SUSTAINABLE PLANNING?: DEFINING THE CONCEPT

By

Brenda G. Mathenia

A PLAN B PAPER

Submitted to

Michigan State University

in partial fulfillment of the requirements

for the degree of

MASTER OF URBAN PLANNING

Urban Planning Program

1992

ACKNOWLEDGEMENT

I would like to take this opportunity to thank **Dr. Thomas Lyons** for his assistance, and patience, while working on this Plan B. Not only did he provide academic guidance, but his faith, encouragement and enthusiasm, throughout my graduate program, have been invaluable. I would also like to express my best wishes to Dr. Lyons as he pursues fame and fortune in sunny southern California. You will be missed, but not forgotten. Thank you Tom!

I would also like to take this opportunity to thank *all* of the faculty and staff of the Urban Planning Program for making my graduate career at Michigan State three of the most memorable and successful years in my life. Particular thanks goes to Dawn Brown, our faithful secretary, for keeping me on the right path throughout the program, and for providing immeasurable help and guidance in my quest for the ever elusive M.U.P.

TABLE OF CONTENTS

INTRODUCTION

The purpose of this paper is to establish a coherent and usable definition of sustainability for planners. The overall goal in attempting this, is to help planners understand and appreciate the importance of the interrelationships between humans and their environment. There is a movement, one planners can ill afford to ignore, towards reestablishment of a gentler, more humane relationship between man and nature. Sustainability, and the various concepts associated with it, is one way in which humans can begin to make positive steps toward healing the already battered and bruised earth, as well as make plans for future actions which will ensure a long and healthier life for the planet and all the life it hosts.

DEFINING SUSTAINABILITY

Webster's New World Dictionary, 2nd Edition, defines sustain, the root of sustainability, as "1. to keep in existence; keep up; maintain or prolong; 2. to provide for the support of; specifically, to provide sustenance or nourishment for."[1] Any activity that is sustaining is, therefore, created to keep something "in existence".

Defining sustainability for use by planners is not an easy task. Currently, there is much literature concerning sustainable agriculture, sustainability of biological diversity, as well as sustainable development. But what, if anything, do these terms mean to planners? Obviously, sustainability in terms of development is the most relevant, since

---

[1] Guralnik, David B., ed., Webster's New World Dictionary of the American Language, 2nd Edition, (New York: Simon & Schuster, 1986).

planners typically are involved in the development of, and activities involving, urban areas. Again the question of what is sustainable development arises.

If we take Webster's meaning, then sustainable development could be defined as development which is designed to maintain or prolong something, perhaps a community: to keep in existence whatever that particular development affects. That seems clear enough, but the real question comes when deciding exactly what qualifies as being sustainable development. Until we can establish criteria for what actually constitutes sustainable development, as well as a way to implement these activities, we will make precious little headway to truly effecting positive change for our cities, towns, or our earth.

Because of this lack of understanding of what sustainability actually means in terms of activity and action, it is crucial that we look at the definitions and uses of sustainability criteria and concepts found in other disciplines. This is due to the fact that other disciplines, agriculture and biology in particular, have been dealing with these same terms and concepts much longer than the social sciences (e.g.: planners). By examining their definitions, their concepts, programs, successes and failures, we can synthesize a much clearer picture of what planners are facing, today and in the future, in terms of sustainability issues. We can also begin to arrive at some conclusions about how to begin implementing the appropriate changes in order to have effective sustainable development activities actually occurring.

Before beginning a discussion of sustainability it is important to understand that any definition will be relative to the particular discipline which is involved. The

particulars, will be vastly different from case to case, but the underlying concept, will remain constant. We must remember Webster's words, "to keep in existence", in order to truly appreciate the importance of being able to define or act to encourage true sustainability. This is as true for the biologist as it is for the planner.

