Systems concepts for a transdisciplinary landscape science

Ervin LASZLO & Zev NAVEH

Zusammenfassung

Die Europäische Konferenz der International Association of Landscape Ecology (IALE), die im Juli 2009 in Salzburg stattgefunden hat, hat sich den Herausforderungen des Landschaftswandels gewidmet und beschlossen, ein neues Kapitel der europäischen IALE aufzuschlagen. Nach 70 Jahren, in denen der Biogeograph TROLL den Begriff der "Landschaftsökologie" prägte, konnte in dieser Konferenz eine deutliche Verschiebung hin zu einer transdisziplinären Landschaftsforschung beobachtet werden. TROLL konzipierte die Landschaftsökologie als eine ganzheitliche "Öko-Wissenschaft", ein Studium der Landschaften in ihrer Gesamtheit als voll integrierte Einheit oder ganzheitliches System, in dem das Ganze mehr als seine Teile darstellt. Dies ebnete nach dem Zweiten Weltkrieg den Weg der Entstehung der Landschaftsökologie in Mitteleuropa als eine ganzheitliche, interdisziplinäre Wissenschaft der Landschaftsplanung und -gestaltung, des Landschaftsmanagements, der Landschaftspflege und –wiederherstellung. 1984 lieferten NAVEH und LIEBERMAN die Systemkonzepte der Landschaftsökologie als theoretische Grundlagen für eine transdisziplinäre Human- und Ökosystemwissenschaft. Neben der Verschiebung zur transdisziplinären Landschaftsforschung befinden sich aber auch die menschliche Gesellschaft und ihre offenen und bebauten Landschaften in einem tiefgreifenden Wandel von einem Industrie- hin zu einem globalen Informationszeitalter. Diese "Makroverschiebung" wird durch eine tiefe ökologische, sozioökonomische und kulturelle Krise begleitet.

Introduction

The European conference of the International Association of Landscape Ecology (IALE) in July 2009 at Salzburg has been devoted to the challenges of landscape transformation and decided to form a special European IALE chapter. In this conference a significant shift towards a transdisciplinary landscape science has taken place, seventy years after the German bio-geographer TROLL coined the term "landscape ecology" (TROLL 1939). He conceived landscape ecology as a holistic "eco-science" for the study of landscapes in their totality, as a fully integrated entity or system, in which the whole is more than the parts (TROLL 1971).

This paved the way for the emergence of landscape ecology in Central Europe after World War II as a holistic, interdisciplinary science of landscape planning and design, management, conservation and restoration. Two years after the foundation of IALE, NAVEH & LIEBERMAN (1984) provided the systems concepts for landscape ecology as the theoretical basis of a transdisciplinary human ecosystem science.

Since its foundation IALE has become a well-recognized global scientific organization, and as discussed recently (NAVEH 2007) it has made great strides towards transdisciplinary research and action. However at the same time, human society and its open and built-up landscapes are undergoing a crucial transformation from the industrial to the global information age. This "Macroshift" (LASZLO 2008) is accompanied by a deep ecological, socio-economic and cultural crisis.

The need for a systems approach

In view of these developments, we have to re-examine the system concepts for the emerging transdisciplinary landscape science, in the light of new insights that became available regarding the dynamics of complex systems and the coherence of the world as a whole. These new insights, gained thanks to some of the most important recent breakthroughs in such diverse sciences as quantum physics, physical cosmology, evolutionary- neuro- and quantum-biology, and in the new field of consciousness research, have been summarized and integrated into a unified view of the world as the "in-formed universe," where all organisms and environments are coherently connected (LASZLO 2004). These are fields to which many of us pay scant attention, yet they offer an all-embracing systems conception that sheds new light on the place of humans in nature. And thus it offers fresh insights into the place and role of human beings and societies in regard to rural, urban, industrial, and traditional landscapes.

The broadening of the scope of our worldview has far-reaching implications for a correct comprehension of the relations between human beings and human culture and society. Understanding these relations is a cornerstone of a transdisciplinary science of landscape planning and management, conservation, and restoration.

We need to become conscious of the fact that we have arrived at a watershed in history. The world we have created is no longer sustainable: it will either change, or break down. The question is no longer whether change will happen, only when it will happen and at what price.

Given current trends in demography, resource consumption, militarization, life-style and wealth-disparities, and the degeneration of the environment, our future is no longer assured. While on the one hand we could pave the way toward a system of social, economic, and political organization that is peaceful and capable of ensuring an adequate level of sustainability of the human life-supporting environment and its landscapes, on the other we could find ourselves on a descending path toward spreading terrorism, crime, and war, with growing cultural clashes, political conflicts, ecological degeneration, and more and more natural and man-made catastrophes. The choice at this point in time is still open. It merits deeper reflection.

The unsustainability of the world means that change must happen, and that it cannot be piecemeal and superficial. The future can no longer be a simple continuation of the past; it will have to be fundamentally different. Many people have difficulty comprehending this basic fact.

