by contrast, restrict the use of “development” to a single economic dimension, usually measured in terms of per capita GDP. The huge diversity of human existence is compressed into this linear, quantitative concept and then converted into monetary coefficients.

The economist Paul Ekins (1992) has summarized the concept of economic development, as it is presently played out on the world stage, in terms of three basic characteristics: it is economicistic, Northern-oriented, and top-down. Development, Ekins points out, is a fairly recent economic concept. Before World War II, no one would have thought of development as an economic category. But from the second half of the twentieth century, it has been used almost exclusively in the narrow economic sense. The entire world is arbitrarily categorized into “developed,” “developing,” and “less developed” countries, like in a football league, according to a single economic dimension. Development is measured only in terms of money and cash flows, ignoring all other forms of wealth – all ecological, social, and cultural assets.

Moreover, this economic “league table” is arranged according to Northern criteria. Countries considered as developed are those that have adopted the Northern industrial way of life. This makes development a Northern, profoundly monocultural concept: to be a developing country means to succeed in the aspiration of becoming more like the North. And finally, economic development is a top-down process. Decisions and control rest firmly in the hands of experts, managers of international capital, bureaucrats of state governments, and global financial institutions like the World Bank and the International Monetary Fund (IMF).

The linear, one-dimensional view of economic development, as used by most mainstream and corporate economists, and by most politicians, corresponds to the narrow quantitative concept of economic growth, while the biological and ecological sense of development corresponds to the notion of qualitative growth. In fact, the biological concept of development includes both quantitative and qualitative growth.

A developing organism, or ecosystem, grows according to its stage of development. Typically, a young organism will go through periods of rapid physical growth. In ecosystems, this early phase of rapid growth is known as a pioneer ecosystem, characterized by rapid expansion and colonization of the territory. The rapid growth is always followed by slower growth, by maturation, and ultimately by decline and decay, or, in ecosystems, by so-called succession (see Section 16.1). As living systems mature, their growth processes shift from quantitative to qualitative growth.

The distinction between the biological and the current economic sense of “development,” and the association of qualitative economic growth with the former and purely quantitative growth with the latter, help to clarify the widely used but problematic concept of “sustainable development.” If “development” is used in the current narrow economic sense, associated with the notion of unlimited quantitative growth, such economic development can never be sustainable, and the term “sustainable development” would thus be an oxymoron. If, however, the process of development is understood as more than a purely economic process, including social, ecological, cultural, and spiritual dimensions, and if it is associated with qualitative economic growth, then such a multidimensional systemic process can indeed be sustainable.

Such a broad, alternative view of development is advocated today by a number of scholars and activists, who see development as a creative process of increasing one’s capabilities – as characteristic of all life – which requires, first and foremost, control over local resources (see Escobar, 1995; Esteva and Prakash, 1998; W. Sachs, 1992). In this view, development is not purely an economic process, but includes social, ecological, cultural, and ethical dimensions. It is a multidimensional and systemic process, in which the primary actors of development are the institutions of civil society – the NGOs based on kin, neighborhood, or common interests.

Because people are different and the places in which they live are different, we can expect development to produce cultural diversity of all kinds. The processes whereby it happens will be very different from the current global trading system. It will be based on the mobilization of local resources to satisfy local needs, and informed by the values of human dignity and ecological sustainability. Such truly sustainable development is based on the recognition that we are an inseparable part of the web of life, of human and nonhuman communities, and that enhancing the dignity and sustainability of any one of them will enhance all the others.

17.2.3 Qualifying economic growth

Let us now return to the central challenge of our economic and ecological crisis. How can we transform the global economy from a system striving for unlimited quantitative growth, which is manifestly unsustainable, to one that is ecologically sound and socially just? The concept of qualitative economic growth will be a crucial tool in this task. Instead of assessing the state of the economy in terms of the crude quantitative measure of GDP, we need to distinguish between “good” growth and “bad” growth and then increase the former at the expense of the latter, so that the natural and human resources tied up in wasteful and unsound production processes can be freed and recycled as resources for efficient and sustainable processes. A first step in this direction was the “Beyond GDP” conference in the European Parliament in November 2007, spearheaded by the European Commission together with the Club of Rome, the Organization for Economic Cooperation and Development (OECD), and the World Wildlife Fund (WWF) (see www.beyond-gdp.eu).

From the ecological point of view, the distinction between “good” and “bad” economic growth is obvious. Bad growth is growth of production processes and services that externalize social and environmental costs, are based on fossil fuels, involve toxic substances, deplete our natural resources, and degrade the Earth’s ecosystems. Good growth is growth of more efficient production processes and services that fully internalize costs and involve renewable energies, zero emissions, continual recycling of natural resources, and restoration of the Earth’s ecosystems.

Since their initial 2007 conference, the “Beyond GDP” partners have continued to work on a road map for qualifying economic growth. Many of the suggested reforms will involve shifts of perception from a product orientation to a service orientation and the “dematerializing” of our productive economies. For example, an automobile company should realize that it is not necessarily in the business of selling cars but rather in the business of providing mobility, which can also be achieved, among many other things, by producing more buses and trains and by redesigning our cities. Similarly, countries, and especially the USA, should realize that fighting climate change is today’s most important and most urgent security issue. The US government should reduce the Pentagon’s budget accordingly, while increasing funds for diplomacy, mitigating climate-related threats to global security, and building a new “green” economy.

17.2.4 From materialism to community

The shift from quantitative to qualitative growth will require deep changes not only at the social and economic levels, but also at the individual level. It will mean overcoming the pervasive cultural conditioning of materialism and turning from finding satisfaction in material consumption to finding it in human relationships and community. For most of us, this value shift is anything but easy, as we are bombarded daily with a stream of advertising messages assuring us that the accumulation of material goods is the royal road to happiness, the very purpose of our lives (see Dominguez and Robin, 1999).

The USA projects its tremendous power around the world to maintain optimal conditions for the perpetuation and expansion of production. The central goal of its vast empire – its overwhelming military might, impressive range of intelligence agencies, and dominant positions in science, technology, media, and entertainment – is not to expand its territory, nor to promote freedom and democracy, but to make sure that it has global access to natural resources and that markets around the world remain open to its products (Ramonet, 2000). Accordingly, political rhetoric in America moves swiftly from “freedom” to “free trade” and “free markets.” The free flow of capital and goods is equated with the lofty ideal of human freedom, and material acquisition is portrayed as a basic human right, and increasingly even as an obligation.

This glorification of material consumption has deep ideological roots that go far beyond economics and politics. Its origins seem to lie in the universal association of manhood with material possessions in patriarchal cultures. The anthropologist David Gilmore studied images of manhood around the world – “male ideologies,” as he puts it – and found

striking cross-cultural similarities (Gilmore, 1990, p. 2). There is a recurring notion that “real manhood” is different from simple biological maleness, that it is something that has to be won. In most cultures, Gilmore shows, boys “must earn the right” to be called men. Although women, too, are judged by sexual standards that are often stringent, Gilmore notes that their very status as women is rarely questioned. Curiously, however, Gilmore does not mention the fact, widely discussed in feminist literature, that there is no need for women to prove their womanhood, because of their ability to give birth, which was perceived as an awesome, transformative power in pre-patriarchal cultures (see Rich, 1977).

