Ecological Planning, Management, and Design

by Richard L. Meier

FOREWORD

An exciting degree of effectiveness for plans is introduced by the merging of information technology with ecosystems principles. Goals that previously seemed out of reach, such as sustainable development and accelerated control of global population, appear to be achievable in a human lifetime. Strategies that are well within our power to implement can be formulated to reach these goals.

Systematic, comprehensive data connect with the real world, and most of those data have urban origins. They make possible multidimensional accounts that report how much progress is being made and what new resources are available.

Planning, I believe, is a procedure for gaining human freedom, and *design* a means of fitting knowledge to fulfill specific needs within the limits of environmental conditions. Distributing such freedoms widely is a matter of social justice, and thus a high priority for future change. Managing this process in order to extend opportunity to everyone in a community to participate (or withdraw) will assure a future for the community.

At least two ways can be found for introducing ecology into design. One of them starts with the established practice of design, as taught in contemporary schools, and ranges from site analysis to environmental impact. Ecological insights are then used to inform the designer. Such a design should be worked out within an environmentally sensitive general plan. The outcome that follows is more desirable than would otherwise occur, but the net result is usually a short-term adaptation. It is really a contribution to responsible management. These designs, when taken together, do not assure sustainability, because they have not taken into account the future global and regional scarcities (energy, water, land, etc.).

Another approach, the strategy employed here, addresses anticipated biosphere conditions systematically. A community must be able to do its share to support a world population of humans twice as large as that of the present and a vehicle population several times as great, and still provide an adequate level of living while supporting a good quality of life. The strategy espouses eco-development through self-reliance of communities, with minimum direction from the state. Early contributors to the concept had no adequate examples within the urban ecosystem.

I am most sympathetic to the viewpoints of Ignacy Sachs, who invented the term eco-development and led a European and United Nations University contingent that emphasized efficiency of consumption. Participants in the global e-mail Conference on Sustainable Development (ECO-TEC 1994), which terminated in a face- to- face meeting in Beijing, critiqued and reinforced many of the ideas.

Presentation of the new theory and advanced practice could make it appear complex and unmanageable, yet, when condensed to a set of core arguments with all the terms grounded in observables, the theory is wonderfully concise and systematic. An appropriate management system for reaching and maintaining it can be proposed.

Prospective benefits to be obtained from applying the new information technology to sustainability are extraordinary:

* The new technological capabilities expedite communications over linguistic and political boundaries, thus enabling new ideas to be simultaneously shared. Food security can be achieved for two to three times the present global population through dissemination of new agro-ecological knowledge among the workers, many fewer of whom will remain in the rural areas.

* Real progress can be made toward removing the stubborn educational deficit, which especially affects girls in Africa and Asia.

* Education for a livelihood, entrepreneurship, and applied science promises to be an effective means to reduce human fertility to replacement levels without the application of coercion.

* A multiplicity of nongovernmental organizations (NGOs) engaged in public service and cultural creativity is expected to lead to stable governments, due to the introduction of bargaining and coalition building to deal with many interests.

* An ecological perspective challenges communities to find relatively secure niches supporting a high quality of life that is compatible with global trends, including the steady depletion of nonrenewable resources.

As these desirable ends are being pursued, it is apparent that some losses will result. The costs that can be foreseen are:

* Indexes of cultural diversity, as presently conceptualized, will decline as more people are swept into communications networks.

* Huge amounts of personal attention will be spent upon the new overhead costs of maintaining equipment, upgrading software, sampling the voluntary transactions, and responding to questions raised in the two-way media that supplement the telephone.

* Disturbing alarms and rumors that arise periodically in various existing communities will go global very quickly, so that markets and political situations that respond to such phenomena are likely to be destabilized. Any external controls imposed as preventives would be viewed as restraints upon freedom.

At the moment the benefits of information technology far outweigh the costs by a very large margin for a predominant share of the human population. Justifications for taking action to prevent shortages of food, fuel, water, living space, housing, health services, learning, and access to open space are expected to remain strong for a long time to come. Planning and designing new facilities to implement them will be very much in demand.

Before the 1990s, these agenda would have been irrelevant dreams because the tools for achieving them were not available. In some cases these tools still exist only at the prototype stage, but are scheduled to reach mass availability after the turn of the

millennium. The question of why the pessimism still appearing in print is obsolete will be taken up first.

Natural resources needed to sustain cities pose the greatest difficulty encountered in eco- development -- a problem the world has inherited from history. Urban communities now accommodate about half the world's population, but new urban settlers are expected to accumulate in numbers about equal to further overall population growth. Thus the prospective doubling of world population means a tripling of urban population. Only a minor, affluent fraction of the world's population has escaped scarcities for the last century by appropriating most of the natural resources for itself. A feasible resource-r- conserving program for this segment, it will be argued, might save 30 percent of the use of nonrenewable resources, and it might take ten to thirty years to implement. However, only affluent communities can afford to train the planners, managers, and designers. Half the people living today are citizens of sovereign states that most acutely need these professional capacities but cannot afford them. The plight of poor cities highlights the necessity to employ the most powerful tools -- those that enable global collaboration.