A more sophisticated variant of the currently dominant view perceives the possibility of change, but does not see it as fundamental. It describes the future in terms of the unfolding of "trends". Trends, whether local or global, micro or mega, introduce a measure of difference: as they unfold, there are more of some things and less of others. The world is still the same, only some people are better off and others worse. This view is also shared by forecasters and by trend analysis and has been applied often to characterize landscape transformations.

Trend-based forecasting ignores the fact that trends not only unfold in time, but can also break down and give rise to new trends, new processes, and different conditions. This possibility needs to be considered, since no trend operates in an infinitely adapted environment; its present sway and future unfolding have limits. These may be natural limits due to finite resources and supplies, or human and social limits due to changing structures, values, and expectations. When a major trend encounters such limits, the world is changing and a new dynamic enters into play. Extrapolating existing trends does not help in defining the emerging world. We need a systems approach to change and transformation.

The developmental dynamics of complex systems

To know what happens when a trend breaks down calls for going beyond the observation of current trends and following their historic path. It calls for knowing the developmental dynamics of the system in which the observed trends appear – and may disappear. Such knowledge is provided by the theory of complex systems, especially its branch popularly known as "chaos theory." Because of the unsustainability of many processes in today's world, the dynamic of development that will apply to our future is not the linear dynamic of classical extrapolation but the nonlinear chaos dynamic of complex-system evolution.

The crisis we are currently experiencing will not be overcome by tried and tested measures, carried out step by step. The way beyond today's crisis lies in profound and radical transformation. We can no longer ignore that current trends build toward critical thresholds – toward some of the famous (or infamous) "planetary limits" that in the 1970s and 1980s were said to be the limits to growth. Whether they are limits to growth altogether is questionable, but they are clearly limits to the kind of growth that is occurring today. As we move toward these limits, we are approaching – and have now definitively entered – a period of instability. It brings with it the deflection or disappearance of some trends and the appearance of others. This is not unusual: systems and chaos theory tell us that the evolution of complex systems always involves alternating periods of stability and instability, continuity and discontinuity, order and chaos. We are living in the opening phases of a period of social and ecological instability – at the bifurcation point.

The evolutionary process

A bifurcation is the critical decision-point of a vaster and more general process: the process of complex-system evolution. Whether it occurs in nature or in the human world, evolution is characterized by basic features that recur independently of the nature of the things that evolve, and also of their particular their time and place. Wherever it occurs, the process is continuous and unrelenting, but it is not smooth and even. Aside from occasional temporary reversals, the evolution of complex systems is largely irreversible, and the way it unfolds is highly nonlinear. A seemingly enduring process of change suddenly forks off in a new direction. This process comes to the fore whenever and wherever the systems undergo irreversible change.

The processes of evolution are continuous and unrelenting, but not smooth and even. Aside from occasional temporary reversals, evolution is largely *irreversible*, and the way it unfolds is highly *nonlinear*. A seemingly enduring process of change suddenly forks off in a new direction. The systems become chaotic, more exactly, the kind of butterfly-shaped attractors that were discovered by meteorologist EDWARD LORENZ appear in the dynamic "portrait" of their evolution. As a result their trajectory forks off: it *bifurcates*. This process comes to the fore whenever and wherever complex systems undergo irreversible change.

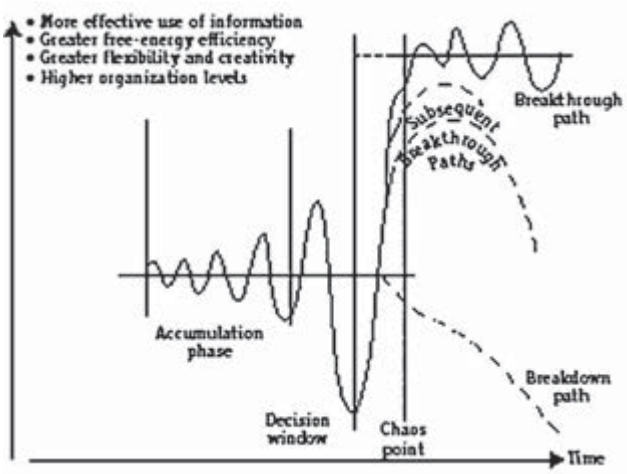

Fig. 1: The basic bifurcation diagram
At the threshold of a critical instability, fluctuations that were previously corrected by self-stabilizing negative feedbacks within the system run out of control – they break open the system's structure. The system enters a period of chaos. Its outcome is either the disintegration of the system into its individually stable components *(breakdown)*, or rapid evolution toward a kind of system that is resistant to the fluctuations that destabilized the prior system *(breakthrough)*.

Evolution in the biosphere is an integral process; it encompasses unicellular organisms on the one end of the scale of organization and complexity, and entire biospheres populated by multicellular organisms on the other. The process is driven by the flow of free energy from the Sun. Free energy is transformed by plants into biomass; the biomass is consumed by herbivores that in turn are food for carnivores, creating a continuous cycle that constitutes an open thermodynamic system. This energy-mill drives the biological and biochemical processes in the biosphere.

