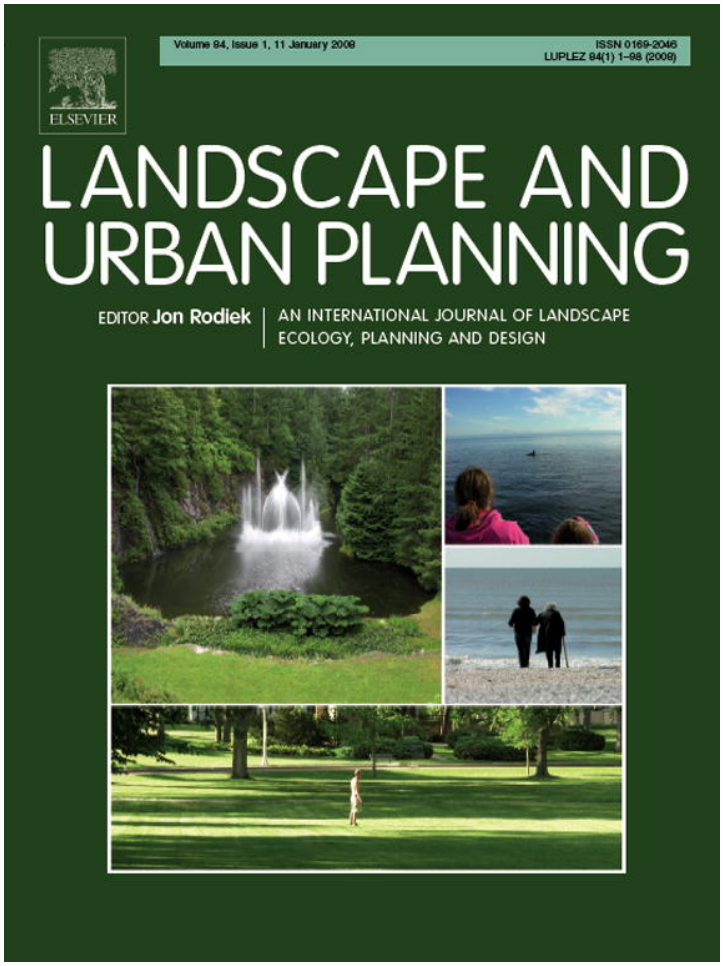

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Editorial

Protecting ecosystems and open spaces in urbanizing environments

1. Preamble

Elsevier is among the founding publishers of HINARI [Health Internet work Access to Research Initiative]. This U.N. sponsored initiative provides public institutions in developing nations with free or low cost online access to major journals in the biomedical and related social sciences field.

Inspired by HINARI's success the U.N.'s Agriculture Organization established AGORA [Access to Global online Research in Agriculture] which provides researchers, policy makers, educators, technical workers and extension specialist with access to the same extensive list of online journals as provided in HINARI.

A new global partnership was launched in October 2006 called OARE [Online Access to Research in the Environment] Through OARE public and non profit environmental institutions in more that 100 of the worlds least developed nations receive access to over 1000 peer reviewed environmental service journals.

Dr. Shamus O' Reilly, Senior publishing Editor, Elsevier.

Dr. O'Reilly sent this memo to all journal editors who participate in any of the above programs. *Landscape and Urban Planning* journal participants in the AGORA and OARE programs. Dr. O'Reilly thought we might like to know. To this editor the message underlines the value of the work freely provided by our authors, reviewers and editorial board members to the publishing system. It says what we do can be meaningful to others. The memo helps us visualize how some of our work is transferred to those who can use it.

There are those who would see any such effort as foolish and unwarranted. One individual emailed me when we requested his assistance in reviewing a paper thus, "I hesitate to provide free reviewing services to journals who profit financially from the publication of scientific and learned journals." He declined the invitation to review.

Of course that is an option that person and any other individual has when asked to join us in the processing of scientific information. There are other options as well. For those who choose to contribute to the review process there is the possibility that they are looking to see who could benefit from such a generous contribution of their time and effort.

The following editorial is an attempt to bring into consideration the process by which scientific information, planning and design come together to create an opportunity for ecosystem protection. The effort champions two seemingly disparate scientific works. These works formed the basis for creating a master plan for open space and recreation for the good citizens of Spring, Texas.

The master planning effort was supported by public funds to carry out the study. No profits were made from the contract. However it did support 26 seniors in their final spring semester of Landscape Architecture studio as well as three graduate students who used the work to create their final projects as part of their requirements for graduation.