SUSTAINABLE AGRICULTURE

Sustainable agriculture deals largely with concerns over soil erosion and degradation, long term food production potentials, pollution caused by agricultural practices, and the impacts agricultural policies have on the agricultural industry and the earth as a whole. The concept of sustainable agriculture has led scientists to "focus on soil as an ecological community and to examine the long term impacts of farming practices."[2] This is an important statement, since the entire concept of sustainability has its roots in biology and ecology. By looking at an activity as being merely one small link in the chain that makes up the whole, sustainability (long term existence) can be achieved. This sounds rather familiar in that it is reminiscent of the reasons comprehensive planning is encouraged, the need for a holistic approach to planning. The farmer is the prototype for humankind. He prospers only insofar as he understands the land and by his management maintains its bounty.[3] We must begin to manage and understand the land, and the processes which affect it, for our own prosperity.

---

[2] Charles Benbrook, "Protecting Iowa's Commonwealth: Challenges for the Leopold Center for Sustainable Agriculture," Journal of Soil and Water Conservation 41, no. 2 (Mar/Apr 1991): 89.

[3] Ian L. McHarg, Design With Nature, (New York: Natural History Press, 1969), 29.

Soil erosion is one area of concern worldwide. Sustainable agricultural practices are aimed at limiting, if not stopping, the unnecessary loss of fertile soil due to inappropriate farming practices. This is an effort to maintain, and prolong, the production capabilities of our earth. Much of the soil erosion problems can be solved by utilizing intelligent farming practices such as strip farming, maintaining wind breaks, not farming marginal lands, alternating crops, etc. But soil erosion is but one small part of sustainable agriculture. An important area that is much more difficult to focus on than are physical activities, is the economic mechanisms which encourage poor farming practices. These policies reward for over-production of farm land, farming on marginal lands, and heavy reliance on pesticides and fertilizers to produce large cash crops rather than encouraging wise farming methods such as alternating crops, which may not make as much money, but will help to nourish and replenish the soil. "Agricultural production can only be sustained on a long-term basis if the land, water, and forests on which it is based are not degraded."[4] We must begin to pursue and utilize methods which will sustain agricultural production.

Sustainable agriculture is a complex and involved process, but one that is being acted upon. Ignoring the problems is what caused them to become so large in the first place. (Americans should be familiar with agricultural crisis. The Dust Bowl of the 1930's was largely a result of poor farming practices which turned the farmland of the plains into a virtual desert.) The important thing is that corrective action is taking place. Conservation farming practices are being stressed throughout the country, and there is

---

[4] World Commission on Environment and Development, Our Common Future, (Oxford: Oxford University Press, 1987), 133.

a greater awareness of the importance of protecting the soil for the future. Specific policies that protect the resource base are needed to maintain and even enhance agricultural productivity.[5] Unfortunately, policy changes are slow to follow. There must be a change in the tax and monetary incentive systems which encourage farmers to cultivate marginal lands, and to produce single large, and often easily destroyed, cash crops. These same policies produce surplus foods which affect the state of agriculture, poverty and dependence in developing nations. There is a long road ahead, and a bumpy one at that, but the journey has begun. Planners can and must learn about the obstacles and shortcuts to success by understanding more about the war being waged to encourage sustainable agricultural practices.

SUSTAINABILITY OF BIOLOGICAL DIVERSITY

Biological diversity is a catch-phrase which proliferates in current literature related to loss of habitat, species extinction, even global warming. Most know it is important, but few truly understand what it means and the role it plays in survival of the human species.

Reid defines biodiversity as "the variety and variability of living organisms and the ecological complexes in which they occur; the variety of the world's species, including their genetic diversity and the assemblages they form.[6] Biological diversity

---

[5] Ibid.

[6] Walter V. Reid and Kenton R. Miller, Keeping Options Alive: The Scientific Basis for Conserving Biodiversity, (Washington D.C.: World Resources Institute, 1989), 106.

is, in very simple terms, the variety of forms of life which exist in one place. Biologists use this concept in studying the long term health and prospects of a variety of organisms as well as their habitats. Much in the same way that a diverse economy will fair better during economic recession or depression, than one based on a single industry, so can a natural community survive natural alterations or man-made changes better if there exists a variety of life forms.