My search for an ecosystems theory with closure and for a body of principles best suited to solving problems in an integrated way leads me to propose community ecology. It is an area for investigation that has barely been opened, and one well equipped for combining observation, measurement, experiment, and speculation. Community ecology can be a frontier for innovation in developed societies, but it is the only one among many paradigms available that seems practical in the less affluent, as well the most urbanized, parts of the world.

Ecological thinking repeatedly brings to mind the concepts of evolution and the long-term future. Having alternative paths for evolving futures provides a new degree of freedom. These newly feasible prospects are radically different from those of the past, but they can influence the choices presently under consideration. Some of the longer- term possible sustainable futures are also introduced in order to start public discussion.

Policies for preventing expected urban growth encounter a series of possible Malthusian catastrophes that could also overwhelm many cities--the same outcome we would expect from proceeding without planning. These arguments were taken up in a study entitled Planning for an Urban World: Design of Resource-Conserving Cities (Meier 1974). Therefore this book leans heavily upon the knowledge base of developed societies, but the how-to-do-it examples draw heavily upon experience

elsewhere in critical situations, which is where ecosystems thinking can do the most good.

This work is positioned on several frontiers, so it is vulnerable to criticism from many directions. It takes up a necessary task for the future -- the ecological reform of planning and design procedures -- but it may not dramatize the professional issues emphatically enough to attract the enthusiasm of the pioneers and change agents, because the claims are presented modestly. The most sweeping criticisms of the environmentalists' enthusiasms and of the rejections by ultraconservatives have been abjured.

Guide to the Central Argument

Ecosystem planning presents an alternative approach to planning that seeks comprehensiveness by identifying all significant forces and actions that have long-term consequences. The central components of the argument for this thesis follow.

A. Living systems sustain and reproduce themselves by ingesting materials, components, and energy from the environment and disposing of wastes into it.

1. A community ecosystem is a collection of living systems and nonliving structures that maintains a recognizable order over many generations within a semi-permeable boundary.

2. Scholars of management of large- scale organizations have recently recognized that these organizations grow and evolve within ecosystems that are largely industrial, and that sustaining the organization over many decades requires coevolutionary policies.

B. Urban communities dominate the world scene, because of human organizations and human biomass.

1. Of the sixteen categories of actors that can be treated as separable populations, automata, knowledge, and their infrastructure are the most frequently disregarded in planning.

2. Of the eight separate vital inflows, messages/ data and variability in water are the two most commonly overlooked.

3. Of the five or six key outflows, the importance of the flow of information and services is the most often underestimated.

4. Interaction of inputs with actors can be "quantized" into countable transactions, and increasing numbers of them add to both welfare and sustainability. More than half of the transactions are not "monetized," but contribute to the integration of society and culture.

C. Life cycles in a sustainable ecosystem are intertwined so that individual species have niche functions and play community roles.

1. Implications of lifetime changes of artifacts, such as items of knowledge, software, vehicles, and machines, are most often overlooked.

2. Death rates are falling, a trend that will continue, for humans, artifacts, and their organizations, thus leading to unprecedented problems with aging.

3. The rate of births and the proliferation of new products both need to be selectively reduced to prevent waste.

4. Balancing of populations should be accomplished through migration of people, artifacts, and knowledge, but this flow meets resistance to change of quotas and embargoes at the political boundaries.

D. Transactions create bonds between actors, and many new bonds naturally lead to forming of teams, groups, and new organizations.

1. Implementation of plans depends upon both information flow and the creation of structural change in organizations.

2. Institutional rules in a community freeze memories of past interactions and manage most of the current transactions.

E. Ecological accounts should be maintained in order to determine how things are changing and how much should be allocated to get the most out of natural resources, especially energy and water.

1. Information flows and time budgets are the least developed among a half dozen of the most useful kinds of accounts.

2. Indicators of critical limits in the accounts -- points where the hurt begins to show, but not yet debilitate--can be derived from these data and from the community feelings.

F. Knowledge resources are local, organizational, and global. They include a comprehensive map of the community with its environment and their evolution, together with the huge stock of findings from science and technology.

1. Search methods assume that knowledge is an ecology of terms representing images, with a predominant share of them named and catalogued.

2. Images are used to carry information, as well as to store it. It is possible to use computers to simulate community action, explore possible futures, and find the best outcomes, based upon internal forces and preferences.

G. Alternative futures can be mapped out using shared knowledge. The catastrophes the world is headed for can be framed, and likely strategies found for avoiding the most painful.

1. New frontiers for forming sustainable communities can be found in aquatic environments and in designed organizations.

3. Information technology has introduced cyberspace, which hosts virtual communities that are rarely sustainable.

3. Sustainability, looked at from these futures, appears to be a temporary objective, lasting perhaps for two generations while deprived populations catch up. Then, we have to decide from the perspectives of global urbanism and enlarged knowledge what visions are worthwhile.

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To keep the text focused on the future, and to forego excessive explanations of recent history, most chapters are sparse in footnotes and references. Only the best, most recent, or most difficult-to-find contributions were included. When the argument was based upon field work, those areas have very little relevant published documentation.