In addition to well-known images of manliness like physical strength, toughness, and aggression, Gilmore found that in culture after culture, “real” men have traditionally been those who produce more than they consume. The author emphasizes that the ancient association of manhood with material production meant production on behalf of the community: “Again and again we find that ‘real’ men are those who give more than they take; they serve others. Real men are generous, even to a fault.” (Gilmore, 1990, p. 15). Over time, there was a shift in this image, from production for the sake of others to material possession for the sake of one’s self. Manhood was now measured in terms of ownership of valuable goods – land, cattle, or cash – and in terms of power over others, especially women and children. This image was reinforced by the universal association of virility with “bigness” – as measured in muscle strength, accomplishments, or number of possessions. In modern society, Gilmore points out, male “bigness” is measured increasingly by material wealth: “The Big Man in any industrial society is also the richest guy on the block, the most successful, the most competent . . . He has the most of what society needs or wants.”

The association of manhood with the accumulation of possessions fits well with other values that are favored and rewarded in patriarchal culture – expansion, competition, and an “object-centered” consciousness. In traditional Chinese culture, these were called *yang* values and were associated with the masculine side of human nature. They were not seen as being intrinsically good or bad. However, according to Chinese wisdom, the *yang* values need to be balanced by their *yin*, or feminine, counterparts – expansion by conservation, competition by cooperation, and the focus on objects by a focus on relationships. As one of us (F.C.) has long argued, the movement toward such a balance is very consistent with the shift from mechanistic to systemic and ecological thinking that is characteristic of our time (Capra 1982, 1996).

The values of conservation, cooperation, and community are promoted today by many grass-roots movements and organizations in the new global civil society (see Section 17.4). Among them, the feminist movement and the ecology movement advocate the most profound value shifts, the former through a redefinition of gender relationships, the latter through a redefinition of the relationship between humans and nature. Both movements could contribute significantly to overcoming our culture’s glorification of material consumption.

By challenging the patriarchal order and value system, the women’s movement has introduced a new understanding of masculinity and personhood that does not need to associate manhood with material possessions. At the deepest level, feminist awareness is

based on women's experiential knowledge that all life is connected, that our existence is always embedded in the cyclical processes of nature (see Spretnak, 1981). Feminist consciousness, accordingly, focuses on finding fulfillment in nurturing relationships rather than in the accumulation of material goods.

The ecology movement arrives at the same position from a different approach. Ecological literacy requires systemic thinking, which includes a shift of perspective from objects to relationships (see Section 4.3), and ecodesigners advocate a transition from an economy of goods to an economy of "service and flow," as we shall discuss in our last chapter. In such an economy, matter cycles continually, so that the net consumption of raw materials is drastically reduced.

Thus the rise of feminist awareness and the movement toward ecological sustainability could combine to bring about a profound change of thinking and values – from linear systems of resource extraction and accumulation of products and waste to cyclical flows of matter and energy; from the focus on objects and natural resources to a focus on services and human resources; from seeking happiness in material possessions to finding it in nurturing relationships. In the eloquent words of the biologist and environmental activist David Suzuki:

Family, friends, community – these are the sources of the greatest love and joy we experience as humans. We visit family members, keep in touch with favourite teachers, share and exchange pleasantries with friends. We undertake difficult projects to help others, save frogs or protect a wilderness, and in the process discover extreme satisfaction. We find spiritual fulfillment in nature or by helping others. None of these pleasures requires us to consume things from the Earth, yet each is deeply fulfilling. These are complex pleasures, and they bring us much closer to real happiness than the simple ones, like a bottle of Coke or a new minivan.

(Suzuki and Dressel, 1999, pp. 263–4)

These reflections testify to the important role of community in our task of creating a sustainable future. As we discussed in Section 16.3, building and nurturing community lies at the core of ecological sustainability, and community is also the most effective antidote against excessive material consumption. As Suzuki and Dressel point out in the passage quoted above, the happiness we derive from being an active member of a community – human or ecological – ultimately gives us a sense of spiritual fulfillment. indeed, the exhortation of a value shift from material consumption to human relationships and community can be found in the teachings of many spiritual traditions. The Dalai Lama (2000) expressed it beautifully:

All sentient beings seek happiness. They all want to overcome pain and suffering at the sensory level. Human desires and goals come not only from sensory experience but also from pure imagination. This creates a mental level of pleasure and pain beyond the sensory. Material fulfillment – money, material goods, and so on – gives us satisfaction at the sensory level. But at the mental level, at the level of our imagination and desires, we need another kind of satisfaction which the physical level cannot provide. Material comfort alone is not an answer for humanity. I have met many people who live in great material comfort and yet are full of anxiety; and they tell me about their many problems.

The counter force to this mental disturbance is loving kindness. Human affection, caring, a sense of responsibility, and a sense of community – that is spirituality.

17.3 The networks of global capitalism

Let us now return to the impact of unrestricted, undifferentiated economic growth, and specifically to global capitalism, the dominant economic system today, which is the main driving force of economic and corporate growth. This new type of capitalism is profoundly different from the one formed during the Industrial Revolution (see Section 3.3) and from the Keynesian capitalism that was the dominant economic model for several decades after World War II (see Section 3.4).

The new capitalism, which emerged from the information technology revolution during the past three decades, is characterized by three fundamental features. Its core economic activities are global; the main sources of productivity and competitiveness are knowledge generation and information processing; and it is structured largely around networks of financial flows. This new global capitalism is also referred to as “the new economy,” or simply as “globalization.” Because of the global networks of informational and financial flows that form its very core, it is especially interesting to analyze the new global economy from a systemic perspective. To do so, we shall begin with a brief review of various aspects of globalization.

17.3.1 Understanding globalization

During the last decade of the twentieth century, a recognition grew among entrepreneurs, politicians, social scientists, community leaders, grass-roots activists, artists, cultural historians, and ordinary women and men from all walks of life that a new world was emerging – a world shaped by new technologies, new social structures, a new economy, and a new culture. “Globalization” became the term used to summarize the extraordinary changes and the seemingly irresistible momentum that were felt by millions of people.

Indeed, within a few years we became quite used to many facets of globalization. We rely on global communications networks for news, sports, and cultural events; we routinely use the Worldwide Web as a global information system; and through a variety of social networks we can enjoy staying in touch with friends around the world on a daily basis. Within the context of this section, however, we shall concentrate on the new global economy whose impact on our well-being has been much more problematic.

With the creation of the World Trade Organization (WTO) in the mid 1990s, economic globalization, characterized by “free trade,” was hailed by corporate leaders and politicians as a new order that would benefit all nations, producing worldwide economic expansion whose wealth would “trickle down” to all. However, it soon became apparent to increasing numbers of environmentalists and grass-roots activists that the new economic rules established by the WTO were manifestly unsustainable and were producing a multitude of interconnected fatal consequences – social disintegration, a breakdown of democracy,

more rapid and extensive deterioration of the environment, a series of financial crises, and increasing poverty and alienation.