The discussion is not based on scientific research but rather the utilization of scientific information to help formulate a more comprehensive master plan for some 156 acres of land located along a drainage corridor in North Harris, County Texas.

2. Introduction

The expansion of urban environments occurring across the United States today is only the latest stage in the continuing evolution of our human population here on the North American continent. The legacy of this human population growth began over 12,000 years ago. Since that time humans have been leaving the mark of their occupancy on the landscape in larger and increasingly longer lasting degrees of impact.

Historically these impacts were of little consequences to the ecological matrix in which they occurred. Today the scale of human population growth and the order of technological change have had a permanent impact (within humans orders of temporal change at least) on the environment. Ecosystem management scientists have informed us of the costs for carrying on in such a careless manner. We have taken note of our mistakes and made serious attempts to rectify our predicament. The results have not been promising. We have assessed our current state of land use conversions and realized, be it ever so gradually, that we must establish a concept of sustainability into out plans for future growth.

New sustainable planning constructs have produced some encouraging results in an ecosystem management context on our federally managed lands. We have seen the creation of more

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reasonable policies for resources production and ecosystem protection. We have witnessed the restoration and rehabilitation of habitats and the recovery of endangered species from the edge of extinction. We have prevented soil losses due to erosion, and the improvement in water quality in our lakes and streams in many of our watersheds. In general we have seen an improvement in the quality of our environments.

The experience gained from the research conducted to build defensible resource management decisions on protected federal lands has proven useful in a much different arena. That arena is in the urbanizing environment where human densities, urban infrastructure, pollution, landscape conversions and destroyed or degraded habitats are all too common a condition. Urbanizing environments are different because the strategy of maximizing the use of landscapes for human needs is dominant. The strategy of protecting natural landscapes in this environment is, for the most part, an afterthought of any proposed master plans.

Ecosystem protection in these urbanizing environments is a topic that is now being addressed on many different levels by many different disciplines and professional groups here in the United States, Europe, South America as well as China and Japan. Urbanization is yet another phenomenon that validates the concept that humans are agents of ecological change. It would seem that we should choose more diliberatly the roles we carry out as change agents.

3. The problem

Planning for land use in the urbanizing environment of Spring, Texas was another example of the dilemma facing many communities. What planning concepts can be applied to these landscapes so as to protect the ecosystem structure and functions and still provide residential space, open space and recreation opportunity for its citizens? Two major scientific works were used to provide the planning effort with a central vision in which all objectives and goals would have significance.

The first work was a geographical study, the second was a theoretical work on ecosystem organization. Both works gave the planning team and the client the confidence needed to promote a plan that would ultimately need public support for funding.

4. Targeting the problem geographically

Robert Lang and Dawn Dhavale produced a paper entitled "Beyond Megalopolis: Exploring America's New Metropolitan Geography" (Lang and Dhavale, 2005). The study identifies 10 U.S. "Megalopolitan Areas" or clustered networks of metropolitan areas that exceed 10 million total residents (or will pass that mark by 2040). Six areas lie in the eastern half of the U.S. while four are found in the west. Urbanization contained within these regions has a population equal to France, Germany and the United Kingdom combined. That is by anyone's measure a problem suited for geographic analysis.

Geographer Jean Gottman commented, "the Megapolitan concept seems to have popularized the idea that modern cities are better reviewed not in isolation, as centers of a restricted area only, but rather as parts of "city systems" as participants in urban networks revolving widening orbits" (Gottmann, 1987).

The study was helpful in three specific instances. First the study identified Spring, Texas to be contained within the Gulf Coast Megalopolitan area. The client was informed of this geographic reality. They were aware that Cypress Creek Corridor was replete with expanding subdivisions. What they learned was that their segment of this massive drainage corridor was one of the few places where protective land use zoning could protect a forest adjacent to one of the largest public native forests in the Gulf Coast region namely, Mercer Arboretum.

Like most Megalopolitan areas this study defines urban areas already in place and the urbanized region about to experience landscape conversions that will harden them to ecosystem recovery if left to urban development. Knowing this fact the client was reinvigorated to get the master plan done. Having that plan allowed the client to demonstrate the value of purchasing the land and placing it into protective recreational and open space use.