Many people associate biological diversity with the "lower" life forms, the conservation movement and natural resources protection. They also assume the loss of a few species here and there will not affect them. As we proceed through the last decade of the 20th century we are finding that humans and human activity is intimately linked to the natural environment and the health and diversity found within. The unity and balance of the natural environment is conditioned by the complex interrelationships between each of the major sub-systems of the biosphere. Each is self-sustaining in the natural state, yet intimately linked with the stability and progress of the other sub-systems. Because of this linkage, a human modification of one part of one sub-system can be translated into a series of repercussions which can ultimately influence, if not disturb each of the other sub-systems, and thus the biosphere as a whole.[7] Accordingly much study is being carried out in an attempt to understand and limit the damage to natural systems caused by human selfishness and ignorance.

According to James Gustave Speth, President, World Resources Institute,

". . . the world is being impoverished as its most fundamental capital stock - its

---

[7] C. C. Park, Ecology and Environmental Management, (Kent: Wm. Dawson & Sons Ltd., 1980), 62.

> species, habitats, and ecosystems - erode. Not since the Cretaceous Era ended some 65 million years ago have losses been so rapid and great. If the trend continues, one quarter of the world's species may be gone by 2050. Desertification, fisheries collapse, tropical deforestation, - such losses already attest amply to how much biological impoverishment costs humans today."[8]

It is crucial that humans begin to view themselves as an integral part of the biosphere, rather than as lord and master of all they see. Planners can play an important role in stressing "the urgency of protecting natural areas and communities and wild species because of the need to increase understanding of the functions of the biosphere and of the operation of balance mechanisms."[9] Until mankind's superior attitude changes, there is little hope that man will realize the importance of maintaining the greatest amount of diversity of species and organisms possible. Currently, humans benefit from the varieties of food crops and medicines which come from the existence of a wide variety of plants and animals. According to the World Commission on Environment and Development "scientists have intensively investigated only one in every 100 of Earth's plant species, and a far smaller proportion of animal species. If nations can ensure the survival of species, the world can look forward to new and improved foods, new drugs and medicine, and new raw materials for industry.[10] Humanity also benefits from other products, besides food and medicine, such as the elegance of tropical woods used in fine furniture production to the more general aesthetic benefits of natural

---

[8] Reid, v.

[9] R. F. Dasmann, "A Rationale for Preserving Natural Areas," Journal of Soil and Water Conservation 28, 1973: 114-117, in C. C. Park, Ecology and Environmental Management, (Kent: Wm. Dawson & Sons Ltd., 1980), 34.

[10] World Commission, 147.

beauty and variety. Unfortunately there is a misconception that preserving biological diversity, including habitat, species, etc., is diametrically opposed to economic development. We are learning, however, that sustainable economic development is actually dependent on the sustained availability of natural resources. In the U.S. alone, for example, agricultural crop-breeding programs, which utilize genetic diversity, "add an estimated $1 billion annually to the value of production."[11] From coal, and other energy sources, to tropical rain forests and strong genetic crops, production/economic activity must rely on some resource. All the resources we use are part of that natural, biological diversity, and we must preserve it in order to survive ourselves.

HUMAN ECOLOGY AND SUSTAINABILITY

Human ecology studies the relationships of humans and their environment. Unfortunately, for centuries, man did not see himself as part of the environment. Rather he pictured himself above, able to effect change and be affected by change, but not really as a link in the ecological chain which exists. Man is, however, only one of the species of organic life in the biosphere, and , like all life forms, exists only in interrelation with all others. The precise degree of interdependence may seem remote and tenuous at times, but it is, nonetheless, real.[12]

Humanity is inextricably connected to nature. We eat, are housed, have

---

[11] Office of Technology Assessment, Technologies to Maintain Biological Diversity, OTA-f-330, (Washington D.C.: Government Printing Office, 1987), 3.