In 1996, two books were published that provided the first systemic analyses of economic globalization. They were written in very different styles and their authors followed very different approaches, but their starting point was the same – the attempt to understand the profound changes brought about by the combination of extraordinary technological innovation and global corporate reach.

The Case Against the Global Economy is a collection of essays by more than forty grass-roots activists and community leaders, edited by Jerry Mander and Edward Goldsmith, and published by the Sierra Club, one of the oldest and most respected environmental organizations in the USA (Mander and Goldsmith, 1996). The authors of this book represent cultural traditions from many countries around the world. Most of them are well known among social-change activists. Their arguments are passionate, distilled from the experiences of their communities, and aimed at reshaping globalization according to different values and different visions. *The Rise of the Network Society* by Manuel Castells, professor of communication technology and society at the University of Southern California, is a brilliant analysis of the fundamental processes underlying economic globalization, published by Blackwell, one of the largest academic publishers (Castells, 1996).

During the years following the publication of these two books, some of the authors of *The Case Against the Global Economy* formed the International Forum on Globalization, a nonprofit organization that holds teach-ins on economic globalization in several countries. In 1999, these teach-ins provided the philosophical background for the worldwide coalition of grass-roots organizations that successfully blocked the meeting of the World Trade Organization in Seattle and made its opposition to the WTO's policies known to the world (see Section 17.4).

On the theoretical front, Manuel Castells published two further books to complete a series of three volumes on *The Information Age: Economy, Society and Culture* (Castells, 1997, 1998). This trilogy is a monumental work, encyclopedic in its rich documentation, which the sociologist Anthony Giddens (1996) has compared to Max Weber's *Economy and Society*, written almost a century earlier.

Castells' thesis is wide-ranging and illuminating. His central focus is on the revolutionary information and communication technologies that emerged during the last three decades of the twentieth century. As the Industrial Revolution gave rise to "industrial society," so the new information technology revolution is now giving rise to an "informational society." And since information technology has played a decisive role in the rise of networking as a new form of organization of human activity in business, politics, the media, and NGOs, Castells also calls the informational society the "network society" (see Section 14.4).

During the first decade of our new century, the attempts of scholars, politicians, and community leaders to understand the nature and consequences of globalization have continued and intensified (Cavanagh and Mander, 2004; Grewal, 2008; Hutton and Giddens, 2000). In the following pages, we shall synthesize the main ideas about economic globalization

from the publications mentioned above. Applying our systemic perspective, we shall try to show how the rise of globalization has proceeded through a process that is characteristic of all human organizations – the interplay between designed and emergent structures (see Section 14.5).

17.3.2 The information technology revolution and the birth of global capitalism

The common characteristic of the multiple aspects of globalization is a global information and communications network based on revolutionary new technologies. The information technology revolution is the result of a complex dynamic of technological and human interactions, which produced synergistic effects in three major areas of electronics – computers, microelectronics, and telecommunications. The key innovations that created the radically new electronic environment of the 1990s all took place twenty years earlier, during the 1970s.

All these measures relied crucially on the new information and communication technologies, which made it possible to transfer funds between various segments of the economy and various countries almost instantly and to manage the enormous complexity brought about by rapid deregulation and new financial ingenuity. In the end, the information technology revolution helped to give birth to a new global economy – a rejuvenated, flexible, and greatly expanded capitalism.

17.3.3 Casino finance

In the new economy, capital works in real time, moving rapidly through global financial networks. From these networks it is invested in all kinds of economic activity, and most of what is extracted as profit is channeled back into the meta-network of financial flows. Sophisticated information and communication technologies enable financial capital to move rapidly from one option to another in a relentless global search for investment opportunities. Profit margins are generally much higher in the financial markets than in most direct investments; hence all flows of money ultimately converge in the global financial networks in search of higher gains.

The dual role of computers as tools for rapid processing of information and for sophisticated mathematical modeling has led to the virtual replacement of gold and paper money by ever more abstract financial products. These include “future options” (financial gains in the future, as anticipated by computer projections), “hedge funds” (high-risk investment funds that are used to buy and sell huge amounts of currencies within minutes to profit from tiny margins), and “derivatives” (packages of diverse funds, representing collections of actual or potential financial values). The end result of all these technological and financial innovations has been the transformation of the global economy into a giant, electronically operated casino. Here is how Castells (1996, pp. 434–5) describes the operations of these new financial markets, which have since become known as “casino finance”:

The same capital is shuttled back and forth between economies in a matter of hours, minutes, and sometimes seconds. Favored by deregulation . . . and the opening of domestic financial markets, powerful computer programs and skillful financial analysts/computer wizards sitting at the global nodes of a selective telecommunications network play games, literally, with billions of dollars . . . These global gamblers are not obscure speculators, but major investment banks, pension funds, multinational corporations . . . and mutual funds organized precisely for the sake of financial manipulation.

At the existential human level, the most alarming feature of the new economy may be that it is shaped in very fundamental ways by machines. The “global market,” strictly speaking, is not a market at all but a network of machines programmed according to a single value – moneymaking for the sake of making money – to the exclusion of all other values. In other words, the global economy has been designed in such a way that all ethical dimensions are excluded. However, the same electronic networks of financial and informational flows *could* have other values built into them. The critical issue is not technology, but politics and human values. And human values can change; they are not natural laws.

The process of economic globalization was purposefully designed by the leading capitalist countries (the “G7 nations”), the major transnational corporations, and by global financial institutions that were created for that purpose (see Mander, 2012). The most important of these financial institutions are the World Bank, the IMF, and the WTO. They are known collectively as the “Bretton Woods” institutions because they were established at a UN conference in Bretton Woods, New Hampshire, in 1944, in order to create an institutional framework for a coherent worldwide post-war economy.

The World Bank was originally created to finance the postwar reconstruction of Europe, and the IMF to ensure the stability of the international financial system. However, both institutions soon shifted their focus to promoting and enforcing a narrow model of economic development in the Third World, often with disastrous social and environmental consequences (see Sections 17.3.4 and 17.3.5). The ostensible role of the WTO is to regulate trade, prevent trade wars, and protect the interests of poor nations. In reality, the WTO implements and enforces globally the same agenda that the World Bank and the IMF have imposed on most of the developing world.

In spite of the stringent rules established by the Bretton Woods institutions, the process of economic globalization has been far from smooth. Once the global financial networks reached a certain level of complexity, their nonlinear interconnections generated rapid feedback loops that gave rise to many unsuspected emergent phenomena. The resulting new economy is so complex and turbulent that it defies analysis in conventional economic terms. Thus Anthony Giddens admitted in 2000, when he was the director of the prestigious London School of Economics, “The new capitalism that is one of the driving forces of globalization to some extent is a mystery. We don’t fully know as yet just how it works” (in Hutton and Giddens, 2000, p. 10).

In the global casino, the financial flows do not follow any market logic. The markets are continually manipulated and transformed by computer-enacted investment strategies, subjective perceptions of influential analysts, political events in any part of the world, and – most significantly – unsuspected turbulences caused by the complex interactions of

capital flows in this highly nonlinear system. These largely uncontrolled turbulences are as important in setting prices and market trends as are the traditional forces of supply and demand.