Second, this area was strategically located to serve as an access node for a large portion of the North Harris County area. Access would serve not only Spring, Texas but also a larger number of residence in the northern portion of the greater Houston area. Houston is the fourth largest city in the country. Achieving protection status for these lands would help set a land planning precedent for open space in the Gulf Coast area.

Third, these two pieces of knowledge encourage the client to prepare a multi-tiered action plan to take place over the next 5 years. Included in these plans were three forms of financial support requests and three different volunteer programs to help in the construction of the various facilities planned.

All of these points made it possible for these urban conservationists to organize and focus their activities, their resources and their plans on the programs they wished to support for ecosystem protection. No longer did they have to guess at what landscape parcels to protect. By knowing the mega and micro geography of the landscape they knew best where to focus their efforts.

4.1. Simplifying the ecosystem spectrum

If we are to realize genuine protection of ecosystems (landscapes) within urbanized environments we must first know how to identify good candidates. It seems an impossible task to inventory, assess and select landscapes suitable for protection within the natural landscape continuum remaining within the urban environment. We have to determine what to protect and how to protect it.

"Making complex things simple is hard work". That statement was spoken to a graduate class in ecological assessment some 40 years ago. It made many of us wonder if we could actually make ecological information useful and understandable to the planning discipline. Fortunately for us Dr. Eugene Odum had already done the hard work. Today we take full advantage of his strategy of ecosystem development and his compartmental model (Odum, 1971). It was theoretical then. Today it has proven its worth and can be used to formulate a useful ecosystem

evaluation model for any urbanized area in need of ecosystem protection.

Odum promoted the use of bioenergetics to evaluate what kind of ecosystems one has and how to rank their value for planning. Early stage or young ecosystems are highly productive. Their rate of primary production (or total gross photosynthesis) *P* exceeds their rate of community respiration *R*. Their *P*/*R* ratios are greater than 1. Polluted environments have a *P*/*R* ratio of less than 1. Mature ecosystems approach a *P*/*R* ratio of nearly 1.

It has been discovered through numerous studies of this theory that there are valid reasons for applying this evaluation method to ecosystem protection activities. The theory is easily converted into a simple compartmental model. Productive ecosystem or growth systems have a *P*/*R* ratio greater than 1. Protection systems have a *P*/*R* ratio approaching 1. Urban-industrial systems (native systems) have a *P*/*R* ratio less than 1. Compromise systems or multi-use systems have mixes of protection or production and urban systems with *P*/*R* ratios of less than 1. If left unchecked these systems will reduce the protection or production systems to nonvital systems.

Odum's work allowed us to see the possibility of reducing the ecosystem matrix into a simplified continuum of component landscapes. It has several features that served the Spring, Texas project well. First complex landscapes such as wetlands can be converted from "Lacustrine, Littoral, emergent, non-persistent freshwater wetlands" to "production" landscapes. Vocabularies are therefore reduced to simple terms where scientists, politicians and special interest group people can communicate more effectively. Once communication is achieved understanding can follow.

Second, the time and money necessary to document the preciseness of the ecological character of landscape is not always available. This model allows for the evaluation of landscape character differences based on an index of ecological values delivered from representative landscape assessments of similar sites. This operation greatly expedites the planning process without inhibiting technical accuracy.

Finally, the model allows for the achievement of genuine ecological protection based on scientific principles. Rational land use policies must be based on recognition of the fundamental conflict of maximum production of urban environments and maximum protection of natural environments. Using bioenergetics to value any landscape gets at the basic purpose of ecosystem protection. That purpose should be the positive coexistence of humans, urban areas and natural environments.

There were five landscapes identified on the site in need of protection or restoration. These were: (1) maturing mixed forests (protection), (2) flooding riparian forests (protection), (3) fresh water wetlands (production), (4) fresh water ponds (production, low) and (5) upland grasslands (production). The master plan proposed protection zoning for landscapes #1 and 2. It proposed upgrade restoration activities for landscapes #3, 4 and 5.

4.2. Planning precedents

There was a third concern to be addressed. What planning precedents were there to guide the planning team? It was evident that the team needed good planning and scientific reference work to draw from. Once again the work done by other scientist was used to create an appropriate course of action. This time the source originated with the U.S.D.A. Forest Service Deputy Chief of Research and Development, Ann Bartuska.

She stated in her January 2005 report, "I see R&D's (research and development) relationship with the rest of the agency growing ever stronger in the new century as we continually seek ways to live in harmony with our dynamic environment. We can no longer afford to view the human community as something separate and apart from natural resources. The intercommunications between society and the environment are profound and must be the basis for our future science endeavors."