The evolutionary process is integral, but its unfolding is strongly nonlinear. Periodic bifurcations in the evolutionary history of biological and ecological systems mark the course of evolution on Earth, with its early phases occurring throughout the universe.

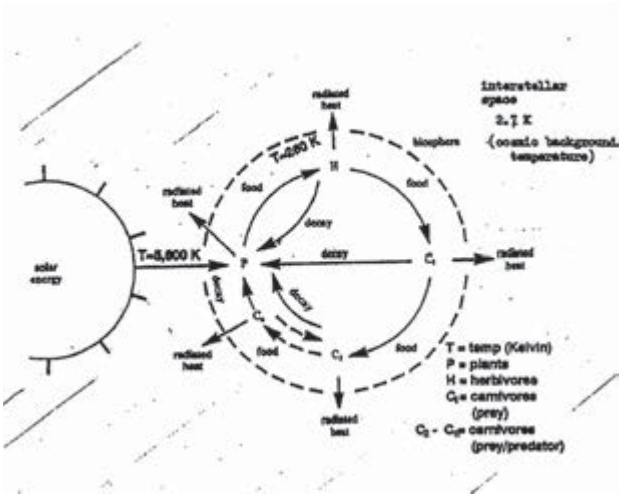

Fig. 2: The energy-mill that powers life in the biosphere
The thermal energy gradient between the energy streaming from the Sun to the surface of the Earth and the temperature of space around the planet (the cosmic background temperature) constitutes an energy-mill where the heat energy of solar radiation is transformed into systems of increasing complexity, and the waste energy – degraded to lower temperatures – is radiated off into space.

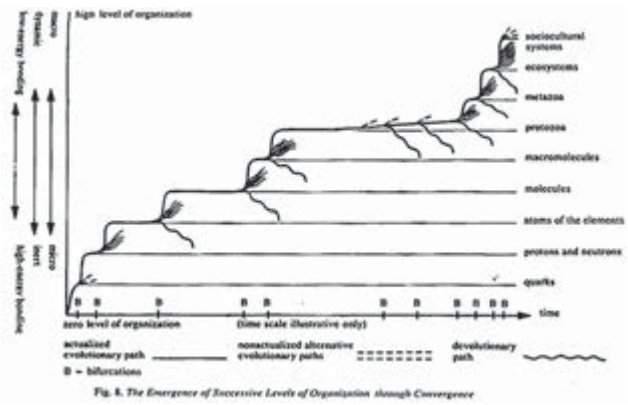

Fig. 3: Evolution through bifurcations in nature
Evolution in the universe took off from physical systems and – through the chemical evolution of stars and related interstellar processes – moved progressively from the substratum of quarks and elementary particles to the atoms of the elements and the molecules and crystals formed by atoms. On the Earth's energy-irradiated surface, evolution progressed further. Solar radiation combined with submarine hot springs stirred the rich "molecular soup" in the shallow primeval seas of the young Earth and created progressively more complex structures: prokaryotic and then eukaryotic cells, and subsequently colonies of cells and ultimately genuine multicellular organisms.

The evolutionary process of alternating dynamic stability and critical instability leads to the progressive build-up of complexity in nature, from the physical substratum of quarks and elementary particles, through the atoms of the elements, the molecules formed by some of the atoms and, in suitable planetary environment, to the macromolecules and cells formed by some of the molecules. On Earth it has further led to protozoa and metazoa based on macromolecular and cellular components, to the ecosystems formed by these sequentially integrating natural systems, and to the socio-cultural and technological systems formed by human groups and their integration with their environment as the Total Human Ecosystem. Evolution through periodic bifurcations gave birth to the lineage of hominids. The family of primates split off from the then existing species of mammals around 40 million years ago. The first primates were the old world monkeys that populated wide areas of Asia and Africa. Then, about 9.2 million years ago the primate family split into two groups. One, the pongids, stayed with arboreal life and, while several branches became subsequently extinct (such as *gigantopithecus* and *sivapithecus*), the survivors evolved into the modern apes: the chimpanzees, gorillas, orangutans, and gibbons. The other group became terrestrially based bipedalists: the family of hominids.
Although the details of hominid evolution are not definitively established, it appears that modern human beings, *H. sapiens sapiens*, evolved from *H. erectus* in Africa and moved at the Lower Pleistocene, about a million years ago, via the Rift Valley and the Jordan Valley to Asia and from there, also to Europe. Some forty thousand years ago sapients appeared in Europe, probably co-inhabiting the continent with *H. neanderthalis*. The latter disappeared around thirty thousand years ago, making *sapiens sapiens* the sole survivor of the hominid branch.
With *sapiens sapiens* evolution shifted from the biological to the sociocultural dimensions. Here it is not the genetic structure that mutates, but the dominant civilization: how people are organized, what ideas and values they entertain, and how they see themselves and the world around them. Mutations in society are all-encompassing, involving every segment and every aspect. They are shifts in civilization: shifts that are "macro." Across numerous hills and valleys, and occasional abrupt leaps, these Macroshifts drive toward the progressive integration of different peoples, enterprises, economies, societies, and cultures in systems of larger and larger dimensions.