[12] John McHale, The Ecological Context, (New York: George Braziller, 1970), 57.

medicine, simply survive because of what nature provides. Humans however, have taken nature for granted, assuming it will always provide. Without protection, much of the resources we rely on for day to day activities will be used up or destroyed in some other fashion, much sooner than we will be able to replace them, leaving a collapsed and devastated environment and economy. We must reverse this trend, and we must begin now.

As the richest nation on earth we must lead the way in reorganizing priorities and values. Attitude adjustments along with solid policy changes are the only way we can work to undo some of the damage that has already taken place and to ensure that the situation does not get worse. Once our priorities are set in the U.S., only then can we propose to take our "knowledge" and "technology" to the developing nations in order to assist them with development and the protection of their natural environment.

SUSTAINABILITY AND PLANNING: A DEFINITION

According to the World Commission on Environment and Development sustainable development refers to development that meets present needs without compromising the ability of future generations to meet their needs.[13] This is a very broad definition which can apply to a very broad array of activities. To establish a definition for planners there must be a focus toward the types of duties which planners perform. The central role of the planning profession is that of information gathering, evaluation and synthesis. Planners are not the final decision makers, rather their role is

---

[13] World Commission, 43.

"essentially to ensure that decisions are made by elected representatives from a position of informed knowledge."[14]

A single, specific definition for planners is difficult because of the variety of activities which planners are involved in. A definition of sustainability or sustainable development for planners might be as follows:

> Sustainable development involves planning activity which encourages the pursuit of development types and land-use policies and regulations which ensure the protection of the ecological systems vital to life, while providing the means to encourage positive, long-term, sustaining economic development activities which are not wholly dependent on non-renewable resources and which tend to provide equitable opportunities for all persons.

For planners this means knowing the difference between sustainable development activities and those that are not. This is, perhaps, an overwhelming responsibility to place on the planner, but it is one that can no longer be ignored.

Planners act as information gatherers and advisors to policy makers. With the right knowledge, and an understanding of the importance of their activities, planners can play a major role in reshaping the types and the location of new development. It is important for planners to become ecologically aware in order for them to make a positive influence on development that is both economically and ecologically sound. Planning is a synthesizing activity and the skills of most planners lie in this area. It is here that the "interface between planners and ecologists occurs in much the same way that interaction

---

[14] R. D. Roberts and T. M. Roberts, Planning and Ecology, (London: Chapman and Hall, 1984), 8.

occurs between planners and many other specialist professions."[15]

Planners talk of revitalization and economic development in order to bring quality of life and prosperity to residents of urban and rural locations. As important as economic development is, we must begin to fully understand the linkage between man-made economic development and growth and the source of the resources we use which allow for growth: the linkage between human and natural systems. Through ecology, biology and other life and natural sciences, it has been well established that life, of all kinds, exists as separate pieces of a huge, interrelated, complex web which makes up LIFE. Man is just beginning to realize his place in this system, but he has much more to learn and to understand.

An example which illustrates the lack of understanding concerning the concept of sustainability is found in the conflict occurring between industry and conservationist in the Northwest. The battle between protectors of the spotted owl and the logging industry is at the front of this dispute. Logging interests believe the forests must be opened up to provide a living for loggers, and to generate economic activity for the region and the country. Conservationist are opposed to this on the grounds that the spotted owl, which has already lost much habitat to earlier logging activities, will become truly endangered leading to the eventual loss of the species. Both sides make a point, but the logging industry fails to see the importance of strictly limiting the amount of logging in order to preserve our nation's ability to produce forest products for the long term. If we are not careful with our natural resources, the Northwest will be depleted of timber in much the

---

[15] Ibid.

same way as the state of Michigan was in the 19th century. As is clear, there is little activity in the logging industry in Michigan anymore. Loggers are thinking and acting in the short term, while we must begin to think in the long term if sustainability is to be achieved.