Global currency markets alone involve the daily exchange of over \$3 trillion, and since these markets largely determine the value of any national currency, they contribute significantly to the inability of governments to control economic policy. As a result, the 1990s saw a series of severe financial crises, from Mexico (1994) to the Asian Pacific (1997), Russia (1998), and Brazil (1999). These crises made evident that the financial networks of the new economy are inherently unstable. They produce random patterns of informational turbulence that may destabilize any company, as well as entire countries or regions, regardless of their economic performances.

In the subsequent years, the global financial institutions were able to prevent further crises for almost a decade by making certain structural adjustments to the markets. At the same time, the global economy became ever more interconnected and its financial products ever more abstract; and in 2008 the system spun out of control again, and this time on a global scale.

The worldwide financial crisis and recession of 2008/9 was brought about by Wall Street bankers through a combination of greed, incompetence, and weaknesses inherent in the system (see Heinberg, 2011; Kroft, 2008). It began as a mortgage crisis, caused by the reckless marketing of risky “subprime” loans; then it slowly evolved into a credit crisis; and finally it became a full-blown global financial crisis.

During the mortgage crisis, the big Wall Street investment houses bought up millions of the least dependable mortgages, chopped them up into tiny bits and pieces, and repackaged them as exotic investment securities that hardly anyone could understand. For this repackaging they collected enormous fees. The complexity of these financial instruments lies at the heart of the credit crisis. Nobody knew exactly what they were made of, nor how they would behave.

These complex financial instruments were actually designed by mathematicians and physicists who used computer models to reconstitute the unreliable loans in ways that were supposed to eliminate most of the risks. But their models turned out to be wrong, because physicists and mathematicians are not experts in human behavior, and human behavior cannot be modeled mathematically.

The next phase of the credit crisis involved the creation of so-called credit default swaps (CDSs) that hid the risks until it was too late to do anything about them. CDSs are essentially side bets on the performance of the US mortgage markets and the solvency of some of the biggest financial institutions in the world; this is a form of legalized gambling that allows one to wager on financial outcomes without having to buy the stocks and mortgages.

With their massive sales of CDSs to mortgage investors, the investment banks created a huge, unregulated market that multiplied their losses. When homeowners began to default on their mortgages and Wall Street’s high-risk securities also began to fail, the big investment houses and insurance companies who sold the CDSs had not set aside the money to pay all the insurance contracts they had written. This brought down three of the biggest firms

on Wall Street (Bear Stearns, Lehmann Brothers, and AIG) and threatened all the others. At this point, the US government stepped in with a set of gigantic bailout packages for the largest Wall Street banks and insurance agencies, using American taxpayers' money to cover the losses of these private businesses, which were considered to be "too big to fail." Soon after receiving their loans and guarantees, the Wall Street banks continued to pay their top executives exorbitant bonuses.

In the new global capitalism, ethical considerations have been systematically excluded, whether they are about human rights, protecting the environment for future generations, or even the basic integrity of doing business honestly. The focus is now exclusively on making money, and the scale of personal rewards on Wall Street is so enormous at the top that greed has eclipsed all considerations of fairness and integrity.

In recent years, so many unethical practices have come to light that all trust and confidence have collapsed. In fact, during the credit crisis of 2008/9, this breakdown of trust was so complete that even the most reputable financial institutions would not lend to each other at all or, at best, just overnight. As a consequence, the money markets that banks organize between themselves completely froze. Credit – the very lifeblood of the economy – dried up, and panic ensued.

The most recent financial scandal, known as the LIBOR scandal, is also by far the largest, affecting payments on financial instruments worth trillions of dollars. It involved widespread rigging of key interest rates – used to determine the London Interbank Offered Rate (LIBOR) – for personal gain by traders at Barclays and several other major banks. In an exposé titled "The Rotten Heart of Finance," *The Economist* (July 7, 2012) noted that this huge global scandal "corrodes further what little remains of public trust in banks and those who run them".

During the last two decades, several authors have pointed out that our global economic system is still poorly understood and susceptible to severe destabilizing turbulences. But it seems that none of them could predict the scale of the system's collapse we recently witnessed on Wall Street. Nor do we know what may still be in store. Complexity theory tells us that, in highly nonlinear systems, small perturbations may give rise to dramatic and unpredictable changes. The current widespread anxiety about the global economy is based on such fears.

Indeed, it did not take long for the effects of the Wall Street crisis to reverberate throughout Europe, Asia, and the Middle East. The Eurozone countries and the UK experienced a dramatic slowing of growth; some Asian countries saw significant slowdowns, and by May 2009 the Arab world had lost an estimated \$3 trillion due to the crisis – partly from a crash in oil prices. One year later, Greece faced a government debt crisis that threatened the economic integrity of the EU, with Ireland, the UK, Spain, and Portugal being the countries most at risk of losing their investors' faith (Heinberg, 2011). Today, the inherent instability of the global economy, due to its recurrent and largely uncontrolled turbulences, is evident to all.

It is interesting to apply the systemic understanding of life to the analysis of this phenomenon. The new economy consists of a global meta-network of complex technological

and human interactions, involving multiple feedback loops operating far from equilibrium, which produce a never-ending variety of emergent phenomena. Its creativity, adaptability, and cognitive capabilities are certainly reminiscent of living networks. However, it does not display the stability that is also a key property of life. The information circuits of the global economy operate at such speed and use such a multitude of sources that they constantly react to a flurry of information, and thus the system as a whole is generating turbulences that are exceedingly difficult to control.

Living organisms and ecosystems, too, may become continually unstable, but if they do, they will eventually disappear because of natural selection, and only those systems that have stabilizing processes built into them will survive. In the human realm, corresponding regulatory mechanisms will have to be introduced into the global economy through appropriate financial policies, as we discussed in Section 17.2.3.

17.3.4 The social impact of economic globalization

In his trilogy on the Information Age, Manuel Castells provides a detailed analysis of the social and cultural impacts of global capitalism. He describes in particular how the new “network economy” has profoundly transformed the social relationships between capital and labor. In the global economy, money has become almost entirely independent of production and services by escaping into the virtual reality of electronic networks. Capital is global at its core, while labor, as a rule, is local. Thus, capital and labor increasingly exist in different spaces and times: the virtual space of financial flows and the real space of the local and regional places where people are employed; the instant time of electronic communications and the biological time of everyday life (Castells, 1996).

Economic power resides in the global financial networks, which determine the fate of most jobs, while labor remains locally constrained in the real world. Thus labor has become fragmented and disempowered. Many workers today, whether unionized or not, will not fight for higher wages or better working conditions out of fear that their jobs will be moved abroad.

As more and more companies restructure themselves as decentralized networks – networks of smaller units which, in turn, are linked to networks of suppliers and subcontractors – workers are employed increasingly through individual contracts, and thus labor is losing its collective identity and bargaining power. Indeed, in the new economy traditional working-class communities have all but disappeared.

Castells points out that it is important to distinguish between two kinds of labor. Unskilled, “generic” labor is not required to access information and knowledge beyond the ability to understand and execute orders. In the new economy, masses of generic workers move in and out of a variety of jobs. They may be replaced at any moment, either by machines or by generic labor in other parts of the world, depending on the fluctuations in the global financial networks.