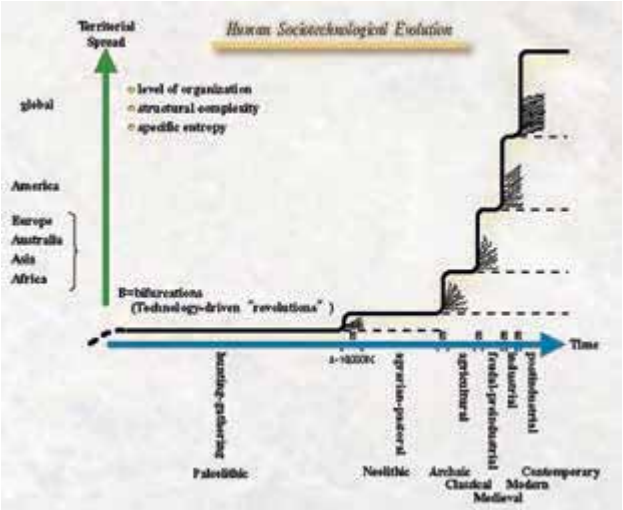

Fig. 4: The path of human socio-cultural and socio-technological evolution

The evolution of human groups in intercommunicating kinship or social structure-based communities is described in the chronicles of history. This is a complex process, for human beings are not simply the passive subjects of evolution, but are active (even if usually not voluntary and conscious) agents that influence its unfolding.

Nevertheless, even if they do not will it, or even know it, the societies formed by human beings undergo an evolutionary process that is analogous to that which occurs in biological nature. In history, too, bifurcations intersperse comparatively stable periods and lead to systems that are more and more complex, and are further and further from inert states of entropy and thermodynamic equilibrium. The evolution of human societies has been driven by the innovations that periodically destabilize the existing systems. Major innovations have been rendered possible by *sapiens'* capacious cranium, harboring a brain of some 1,350 cm^3. This enabled our forebears to develop an expressive and then a symbolic language, conceptual thinking, advanced tool use, and group behavior based on the cooperative use of progressively more sophisticated technologies. At first, societal evolution was slow: Paleolithic Stone Age societies were highly enduring, with a low level of innovation and great stability. However, the first major innovation that proceeded the major bifurcation of the Neolithic revolution in the Levant was by the intentional use of fire as the first extrasomatic energy source of *Homo erectus* in the Lower Pleistocene, about 800 000 years ago. This triggered the first, long lasting bifurcation, intensified by the Neanderthals and the first groups of *H. sapiens*. The bifurcation gradually transformed the pristine forest landscape into a sub- and semi-natural, relatively open landscape in Middle Pleistocene about 100 000 years ago. This was followed in the last Pleistocene stages, about 14 to 10 000 years before our time by a second bifurcation, induced by more advanced hunting and food collecting technologies. In the Levant, these were applied on Mt. Carmel by *H. sapiens* sapiens Natufians. Presumably, their intensive fire-induced vegetation management created more open, proto-agricultural "cultural" landscapes, richer in grasses with edible seeds, including the progenitors of wheat and barley. This led to the domestication of cereals and thereby trigged the principal Neolithic bifurcation of the advent of agriculture.

To support these contentions, NAVEH & CARMEL (2004) referred to the striking ethno-ecological equivalence between the Mt. Carmel Natufians and Californian Coastal Indian tribes, such as the Esselen, the Salinan and the Chumash before their contact with the Spanish missionaries. In comparable climate and vegetation conditions they used controlled burning as a major management tool to increase forage for people and for game, and especially for ungulates.

The first major innovation that rocked these societies was the domestication of plants and animals around ten thousand years before our time: the "Neolithic Revolution." Together with the continued use of fire as a major pastoral management tool it transformed these hunter-gatherers into settled pastoralists, and then into agriculturists. Then, and thenceforth, bifurcations were triggered by advances in the technologies devised by human groups. Technological innovations included the invention of the wheel, the design of progressively more sophisticated tools, and the invention of more and more powerful devices for extending the power of human muscle and the human brain. Such innovations enabled humans to live in larger and larger communities, with progressively greater social differentiation and divisions of labor.

Following the early discovery of how to ignite, conserve, and transport fire, the paramount innovation was pastoralism and the early forms of agriculture. Subsequent innovations – including the invention of the alphabet and the number system, the means of communication over vaster distances, and the stratification of societies from the tribal circle of elders to the hierarchically organized state – transformed groups of Neolithic pastoral-agrarian communities into the vast archaic empires of Babylonia, Egypt, India, and China. Less than four thousand years ago at the rim of the Mediterranean there was another major bifurcation: in classical Greece nature philosophers pioneered a societal mutation that replaced mythical concepts with theories based on observation and elaborated by reasoning. Greco-Roman civilization entered the scene of history. The pre-Socratic philosophers evolved the "heroic mind," present in Homer and the early epics, into the visionary and the theoretical mind, and then the rational mind epitomized by Plato and Aristotle. Logos became the central concept: it was at the heart of philosophy as well as of religion. Together with metron, the concept of quantitative measurement it provided Western civilization with the rational foundation upon which it was to build for nearly two and a half thousand years.