Of course, close management and limitations will result in unemployment for many loggers, but that does not have to be the end of their prosperity. As changes are made in industry focus, and the number of jobs decrease in resource intensive industry, such as logging, there are many more jobs which can be created which rely on less resource intensive activities. As we switch from heavy use and reliance on natural resources, to a more sustainable structure of less use and more reuse, industries designed to recycle and reuse waste and scraps from traditional industries can begin. Here lies the basis for a new generation of economic growth, prosperity, and environmental protection.

Of course none of this will happen until Americans change their attitudes toward natural resources; policy makers take the lead and create appropriate policy for sustainability; we reach true crisis status in terms of pollution, natural resources depletion, economic depression; or all of the above. Let's hope that with timely action and effort we, planners in particular, can help influence and make policy changes happen which will keep us from reaching the "crisis" point.

CRITERIA FOR SUSTAINABLE DEVELOPMENT

While much of the current literature on sustainable development focuses on

developing countries, we can use the criteria established in the literature to form the base from which our own planning activities can begin.

Critical objectives for environment and development policies that follow from the concept of sustainable development include:

1. reviving growth
2. changing the quality of growth
3. conserving and enhancing the resource base
4. reorienting technology and managing risk
5. merging environment and economics in decision making[16]

From these objectives we can guide the activities of planners in attempting to make sustainable development a reality. These objectives are based primarily on the needs and requirements which developing countries face in coming to terms with sustainability. In planning, these are the types of objectives which can easily make up elements of local, regional and or state comprehensive planning efforts. In the United States the major emphasis of our move toward sustainability will be in the area of policy change and legislation. We, as humans, will also have to "change something in our social structure,"[17] our habits of life, and our expectations in regard to resource use and

---

[16] World Commission, 49.

[17] Ann Chisholm, Philosophers of the Earth: Conversations with Ecologist, (New York: E. P. Dutton & Co., Inc., 1972), 21.

our relationships to these resources and other life forms.[18] As Kenneth Boulding states in his essay, The Economics of the Coming Spaceship Earth, "we must make the transition from using the earth as if its resources are limitless, and start thinking in terms of recycling precious materials," as well as "stop assuming that increased production and consumption are inevitable and desirable."[19]

The primary responsibility for change will lie with our elected representatives. These elected officials rely on staff, such as planners, to provide them with the information on which they base their decisions. A quick look at ways to meet the aforementioned criteria may help planners begin to establish ways to effect change.

Reviving Growth:

Growth needs to be encouraged since that is what drives the United States economy. Managed growth is, however, the kind of growth we need. The growth management movement in this country is an attempt to limit and control growth which often focuses on capacity of systems, and environmental issues. This is the direction in which planning should continue to move with corresponding policy and legislative changes to strengthen current practices. Florida's state level growth management legislation is a good example of the type of planning activity that can be achieved.

---

[18] Ibid, 8.

[19] Kenneth Boulding, "The Economics of the Coming Spaceship Earth," quoted in Ann Chisholm, Philosophers of the Earth: Conversations with Ecologist, (New York: E. P. Dutton & Co., 1972), 29.

Unfortunately, Florida is not able to truly claim foresight in planning, because as all too often happens, tough legislation occurs in response to critical circumstances.

Planners need to begin pushing for tough legislation designed to guide growth as well as protect environments. They also need to begin utilizing, more thoroughly, methods of analysis such as Environmental Impact Assessment and carrying capacity analysis in order to help quantify and back-up decisions to act to control growth.

Change the Quality of Growth:

Growth needs to be changed from the historical reliance on industry which is intensive in energy use, material use and waste production, toward economic activity rooted in diversity and renewable and recycled resources in order to ensure sustainability. Additionally, growth needs to address the equity issue, by targeting small businesses, which offer sustainable jobs and security, rather than the continued chase after the big money interests such as General Motors. Diversity is the key, and a diverse and adaptable economy, like a diverse and adaptable ecosystem, is a sustainable economy. Economic development is unsustainable if it increases vulnerability to crisis.[20], therefore, greater attention to new, high technology, service and small businesses would provide for a more sustainable economy and environment than does reliance on a single corporation such as General Motors.