“Self-educated” labor, by contrast, has the capacity to access higher levels of education, to process information, and to create knowledge. In an economy where information

processing, innovation, and knowledge creation are the main sources of productivity, these self-educated workers are highly valued. Companies would like to maintain long-term, secure relationships with their core workers, so as to retain their loyalty and make sure that their tacit knowledge is passed on within the organization.

As incentive to stay on, such workers are increasingly offered stock options in addition to their basic salaries, which gives them a stake in the value created by the company. This has further undermined the traditional class solidarity of labor.

Economic inequality

Because of the fragmentation and individualization of labor and of the gradual dismantling of the welfare state under the pressures of economic globalization, the rise of global capitalism has been accompanied by rising social inequality and polarization (Castells, 1998). The gap between the rich and the poor has grown significantly, both internationally and within countries. According to the UN Human Development Report (UNDP), the difference in per capita income between the North and South tripled from \$5,700 in 1960 to \$15,000 in 1993. The richest 20% of the world's people now own 85% of its wealth, while the poorest 20% (who account for 80% of the total world population) own just 1.4% (UNDP, 1996). The assets of the three richest people in the world alone exceed the combined GNP of the least developed countries and their 600 million people (UNDP, 1999).

Within countries, the USA has by far the highest level of inequality among the advanced industrial countries. As the economist Joseph Stiglitz documents in great detail in his eye-opening book *The Price of Inequality*, America had been growing apart at an increasingly rapid rate already before the recent financial crisis (Stiglitz, 2012). During the last three decades, the bottom 90% have seen their income grow by only 15%, while that of the top 1% has grown by about 150%, and that of the top 0.1% by more than 300%.

By 2007, the year before the crisis, the income of the top 0.1% of US households was 220 times larger than the average income of the bottom 90%. Wealth was distributed even more unequally than income, with the wealthiest 1% owning more than a third of the nation's wealth.

The financial crisis exacerbated these inequalities in many ways. The wealthy lost more in stock market values, but those recovered relatively fast. In fact, the "recovery" since the recession overwhelmingly benefited the wealthiest Americans, the top 1% gaining 93% of the additional income created in the country in 2010, while almost one out of six Americans (and almost a quarter of American children) were left in poverty, and economic insecurity threatened many in the working and middle classes whose jobs, retirement incomes, and homes were all at risk.

CEOs, on the other hand, were remarkably successful in maintaining their high pay. By 2010, the ratio between their annual compensation and that of the typical worker was back to where it had been before the crisis – a shocking 243 to 1. This gap between CEO pay and that of the typical worker is far higher in America than in other countries. In Japan, for example, it is 16 to 1. Here is how Stiglitz (2012, p. 7) sums up the situation:

The simple story of America is this: the rich are getting richer, the richest of the rich are getting still richer, the poor are becoming poorer and more numerous, and the middle class is being hollowed out. The incomes of the middle class are stagnating or falling, and the difference between them and the truly rich is increasing.

These rapidly increasing inequalities were brought about not only by the rise of global capitalism, but also – and perhaps even more – by specific government policies – tax cuts for the very rich, favorable tax rulings for keeping money offshore, deregulation, union busting, and favorable conditions for massive stock options for CEOs. The result has been a systematic transfer of wealth from the poor to the rich. As Stiglitz explains (p. 32), “there are two ways to become wealthy: to create wealth or to take wealth away from others,” and in the USA much of the wealth at the top stems from wealth transfers instead of wealth creation.

Breakdown of democracy

Growing economic inequality is accompanied by growing imbalance of political power, as the super-rich – 400 billionaires with well over \$1 trillion of net worth between them – have increasingly taken over the American political system. In a vicious circle (or self-amplifying feedback loop) between politics and economics, super-rich donors and big lobbies finance all the important electoral campaigns in exchange for favorable policies that further increase their wealth, leading to even larger campaign contributions, followed by yet more favorable financial policies and greater corporate influence on the political process (Sachs, 2011).

Indeed, the key policies of the first Obama administration were shaped significantly by corporate interests. Big Oil and Big Coal completely silenced the president and his secretary of energy (a physics Nobel Laureate) on the critical issue of climate change and prevented the US Senate from even discussing an appropriate climate and energy policy. The private health insurance industry forced the administration to exclude a national, “single-payer,” healthcare system from all discussions of healthcare reform; and the military-industrial complex has steered American foreign policy to a remarkable extent (Sachs, 2011).

The Occupy Movement

By 2011, it had become abundantly clear that the global financial crisis and subsequent recession had perpetuated and even aggravated the economic inequalities created by global capitalism around the world. And suddenly, people all over the world began to rise up and forcefully expressed their outrage. The rapid spread of these popular and largely leaderless uprisings, as well as their mutual declarations of solidarity, were guided by the vast array of social media that have become critical political tools for communities and organizations in our age of globalization.

The uprisings began with a youth movement in Tunisia in December 2010, which spread to nearby Egypt and then to other countries in the Middle East, growing into huge social movements against the region’s dictators that became known collectively as the Arab Spring. The protests in Cairo’s Tahrir Square in January and February 2011, kept alive

by hundreds of thousands for almost three weeks, provided the model of the occupation of public squares and buildings that inspired the concurrent occupation of the capitol of the US state of Wisconsin by tens of thousands protesting against antiunion legislation; the mass movement of *los indignados* (“the indignant,” or “outraged”) in Spain during the subsequent May and June; and finally the “Occupy Wall Street” movement, which began in September 2011 with the occupation of Zuccotti Park in New York’s financial district and subsequently gave rise to the broader “Occupy Movement” in the USA and around the world (see van Gelder, 2011).

The specific grievances of these uprisings varied from country to country; those in the Middle East, in particular, were very different from the grievances in the West. However, as Joseph Stiglitz (2012) points out, there were some shared themes – a common understanding that in all those countries the economic and political systems had failed and were fundamentally unfair. Occupy Wall Street identified the essence of this feeling with the brilliant slogan “We are the 99%,” which quickly caught on in the media and decisively shaped the American political dialogue. Soon government agencies, think tanks, and the media confirmed with numerous statistics that the super-rich, the “1%,” indeed enjoyed high and unjustified levels of inequality; and even though the numbers of actual protesters were relatively small, two-thirds of the American public said that the Occupy Movement expressed their values and that they supported it.

During the winter of 2011–12, the visibility of the Occupy Movement diminished, partly because of the winter cold and of some internal fragmentation, but mostly because of concerted, often brutal, and seemingly nationally coordinated police repression (see La Botz *et al.*, 2012). At this time of writing, one year after the occupation of Zuccotti Park, the further evolution of the Occupy Movement is unclear. However, even at this stage of transition, the achievements of the movement are substantial. By highlighting the contrast between the 1% and the 99%, it has refocused the American political debate, made economic inequality a central theme in the 2012 presidential election, and brought about new political alliances. To quote Joseph Stiglitz once more, “The ‘99 percent’ marks an attempt to forge a new coalition – a new sense of national identity, based not on the fiction of a universal middle class but on the reality of the economic divides within our economy and our society.”