After the fall of the Western Empire of Rome and the founding of the Byzantine Empire in 476 C.E., a further shift occurred in the development of European societies. The rise of Christianity modified the classical culture of Greece. The medieval belief system added to the classical concepts a divine source: the world's creator and prime mover, as well as ultimate judge. Reason came to be embodied in the Holy Trinity and incarnated in man, God's creation. This belief system, whose principal elements were elaborated by St. Augustine and Thomas Aquinas, was dominant in European civilization until the advent of the modern age.

The rationality of the Greeks, borrowed and elaborated by the Romans, was conserved in medieval fiefdoms and princedoms, notwithstanding the addition of Christian elements. It found expression in the creation and use of mechanical devices such as clocks, windmills, watermills, animal-drawn agricultural implements, and horse-drawn carriages.

A further shift occurred in the sixteenth and seventeenth centuries. Although medieval Europe's culture was otherworldly and Christian, in everyday practice it was mechanically colored; it embraced the concept elaborated by Giordano Bruno and Galileo Galilei: the world as a giant machine. This concept, underpinned by new scientific discoveries and wedded with traditional handicrafts, led to an entire series of technological innovations. These included the harnessing of the power of steam and later oil, and the invention of mass production for mass markets. Europe, followed shortly by America, entered the industrial age.

Thanks to an accelerating series of ever more powerful technological innovations *sapiens* became the dominant species on the planet. But this reign is not assured. In its present form, industrial civilization is not sustainable. In the opening years of the twenty-first century the industrial age is shifting into a post-industrial age, impelled by the "second industrial revolution" – a revolution hallmarked by the advent of the technologies of information and communication. These technologies are more powerful than the steam and fossil fuel-based technologies of the first industrial revolution, and the "revolutions" they catalyze are unfolding much faster than the first industrial revolution: in a matter of years instead of decades or centuries. Ultimately the evolutionary dynamic of society builds toward a point of bifurcation, the critical phase at which society's evolutionary path is rapidly decided. As in nature, bifurcations in society are triggered by instabilities that are beyond the ability of the system to overcome: this is the true meaning of "unsustainability." The status quo becomes untenable, and the system either comes up with new ways of maintaining itself, or it goes under.

Breakdown or breakthrough

In the past the evolutionary build-up of structure and complexity was local, national, or regional. Today it is global. Humanity's socio-cultural evolution has reached the dimensions of the planet. Today we are approaching the limits of sustainability in our globalized system – the status quo is no longer tenable. One or another of the available alternative paths of systems development must be entered upon. The alternatives are wide-ranging. There is a distinct possibility that the next phase will be a phase of breakdown, involving growing stress, conflict, and chaos. But there is also a realistic possibility that society will enter a path leading toward sustainability and peace. The scenario of breakdown involves a series of increasing stresses, leading ultimately to global chaos. By the year 2020 wars fought with conventional and non-conventional weapons escalate to the global level; the international economic and financial system is in chaos; political relations among states break down; anarchy and destruction become generalized.

The alternative scenario of breakthrough calls for a major transformation in all aspects and dimensions of society. This would not be unprecedented in the annals of history. Systemic transformation is part of a process of socio-cultural evolution that began with the mythic civilizations of the Stone Age, continued with the theocratic civilizations of the archaic empires, and shifted to the civilizations based on human reasoning innovated by the ancient Greeks. This "Logos-civilization" survives to this day, albeit with the mixture of spiritual and theocratic elements. At present its reign is drawing to a close: the short-term rationality underlying its dominant form of produces more negative social, economic, and ecological side-effects than positive achievements. The time has come for a further civilizational shift: from the civilization of Logos to a civilization that perceives and embraces all aspects and dimensions of society in the context of its life-sustaining environment: the civilization of Holos.

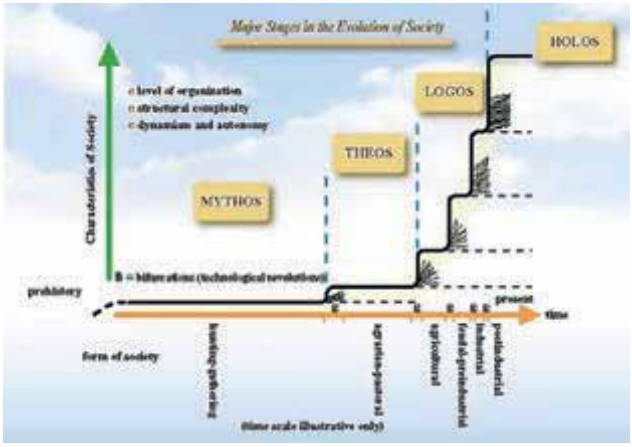

Fig. 5: The major civilizational-shifts in history, leading from the mythology-based civilizations of antiquity through the theocratic civilizations of the classical empires, to the Logos-inspired rationality-based civilization initiated by the Greeks – and then to the current shift toward an integral planetary civilization based on a holistic concept of the human being and the biosphere.