---

[20] World Commission, 53.

Conserving and Enhancing the Resource Base:

There must be policy created which deals effectively with the high consumption rate of resources in this country. Including emphasis on public transit, higher density development (limiting sprawl), recycling and reuse of resources in industry and manufacturing as well as consumer recycling and reuse.

We must actively pursue stronger policies to provide for the protection of agricultural land and to ensure that sustainable farming practices are implemented on a large scale.

The creation of new policies and strengthening of existing laws and legislation aimed at the protection of biodiversity (species and habitats) is necessary. This is imperative since protection of species and their habitats will provide the raw material for development of new food sources, new human medicine, and future economic activity as well as the continued supply of current resource needs. Protection should be provided if for no other reason than the intrinsic value humans place on life.

Enhancing the resource base will also allow the continued reliance on non-renewable resources such as coal and oil until the time when renewable resources can take their place on a large scale.

Finally, policy and legislation which conserves and enhances our resource base will help protect the natural regulating capabilities of earth, so that all life forms, including human, can continue to thrive.

Reorienting Technology:

Present technological capabilities and those being research, must be reoriented towards activities that use less material, are more efficient, and can utilize waste from other technologies as a resource. Research and development activities for such reorientation must be encouraged through increased support and funding at the national level.

Additionally, there needs to be in place, at the national level, policies which ensure, through incentives and disincentives, that commercial organizations find it worthwhile to take fuller account of environmental factors in the technologies they develop or use.[21] This will result in not only greater protection for the environment but will provide the necessary incentives to encourage technological advances to increase efficiency, and decrease environmental impacts.

Merging Environment and Economics in Decision Making:

Reorganization of institutional arrangements is necessary to provide that those making economic decisions are also responsible for making environmental decisions. One cannot operate independently of the other with any chance of both needs being met.

There must be a change in attitudes and objective and institutional arrangements at all levels of government. The sectoral fragmentation between industry types and government agencies must be overcome so that industry and government begin to work together in dealing with ecological and economic problems. There must also be a shift

---

[21] World Commission, 60.

in personal and corporate attitudes as well as changes in the legal and institutional policies which enforce common (i.e., air, water, natural resources) interests. Our "commons" must be protected if any hope exists for sustainability.

Additionally, there must be an increase in community knowledge and support for ecologically sound planning efforts. A grass roots movement demanding protection for the environment is necessary. A movement which can help to ensure that our elected officials respond to the needs and desires of the many, over the needs and desires of the few (primarily the moneyed interests). Increasing education and knowledge of ordinary citizens is the key to building this "grass roots" constituency for the environment.

Finally, environmental objectives must be built into taxation, prior approval procedures for investment and technology choice, foreign trade incentives, and all components of development policy.[22] This will provide for much of the pro-active protection measures which must be in place to make sustainability possible.

PLAN FOR ACTION/RECOMMENDATIONS

What can planners do to become better prepared to meet the sustainability issue head on and provide sound knowledge and advice? First, and foremost, planners must become or stay aware of the latest in ecological/environmental issues. By taking formal course work, planners can be prepared with a strong natural resources/ecological background which will provide a solid base from which further inquiries can begin as relates to various jobs or developments. If formal training is not feasible or desired, then

---

[22] Ibid, 64.

the planner should become well acquainted with a local ecologist or specialist in natural resources so they may feel comfortable in calling upon that person, on a regular basis, for advice and information.

As well as knowing the ecological side of issues, planners must be aware of the variety of ways in which development can impact the environment. Some of this can be accomplished by being aware of the ecological issues, but not all. The use of ecological methods such as impact analysis and carrying capacity analysis may provide the additional information necessary to make a more informed decision.