17.3.5 The ecological impact

According to the doctrine of economic globalization – known as “neoliberalism,” or “the Washington consensus” – the free-trade agreements imposed by the WTO on its member countries (see Section 17.3.3) will increase global trade; this will create a global economic expansion; and global economic growth will decrease poverty, because its benefits will eventually “trickle down” to all. As political and corporate leaders like to say, the rising tide of the new economy will lift all boats.

The analysis by Manuel Castells (1996) shows clearly that this reasoning is fundamentally flawed. Global capitalism does not alleviate poverty and social exclusion; on

the contrary, it exacerbates them. The Washington consensus has been blind to this effect because corporate economists have traditionally excluded the social costs of economic activity from their models (see Section 3.5). Similarly, most conventional economists have ignored the new economy's environmental cost – the increase and acceleration of global environmental destruction, which is as severe, if not more so, than its social impact.

As we discussed in Section 17.2, the central enterprise of current economic theory and practice – the striving for continuing, undifferentiated economic growth – is clearly unsustainable. Indeed, since the turn of this century it has become abundantly clear that our economic activities are harming the biosphere and human life in ways that may soon become irreversible (see Brown, 2008, 2009, 2011). In this precarious situation, it is paramount for humanity to systematically reduce our impact on the natural environment. As Al Gore (then a US senator) declared courageously in 1992, “We must make the rescue of the environment the central organizing principle for civilization” (Gore, 1992, p. 269).

Unfortunately, instead of following this admonition, global capitalism has significantly increased our harmful impact on the biosphere. In *The Case Against the Global Economy* (see Section 17.3.1), the late Edward Goldsmith, founding editor of the pioneering European environmental journal *The Ecologist*, gave a succinct summary of the environmental impact of economic globalization (Goldsmith, 1996). He illustrated how the increase of environmental destruction may be linked to increasing economic growth with the examples of South Korea and Taiwan. During the 1990s, both countries achieved stunning rates of growth and were held up as economic models for the Third World by the World Bank. At the same time, the resulting environmental damage was devastating.

In Taiwan, for example, agricultural and industrial poisons severely polluted nearly every major river. In some places, the water was not only devoid of fish and unfit to drink but also was actually combustible. The level of air pollution was twice that considered harmful in the USA; cancer rates had doubled since 1965, and the country had the world's highest incidence of hepatitis. In principle, Taiwan could have used its new wealth to clean up its environment. However, competitiveness in the global economy is so extreme that environmental regulations were eliminated rather than strengthened in order to lower the costs of industrial production.

Resource depletion and environmental destruction

One of the tenets of neoliberalism is that poor countries should concentrate on producing a few special goods for export in order to obtain foreign exchange, and should import most other commodities. This emphasis on export has led to the rapid depletion of the natural resources required to produce export crops in country after country – diversion of fresh water from vital rice paddies to prawn farms; a focus on water-intensive crops, such as sugar cane, that result in dried-up river beds; conversion of good agricultural land into cash-crop plantations; and forced migration of large numbers of farmers from their lands. All over the world there are countless examples of how economic globalization is worsening environmental destruction (Goldsmith, 1996).

The dismantling of local production in favor of exports and imports, which is the main thrust of the WTO's free-trade rules, dramatically increases the distance "from the farm to the table." In the USA, the average ounce of food now travels more than 8,000 km (5,000 miles) before being eaten (Weber and Matthews, 2008), putting enormous stress on the environment. New highways and airports cut through primary forests; new harbors destroy wetlands and coastal habitats; and the increased volume of transport further pollutes the air and causes frequent oil and chemical spills. Studies in Germany have shown, moreover, that the contribution of nonlocal food production to climate change is between six and twelve times higher than that of local production, due to increased CO₂ emissions (Shiva, 2000).

As the ecologist and agricultural activist Vandana Shiva (2000, p. 112) points out, the impact of climate instability and ozone depletion is born disproportionately by the South, where most regions depend on agriculture and where slight changes in climate can totally destroy rural livelihoods. In addition, many transnational corporations use the free-trade rules to relocate their resource-intensive and polluting industries in the South, thus further worsening environmental destruction. The net effect, in Shiva's words, is that "resources move from the poor to the rich, and pollution moves from the rich to the poor."

The destruction of the natural environment in Third World countries goes hand in hand with the dismantling of rural people's traditional, largely self-sufficient ways of life, as American television programs and transnational advertising agencies promote glittering images of modernity to billions of people all over the globe without mentioning that the lifestyle of endless material consumption is utterly unsustainable. Edward Goldsmith (1996) estimated that, if all Third World countries were to reach the consumption level of the USA by the year 2060, the annual environmental damage from the resulting economic activities would be 220 times what it is today, which is not even remotely conceivable.

Since moneymaking is the dominant value of global capitalism, its representatives seek to eliminate environmental regulations under the guise of "free trade" wherever they can, lest these regulations interfere with profits. Thus the new economy causes environmental destruction not only by increasing the impact of its operations on the world's ecosystems but also by eliminating national environmental laws in country after country. In other words, environmental destruction is not only a side effect but also an integral part of the design of global capitalism.

Climate change

Among all the environmental problems engendered by global capitalism, climate change is by far the most dangerous, threatening the very existence of life as we know it on our planet. Climate change science is now a well-established scientific field with a history of several decades (see McKibben, 2012a). Its findings are unequivocal. The emissions of greenhouse gases due to human activities are now dangerously heating the planet. Climate scientists estimate that, to avoid an irreversible catastrophe, we need to cut global CO₂ emissions by 80% by 2020 (see Box 17.1). This will require decisive global action – "mobilizing to save civilization," as Lester Brown (2008) puts it.

Box 17.1

The basics of climate change science

When sunlight warms the surface of the Earth, a large portion of the reflected thermal radiation is absorbed by greenhouse gases in the atmosphere. In the early history of the planet, this “greenhouse effect” created the protective envelope in which life was able to unfold, and the giant feedback loops of the Gaia system maintained the Earth’s atmosphere at a stable temperature range, conducive to life (see Section 16.2.3).

Since the Industrial Revolution, however, human activities have generated excessive greenhouse gas emissions. Thus, excessive amounts of heat have been trapped by the greenhouse effect, resulting in the global warming of the Earth’s atmosphere beyond safe levels. The principal sources of human-induced greenhouse gases are the burning of fossil fuels and deforestation (CO₂ emissions), and the management of livestock (emissions of methane).

Warmer air means that there is more energy and more moisture in the atmosphere, and this can lead to a wide variety of consequences – floods, tornados, and hurricanes, but also droughts, heat waves, and wildfires. Indeed, during 2011 and 2012 we saw a whole series of climate catastrophes that are consistent with the predicted effects of global warming. Record heat waves in Pakistan, central Russia, and western Europe, triggering wildfires and droughts; mega-floods in Australia, Brazil, Sri Lanka, the Philippines, and South Africa, causing deluges and massive landslides; and the most deadly and destructive tornado season ever seen in North America.

Climate change science is highly complex, and exact predictions are very difficult. However, climate scientists have recently been able to identify some general patterns that seem to be consistent with the currently observed climate catastrophes. The most alarming discovery has been that human emissions of greenhouse gases have caused the Arctic to warm about twice as fast as the rest of the Northern Hemisphere, due to two unique feedback loops in the Arctic climate system. The first has been known for a long time. As the ice melts, it exposes the darker ocean underneath, which absorbs heat rather than reflecting it back into space, thus accelerating the ice melt.