The shift to Holos-civilization has become necessary because in its present form the human/nature system on this planet, and including its landscapes, has become critically unsustainable. Concern with just some of its elements to the exclusion or neglect of others would lead to growing instability, and ultimately to breakdown. The holism required for a sustainable civilization is not a mysterious metaphysical quality. It is the adoption of the systemic approach without which no complex system can be safely and enduringly managed.

The cultural factor on the path to Holos-civilization

The safest and most effective path toward a planetary Holos-civilization is a cultural path: the path of adopting adapted values and behaviors. These need to emerge in a critical mass within civil society; for in the absence of such a cultural shift political and business leaders remain powerless to effect the necessary changes – the former for lack of popular support, and the latter for lack of corresponding demand in the marketplace.

The requirement for a cultural movement that would be capable of producing motivation for heading toward Holos-civilization is not utopian. In many parts of the world a variety of culture is surfacing that could be the harbinger of a civilizational transformation. In this culture people are re-thinking their preferences, priorities, values, and behaviors, shifting from consumption based on quantity toward selectivity in view of quality defined by environmental friendliness, sustainability, and the ethics of production and use. Lifestyles hallmarked by matter and energy wasteful ostentation are shifting toward modes of living marked by voluntary simplicity and the search for a new morality and harmony with nature.

The people who join the new cultural movements are united by the aspiration to live a more simple, healthy, natural, and responsible life. They are appalled by what they see as the heartless impersonality and mindless destructiveness of mainline society. The rise of inner-city deprivation and violence, the drift toward anarchy and ethnic intolerance, the impotence of police and military measures to cope with it, the dissolution of the social contract between society and worker, and the rise of unemployment and homelessness prompt them to alter their thinking and their acting.

These changes in values and behaviors, although they are generally dismissed or underestimated, are rapid and revolutionary. For the present they are occurring at the margins of civil society, where a number of grassroots movements are opting out of the mainstream and are reforming themselves. Their members try to rethink the beliefs, values, and life ways that dominate their society, and adopt alternative patterns of personal and social behavior. A hopeful culture is growing rapidly also in the United States, at the heart of the industrialized world. This is the finding of a series of opinion surveys carried out recently by organizations and individuals keen on tracing the evolution of the thinking and acting of Americans. The factor that identifies the culture that researcher PAUL RAY called "cultural creatives" is less what their members preach than what they practice, for they seldom attempt to convert others, preferring to be concerned with their own personal growth. Their behavior, especially their lifestyle choices, differentiates them from the mainstream.

The common denominator of values and lifestyles among the cultural creatives is holism. This comes to the fore in their preference for natural whole foods, holistic health care, holistic inner experience, whole system information, and holistic balance between work and play and consumption and inner growth. They view themselves as synthesizers and healers, not just on the personal level but also on the community and the national levels, even on the planetary level.

Although the new culture at the margins of society is growing, its members are not well organized and the culture as a whole lacks cohesion. The cultural creatives do not yet possess the political, social, and economic weight to make them into a significant agent of societal transformation. If transformation of the required kind were to get under way, mainstream society would have to enter the scene, with more adapted values and priorities. But for the present, most people in the mainstream are disoriented and disheartened. They find themselves in a rat-race for economic survival in a world where jobs become ever scarcer and finding employment beyond middle age is nearly impossible. Those who pose deeper questions find that they are surrounded by a spiritual, moral, and intellectual vacuum. There are no meaningful answers to questions such as "Who am I?" and "What am I living for?" The consequences include a continuing rise in the popularity of mystical teachings, and an explosion of religious fundamentalism.

Orientation from the new sciences

There are elements of hope illuminating the seeming darkness. The search for meaning and wisdom has gone beyond the confines of the established world. As former Czech President VACLAV HAVEL said, "The authority of a world democratic order simply cannot be built on anything else but the revitalized authority of the universe." A new civilization, capable of orienting people and providing the foundations for peace and cooperation can only be built when the "authority of the universe" informs the authority of the institutions by which people govern themselves in democratic societies. That more and more people are actively seeking a higher authority to conduct their affairs, looking beyond the dominant rationality of their society, means that a window may be opening for the motivation to enter on the path to a planetary Holos-civilization.