Several major themes that are engaging the larger scientific community have emerged as future drivers of our research and management programs. These include (Bartuska, 2005):

1. Restoration and recovery—managing with change.
2. Capturing value in ecosystems.
3. Linking land use and water.
4. Understanding social dynamics and resource use.
5. Providing urban natural resource leadership.
6. Considering the effects of globalization.

We were encouraged by the possibility of linking our project to such an organization's vision. More important we were encouraged to learn that the science Deputy Chief Bartuska spoke of is backed by data sets that span 80 years of research She stated, "We must maintain the fundamental disciplines but put them together in new ways to explore new frontiers. We must do a better job of linking science and practice." (Bartuska, 2005)

4.3. The products of the master plan

The master plan for the 156-acre site included 4.5 mile of primary hike and bike trails, site plans for three major parks within the site (90, 36, 9 acres) and restoration plans for the wetland landscapes found there. In addition new multi-use detention–retention facilities, new wetlands and ponds as well as active recreation sites were proposed.

The master plan was organized so that the concept of interconnections of the Community and the nearby natural environments would be upgraded for local residence and residence of the greater Houston area. Two primary goals of the plan were: (1) linking land use to water in ways that create new, upgraded landscapes while respecting the dynamics of regional drainage issues. (2) Capturing value in ecosystem found on site.

Wetlands and freshwater ponds found on site were low in biomass productivity due to low annual overland flow rates. The plan proposed ways to provide for more reliable year round water flows. The increased water on site would insure a higher vegetative growth in the wetlands. This in turn would benefit the local wildlife utilizing these wetlands.

The riparian and mixed forests would benefit from this water capture and rerouting concept. Drainage bioswales and retention–detention ponds would encourage local water infiltra-

tion and water uptake. Forest wildlife species would benefit from this planning concept.

Two secondary goals of the plan were: (1) demonstrate an understanding for the local and regional residents and their nearby resource use interests. (2) Provide assistance for local urban resource leadership.

Local residents had a demonstrated need to secure local, low cost recreational activities and access to nearby forests, wetlands and ponds. This plan was dedicated to making these needs a reality throughout the study site. Secondly the Timber Lane Utility District Leadership, the core of volunteer resident representatives responsible for all the local leadership for this master plan work, were well served by the creation of this master planning effort in a cost effective manner.

Commercial costs for this planning effort were far beyond what the community could afford. The partnering of the community with the nearby University allowed for this plan to come into reality. It was a win–win situation for both groups of people. The community got a professional level master plan at a reasonable cost. The 26 undergraduate seniors and three graduate students got an invaluable education in a real contest situation.

5. Conclusions

The purpose of this discussion is to see how, through a site-specific master planning effort, various components of the planning process are brought together and converted into meaningful action for both people and their environments. In a larger perspective the point to be made is related to our society and the question of the sustainability of our landscapes. To appreciate how this process works one has to know how society is organized.

Davis (1950) summarized the necessities of societal organization into four increasingly complex evolutionary stages. In stage one the maintenance of the population is important. This stage is concerned with supply of food, protection of its members and up keep of its numbers. In stage two there is considerable effort spent on the division of labor among the population. In stage three is even greater concern for the solidarity of the group in terms of contact between members, tolerance for and resistance against outsiders. In the fourth stage, the most advanced of all stages, there is concern for the perpetuation of the society itself (Davis, 1950).

One can see this explanation as an oversimplification of our present day situation. It is important to remember that making complex things simple is not only hard work, it is a necessity in order for us to understand how complexity operates within our society. As scientists, authors, educators and professionals we play a part in this grand scheme of life. We contribute to the means and methods by which our societies needs are met, protected and sustained.

Twenty years ago the notion of human interactions with outdoor urban environments was a matter of little interest to any, save a few environmental scientists. Today there exists a critical mass of research that has identified human needs related to nature and the role the environment plays in providing social interaction for nearby residents.

Today there is research being conducted to determine the best way to delineate Nation Park boundaries so as to preserve ecological structure and function for its nearby residential communities. Tomorrow there may be research completed that will prove the value of locating cooperative residential communities adjacent to a National Park.

Ann Bartuska is on to something. The interconnections between society and the environment are profound. What scientists, authors and motivated educators and environmental professionals do is to discover and make this information available to all of us.

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