The second feedback loop also has to do with the reflectivity, or “albedo,” of ice. Recent studies of Greenland’s ice sheet have revealed that its albedo gradually decreases as the ice warms, even before the actual melting. As ice crystals warm, they lose their jagged edges, becoming rounder and reflecting less light. Satellite data have shown a steady darkening of Greenland’s albedo from a July average of 74% in 2000 to less than 65% in 2011 (McKibben, 2012c). In addition, the ice sheet was darkened by soot from wildfires in Colorado and Siberia – themselves provoked by climate change. The net effect is a vicious circle similar to the one involved in the complete ice melt. Loss of albedo leads to greater absorption of heat, which in turn accelerates the melting.

An even more recent discovery concerns the surprising effects of the self-perpetuating Arctic ice melt on the climate of northern Europe and North America. The key phenomenon here is the north polar jet stream, a powerful air current that steers weather systems from west to east around the northern hemisphere. The current forms a boundary between adjacent air masses, separating cold and wet air to the north from warmer and drier air to the south. The path of the jet stream has a meandering shape with the meanders themselves propagating eastward.

In a recent paper, the climate scientists Jennifer Francis and Stephen Vavrus show how Arctic warming may be the cause of the extreme weather conditions now observed in formerly

temperate zones (Francis and Vavrus, 2012). The authors explain that the rapid warming of the Arctic has two distinct effects on the polar jet stream: it deepens the meanders, and it slows down their eastward progression. The steep meanders can drag severe ice and snow from the Arctic deep into southern regions and, conversely, may push hot and dry weather from the southern regions far to the north; and because of the meanders' slower progression, these extreme weather conditions – droughts or floods, for example – may be much more persistent than they used to be.

The world authority on the climate crisis is the Intergovernmental Panel on Climate Change (IPCC), a body of over 2,500 leading climate scientists. After 20 years of detailed studies and four unanimous reports, the IPCC has stated that it is “unequivocal” that the climate is changing and will continue to change, and that human generation of greenhouse gases is responsible for most changes since the 1950s (www.ipcc.ch).

The IPCC reports that the Earth's temperature has risen by 0.6 °C since 1970, and that dangerous climate change is considered inevitable beyond a rise of 2 °C. Concentrations of CO₂ in the atmosphere have been measured for the past 650,000 years, using air bubbles in Arctic ice. At no point before the industrial era did the CO₂ concentration exceed 300 parts per million (ppm). Current CO₂ concentration is 390 ppm and is increasing by about 2 ppm every year. Climate scientists estimate that, to avoid runaway climate change, we need to reduce CO₂ concentrations to a safe level of 350 ppm. This means that we need to cut global CO₂ emissions by 80% by 2020.

It is worth noting that the climate catastrophes experienced around the world during the past two years occurred with a temperature increase of less than 1 °C and with CO₂ concentrations of less than 400 ppm. Climate scientists predict that without dramatic action, we will reach up to 6 °C and up to 550 ppm by the end of the century.

So far, such decisive mobilization has not occurred, and the main stumbling block in one international climate conference after the other has been the government of the USA. As we have mentioned, the American oil and coal lobbies have effectively blocked all attempts by the president and the senate to develop a coherent climate and energy policy.

More than that, the fossil-fuel lobbies who are opposing climate-change legislation have financed sophisticated campaigns aimed at actively misleading the public about the nature and severity of the climate crisis. These campaigns are modeled on the disinformation campaigns of the tobacco industry. Their purpose is to systematically create doubt and confusion about the overwhelming scientific consensus concerning the threat of global warming (Oreskes and Conway, 2010). As a consequence, the American public remains largely ignorant about this vital issue.

The concerted obstruction of the fossil-fuel lobby is typical of big corporations in the global capitalist system, who always tend to put profits before ethical considerations. But this fact is not enough to explain their fierce and resourceful resistance against climate change legislation. As Bill McKibben, one of the most eloquent writers on global warming, points out in a recent article, titled “Global Warming's Terrifying New Math,” the predicament of the fossil-fuel industry is encapsulated in two important numbers (McKibben, 2012b).

The first number is 565 gigatons (billion metric tons). It is the amount of CO₂ we can still emit into the atmosphere by mid century while staying below a temperature increase of 2 °C (the limit beyond which climate change is likely to spin out of control). At the current rate of global annual emissions of about 32 gigatons, the limit of 565 gigatons would buy us only 17 years before global climate collapse.

If this number is frightening, the second number is even more scary, writes McKibben. It is the amount of carbon locked up in the proven oil and coal reserves of the fossil-fuel companies and oil producing states: 2,800 gigatons. This is the amount of fossil fuel these companies and states are currently planning to burn – and it is about five times more than the safe limit of 565 gigatons!

As McKibben explains, these 2,800 gigatons of carbon are technically still in the soil, but, economically, they are already above ground, since they are listed as assets on the balance sheets of their owners. They give the fossil-fuel companies their value, and they figure in the national budgets of oil-producing countries. If these companies were to admit that, in order to avoid total climate collapse, they can pump out no more than 20% of their reserves, their values would plummet. At today's market value, they would collectively lose \$20 trillion in assets.

This explains why Big Oil and Big Coal fight so hard against any restrictions on carbon emissions, even to the extent of systematically denying the science of climate change. As McKibben (2012b) concludes, “You can have a healthy fossil-fuel balance sheet, or a relatively healthy planet – but now that we know the numbers, it looks like you can't have both.”

17.4 The global civil society

During the last two decades, the new economy's social and ecological impacts have been discussed extensively by scholars and community leaders, as we have documented in the preceding pages (Section 17.3). Their analyses make it abundantly clear that global capitalism in its present form is unsustainable – socially, ecologically, and even financially – and needs to be fundamentally redesigned (Cavanagh and Mander, 2004; Hutton and Giddens, 2000; Mander, 2012; Mander and Goldsmith, 1996; Korten, 2001; Shiva, 2005).

17.4.1 Core values of human dignity and ecological sustainability

In any realistic discussion of how to redesign the global economy, it is useful to remember that the current form of economic globalization has been consciously designed and thus can be reshaped. As we have pointed out, the “global market” is really a network of machines programmed according to the fundamental principle that moneymaking should take precedence over any other human value (see Section 17.3.3). However, human values can change; they are not natural laws. The same electronic networks of financial flows *could* have other values built into them. The critical issue is not technology, but ethics and politics.

As we discussed in our chapter on science and spirituality, ethics refers to a standard of human conduct that flows from a sense of belonging (see Section 13.2.4). When we belong to a community, we behave accordingly. In the context of globalization, there are two relevant communities to which we all belong. We are all members of humanity, and we all belong to the global biosphere. As members of *oikos*, the “Earth Household,” it behooves us to behave in such a way that we do not interfere with nature’s inherent ability to sustain the web of life. As members of the human community, our behavior should reflect a respect of human dignity and basic human rights.