Science is the best source we possess for discovering the authority of the universe. It is not only the fountainhead of the new technologies that are shaping our lives and everything around us, but also the basis for a trustworthy view of the world. Science could help people adopt timely values and attitudes and even a suitable morality. However, science does not yet fulfill its transformation-facilitating potentials in society. People fail to look to science for guidance because of the separation of science from society, and an outdated views of what science truly is. The mainstream tends to believe that science is limited to observation, and their measurement and computation. In fact, science is far more: it is part of the perennial human quest for making sense of the world. It is a search for meaning along with religion, art, and literature. The difference between these branches of culture and human endeavor is not in the end they seek, but in the method they adopt for reaching that end. Science uses rational thinking in analyzing and interpreting what experience and experiment discloses, while religion combines such thinking with an element of unquestioning faith, and art and literature combine it with aesthetic elements.

The current belief about science is a carry-over from the kind of science that had dominated most of the Modern Age. "Classical" science derived its view of the world from the theories of Galileo, Kepler, Newton, and Descartes – the world as a mindless, soulless domain of inert matter, blindly obeying the universal laws of motion and interaction. At the cutting edge of the new sciences the world is not seen as a machine that can be manipulated at will. It turns out to be very different from a simple world where things behave as solid material objects should behave and are either here or there and not in many places at once. Nor is the effect of one thing necessarily limited to just one or a few other things. True, such conditions hold in our immediate surroundings, but they turn out to be limited to certain orders of size and magnitude, and certain dimensions of speed and distance. Beyond these dimensions things become more and more strange.

It is with good reason that a widely discussed film asked, "What the bleep do we know?" and suggested that it is our consciousness that creates reality. However, even if the world is surprising in light of science's new concepts, it is nonetheless comprehensible. The universe turns out to be meaningful; indeed, more meaningful than the mechanistic world where inert matter moves impersonally against a background of passive space. The whole world proves to be harmonious systems where all things interact together create a

THE NEW WORLD VIEW

	The Modern View	The Emerging World-View
Physical World	Atomisitc, fragmented Objects are independen-tand free-standing People are individual and discrete	Holisitc; interconnected Objects and people are interwoven into a community
Physical processes	Materialistic; deterministic, mechanisitc	Organic; interactive, holistic
Organic function	Discret and separable; parts are exchangeable	Interwoven and interdependent; parts are not interchangeable or exchange-able
Social ethos	Technology oriented; goods based	Communication oriented; service based
Social progress	Consumptiom dependent; conversion of resources	Adaption oriented, service based
Economics	Competetion and profit driven; exploitative, inter-ventionist	Cooperative and information driven; complementray, intergrationist
Humankind	Mastery over nature; Anthropocentric	Integrated into nature; Gaiacentric
Culture	Eurocentric; colonial	Pluralistic

Tab. 1: Some contrasting features of the typical "modern" view – inspired by Newtonian mechanistic-reductionist science – and the emerging "systemic" view based on the holistic concepts derived from the latest developments in the sciences.

coherent whole. This is not a mechanical aggregate, for it is not readily decomposable to its parts. It is a system: an integral whole. The findings that ground the new worldview of science come from almost all of the empirical disciplines – from physics, cosmology, the life sciences, and even consciousness research. Although the specifics of the phenomena on which they focus differ in detail, they have a common thrust. They speak of interaction that creates interconnection and produces multifaceted coherence. The hallmark of a system of such coherence is that its parts are correlated in such a way that what happens to one part also happens to the other parts – hence it happens to the system as a whole. The system responds to the rest of the world as a whole, maintains itself as a whole, and changes and evolves as a whole.

Wholeness and coherence can also function as basic criteria of a more adapted morality. Given the overall trend toward wholeness and coherence in nature, we have sound reasons to consider actions that promote coherence and wholeness as good, and actions that hinder them as evil. Wholeness in us signifies the integral functioning of our organism: it means health. And wholeness around us means a healthy social community, living in a healthy landscape; an integral ecological milieu.

The new sciences tell us that nature is a whole, and so is the biosphere; only human beings are a major factor of fragmentation and incoherence. This was not always the case: traditional societies respected the integrity of nature and, in times past, even the cosmic laws they believed govern the universe. The fragmentation and incoherence we have wrought in the modern world is a relatively recent unintended evil. When we realize it for what it is, we shall overcome it: the current discovery that we are connected to one another and to nature furnishes motivation for it.

The new sciences could be effective sources of wisdom in society. They could inspire greater solidarity in the human world, and greater concern with and care for nature. They confirm that our fleeting impressions and intuitions of oneness are not figments of the imagination but have roots in the reality of the universe. We are indeed one with each other, with the living world, and with the universe at large. Our individual actions, and even our thoughts and intentions, affect other people around us, and are affected in turn by other people. This makes us part of a network of connection and wholeness. With this realization we could become part of the solution rather than remaining part of the problem. We could become moral agents seeking wholeness in ourselves as well as in our environment.

Conclusions

The realization that we can become part of a biospheric network of connection and wholeness through our landscapes, viewed as the concrete space-time defined ordered wholes of our Total Human Ecosystem, is of greatest relevance for everyone concerned with landscapes in the broadest sense: scientists, professionals and entrepreneurs. They could become conscious architects of a sustainable planetary civilization, ensuring that the "hard" instrumental and "soft" non-instrumental life supporting and enhancing functions of the landscapes of our total Human Ecosystem are coherent. For this reason we need to promote the establishment of new, better-balanced complementary relations between healthier, more livable and attractive urban-industrial techno-sphere landscapes and their "hinterland" of viable and diverse natural and semi-natural biosphere landscapes, as well as their productive agricultural forms. This requires the restoration of degraded uplands, the revitalization of wetlands, rivers, lakes and their embankments, the holistic and dynamic conservation management of nature reserves and parks, and the creation of living corridors and biosphere islands as parks in urban landscapes.

These tasks cannot be achieved merely by piecemeal, ecological, technological, political, and economical means. Success requires a far-reaching mind-shift from a civilization based on the rationality of Logos to the holistic mindset of Holos. This means adopting transdisciplinary systems thinking, transcending and crossing disciplines and professions, including the spheres of scientific, cultural, spiritual and ethical values, and joining them together to bring about a planet-wide sustainability revolution.

Because of the chaotic dynamics of bifurcating complex systems we must realize that we cannot predict the future simply by extrapolating past "trends" into the future, whether of our economy, our society, or our landscapes. But we can take part in creating the future by translating our visions and research data into actions, realizing that what we do today shapes the world of tomorrow. This should be accepted as one of the major challenges for the teaching, research, and public activities of the European IALE landscape association. The IALE needs to work together with all moral citizens of this planet, people who are concerned with, and dedicated to, the sustainability of all life on Earth.

References

LASZLO, E. (2004):
Science and the akashic field: an integral theory of everything. Inner Traditions, Rochester, Vermont.

LASZLO, E. (2008):
Quantum shift in the global brain. How the new scientific reality can change us and our world. Inner Traditions. Rochester, Vermont.

NAVEH, Z. (2007):
Transdisciplinary challenges in landscape ecology and restoration ecology – an anthology with forewords by E. Laszlo and M. Antrop and epilogue by E. Allen. Springer. Dordrecht.

NAVEH, Z. & LIEBERMAN, A. T. (1984):
Landscape ecology: theory and application. Springer. New York.

NAVEH, Z. & CARMEL, Y. (2004):
The evolution of the cultural Mediterranean landscape in Israel as effected by fire, grazing, and human activities. In: Wasser, S. P. (Ed.): Evolutionary theory and processes: modern horizons. Papers in Honour of Eviatar Nevo. Kluwer Academic Publishers. Dodrecht/Boston/London.

TROLL, C. (1939):
Luftbildplan und ökologische Bodenforschung. Zeitschrift der Gesellschaft für Erdkunde, Berlin: 241-298.

TROLL, C. (1971):
Landscape ecology (geo-ecology) and bio-ceonology– a terminology study. Geoforum 8: 43-46.

Laufener Spezialbeiträge 2012

Implementation of Landscape Ecological Knowledge in European Urban Practice

ISSN 1863-6446 – ISBN 978-3-931175-96-2
Verkaufspreis 10,– €

Herausgeber und Verlag:
Bayerische Akademie für Naturschutz und Landschaftspflege
Seethalerstraße 6, 83410 Laufen (ANL)
Internet: www.anl.bayern.de
E-Mail: poststelle@anl.bayern.de
Satz: Hans Bleicher, Grafik · Layout · Bildbearbeitung
Druck: Korona Offset-Druck GmbH & Co.KG, Freilassing
Stand: Januar 2012

Gedruckt auf Papier aus 100 % Altpapier

Schriftleitung:
Ursula Schuster, ANL
Tel.: 08682/8963-53
Fax: 08682/8963-16
Ursula.Schuster@anl.bayern.de

Für die Einzelbeiträge zeichnen die jeweiligen Autoren verantwortlich. Die mit dem Verfassernamen gekennzeichneten Beiträge geben nicht in jedem Fall die Meinung der Schriftleiterin wieder.

Redaktion für das vorliegende Heft:
Jürgen Breuste, Annette Voigt, Martina Artmann.

Erscheinungsweise:
unregelmäßig (ca. 2 Hefte pro Jahr).

Bezugsbedingungen/Preise:
Über Preise und Bezugsbedingungen im einzelnen: siehe Publikationsliste am Ende des Heftes.
Bestellungen über: bestellung@anl.bayern.de
oder über den Internetshop www.bestellen.bayern.de

Auskünfte über Bestellung und Versand:
Annemarie.Maier@anl.bayern.de

Zusendungen und Mitteilungen:
Manuskripte, Rezensionsexemplare, Pressemitteilungen, Veranstaltungsankündigungen und -berichte sowie Informationsmaterial bitte nur an die Schriftleiterin senden. Für unverlangt Eingereichtes wird keine Haftung übernommen und es besteht kein Anspruch auf Rücksendung. Wertsendungen (Bildmaterial) bitte nur nach vorheriger Absprache mit der Schriftleiterin schicken.