Since the systemic conception of life encompasses biological, cognitive, and social dimensions, human rights, from a systems point of view, should be respected in all three of these dimensions. The biological dimension includes the right to a healthy environment and to secure and healthy food. Human rights in the cognitive dimension include the right of access to education and knowledge, as well as the freedom of opinion and expression. In the social dimension, finally, there is a wide range of human rights – from social justice to the right of peaceful assembly, cultural integrity, and self-determination.

In order to combine respect for these human rights with the ethics of ecological sustainability, we need to remember that sustainability – in ecosystems as well as in human society – is not an individual property but a property of an entire web of relationships: it involves a whole community (see Section 16.3). A sustainable human community interacts with other communities – human and nonhuman – in ways that enable them to live and develop according to their nature. In the human realm, therefore, sustainability is fully consistent with the respect of cultural integrity, cultural diversity, and the basic right of communities to self-determination and self-organization.

17.4.2 *The Seattle Coalition*

The values of human dignity and ecological sustainability, as outlined above, form the ethical basis for reshaping globalization. At the turn of this century, an impressive global coalition of NGOs formed around these core values. The numbers of international NGOs increased dramatically over the past few decades, from several hundred in the 1960s to over 20,000 by the end of the twentieth century. During the 1990s, a computer-literate elite emerged within these international NGOs. They began to skillfully use new communication technologies, and especially the internet, to network with one another and mobilize their members.

This networking became especially intense as they prepared joint protest actions for the meeting of the WTO in Seattle in November, 1999. For many months, hundreds of NGOs interlinked electronically to coordinate their plans and to issue a flurry of pamphlets, position papers, press releases, and books in which they clearly articulated their opposition to the WTO’s policies (Barker and Mander, 1999). This literature was virtually ignored by the WTO, but had a significant impact on public opinion. The NGOs’ educational campaign culminated in a two-day teach-in in Seattle before the WTO meeting, organized

by the International Forum on Globalization and attended by over 2,500 people from around the world (Hawken, 2000).

On November 30, 1999, around 50,000 people belonging to more than 700 organizations took part in a superbly coordinated, passionate, and almost entirely nonviolent protest that permanently changed the political landscape of globalization.

The Seattle police turned out in force to keep the protesters away from the convention center where the WTO meeting took place, but they were unprepared for the street actions of a massive, well-organized network totally committed to shutting down the WTO. Chaos ensued, hundreds of delegates were blocked off in the streets or confined to their hotels, and the opening ceremony had to be canceled.

The WTO meeting broke down not only because of these massive demonstrations but also – and perhaps even more so – because of the way the major powers within the WTO bullied the delegates from the South (Khor, 1999, 2000). After ignoring dozens of proposals from developing countries, the WTO leaders excluded the delegates representing these countries from critical behind-the-scenes “green room” meetings and then pressured them to sign a secretly negotiated agreement. Infuriated, many developing countries refused to do so, thereby joining the massive opposition to the WTO that was going on outside the convention center. Faced with the prospect of rejection by developing nations in the final session, the major powers preferred to let the Seattle meeting collapse without even attempting to issue a final declaration. Thus the Seattle meeting, which was meant to be a celebration of the WTO’s solidification, instead became the symbol of worldwide resistance.

After Seattle, smaller but equally effective demonstrations took place at other international meetings, and by the end of 2000, over 700 organizations from 79 countries had joined what they now officially called the International Seattle Coalition. Naturally, there is a great diversity of interests in these NGOs, which range from labor organizations to human rights, women’s rights, religious, environmental, and indigenous peoples’ organizations. However, there is remarkable agreement among them about the core values of human dignity and ecological sustainability.

17.4.3 “Another world is possible!”

During the subsequent years, the Seattle Coalition, or “Global Justice Movement,” as it came to be called later on, not only organized a series of very successful protests at various meetings of the WTO, the G7, and the G8 but also held several World Social Forum meetings, most of them in Brazil, with the official motto “Another world is possible!” (Sen and Waterman, 2009). At these meetings, the NGOs proposed a whole set of alternative trade policies, including concrete and radical proposals for restructuring the global financial institutions, which would profoundly change the nature of globalization (see Section 18.1.1).

The Global Justice Movement exemplifies a new kind of political movement that is typical of our Information Age. Because of their skillful use of the internet and the new social media, the NGOs in the coalition are able to network with each other, share information,

and mobilize their members with unprecedented speed. As a result, the new global NGOs have emerged as effective political actors who are independent of traditional national or international institutions. They constitute a new kind of global civil society.

Civil society is traditionally defined as a set of organizations and institutions – churches, political parties, unions, cooperatives, and various voluntary associations – that form an interface between the state and its citizens. The institutions of civil society represent the interests of the people and constitute the political channels that connect them to the state. With the rise of the global network society, the nation state and its traditional institutions have been losing power, while a new kind of civil society, organized around reshaping globalization, has gradually emerged (Castells, 1996). It does not define itself *vis-à-vis* the state, but is global in its scope and organization. It is embodied in powerful international NGOs – Oxfam, Amnesty International, Greenpeace, and others – as well as in coalitions of hundreds of smaller organizations, all of which have become social actors in a new political environment.

According to the political scientists Craig Warkentin and Karen Mingst (2000), the new civil society is characterized by a shift of focus from formal institutions to social and political relationships among its actors. These relationships are structured around two different kinds of networks. On the one hand, NGOs rely on local grass-roots organizations (i.e., on living human networks); on the other hand, they skillfully use the new global communication technologies (i.e., electronic networks). By creating this unique link between human and electronic networks, the global coalition of NGOs has reshaped the political landscape.

17.5 Concluding remarks

We hope to have demonstrated in this chapter that the major problems of our time are systemic problems – all interconnected and interdependent – and that, accordingly, they require systemic solutions. This is why the systems view of life that we have discussed throughout this book not only is fascinating intellectually but also has tremendous practical relevance.

In addition to the academic fields where the systems view of life is being developed, systemic thinking is practiced today in numerous research institutes and centers of learning established by the global civil society (see Chapter 18). In fact, there is a continual exchange of ideas between the two areas, as quite a few academic systems thinkers are also teaching in civil-society institutions and are engaged in various projects and campaigns that develop systemic solutions to the world's problems.

One of the hallmarks of a systemic solution is that it solves several problems simultaneously. Agriculture offers a good example. If we changed from our chemical, large-scale industrial agriculture to organic, community-oriented, sustainable farming, this would contribute significantly to solving three of our biggest problems. It would greatly reduce our energy dependence, because we are now using (in the USA) one-fifth of our fossil fuels to grow and process food. The healthy, organically grown food would have a huge positive effect on public health, because many chronic diseases – heart disease, stroke, diabetes,

and about 40% of cancers – are linked to our diet. And finally, organic farming would contribute significantly to fighting climate change, because an organic soil is a carbon-rich soil, meaning that it draws CO₂ from the atmosphere and locks it up in organic matter.

Today, hundreds of systemic solutions are being developed all over the world to solve problems of the economy, environmental degradation, energy, climate change, food insecurity, and so on (see Brown, 2008, 2009). In the following, and last, chapter of this book, we shall highlight some of the most far-reaching and most promising of these solutions.