One such method, the Environmental Impact Assessment (EIA), which stems from the National Environmental Policy Act of 1969, requires the federal government, or proponents of an action which involves federal money, and which significantly affects the environment, to demonstrate that they have carried out an assessment of the environmental consequences of their proposals. This assessment is made in the Environmental Impact Statement (EIS) which describes the environmental impacts likely to arise from the action and from alternatives to it.[23] These assessments are not currently required at local levels, except when federal monies are involved. Expanded use of this type of analysis should be sought by local, regional and state planning agencies to ensure comprehensive examination of development impacts.

Carrying capacity analysis, as a planning tool, studies the effects of growth (a requirement of sustainable development,) - amount, type, location, quality - on the natural and man-made environment in order to identify critical thresholds beyond which

---

[23] Roberts, 99.

public health, safety or welfare will be threatened by serious environmental problems.[24]

This planning tool, provides a means for planners to examine natural, man-made, social and/or economic systems which interact to affect the capacity of the land to accommodate growth. Analysis can provide the basis of implementing land use controls, allowing planners to direct growth to the most appropriate areas.

Both carrying capacity analysis and environmental impact assessment provide the means for examining, in a holistic or systemic manner, the effects of growth and development on environmental as well as man-made systems. Even if the actual analysis is not carried out, the concepts of carrying capacity and environmental impact assessment suggest that developments should respect the functioning of the natural processes of the environment, which is nearly as valuable as any specific technical report generated with these techniques.[25]

Methodologies such as these not only provide for a thorough examination of the effects of a specific activity, but they also "form the basis for subsequent discussion, public participation and the final decision-making process which progress through a series of clearly defined steps."[26]

Planners must also take the initiative in dealing with developers. They need to work with developers to ensure that the necessary requirements or changes are made in

---

[24]Devon M. Schneider, David R. Godshalk, and Norman Axler, The Carrying Capacity Concept as a Planning Tool, Planning Advisory Service Report #338, December 1978, (Washington D.C.: American Planning Association, 1978), 1.

[25] Ibid., 10.

[26] Roberts, 99.

the design or conceptual stage of development, so that both the ecological and economic concerns of a community can be met. Planners can also act as educators to developers, citizens and decision-makers alike. They must strive to provide information which will drive home the importance of finding the right balance between nature and development. Through their role as educators, planners can encourage the adoption of additional legislation which will provide the appropriate authority to act to protect the environment as well as providing direct protection to the environment.

Finally, planners must begin to utilize available planning tools, such as zoning, transfer of development rights, etc., to prevent ecological damage from occurring. Through hard learned lessons we are beginning to realize that it costs much less to prevent a mishap than to react to it after the fact. The costs of ignoring potential ecological effects of human activities are well illustrated by the discharge of kepone pesticide into the James River of Virginia, a tributary of Chesapeake Bay.

> Between 1966 and 1975, the pesticide kepone was discharged from the manufacturing plant directly to the sewage treatment plant in Hopewell, Virginia, saving the manufacturer approximately $200,000 in pollution control costs. Kepone killed sewage-digesting micro-organisms, resulting in the discharge of inadequately treated sewage, and kepone, into the James River. A 150 km stretch of river was closed to fishing indefinitely, with sport and commercial fishery losses estimated at $20 million during 1975-1980. The company has so far paid $13 million in pollution fines. Two company executives were also convicted and fined.[27]

From the previous example it is clear to see that had the manufacturer taken responsibility for the technology they were producing, and not dumped the pesticide as

---

[27] Walter E. Westman, Ecology, Impact Assessment, and Environmental Planning, (New York: John Wiley & Sons, 1985), 5-6.

they did, everyone would have profited. As it is this "laissez faire" attitude toward environmental effects of development cost millions of dollars in lost revenue for fisheries, millions in clean-up costs for the company, and the loss of healthy organisms in the James River and Chesapeake Bay.

Planners have the tools to effect growth and development in their cities and regions, but need the assistance of science and legislative authority to fully tackle the task of promoting sustainable development. An important issue that must be addressed before local planners can advance is the lack of national involvement in environment and economic development. Until national legislation is passed requiring strict environmental requirements, polluters and industry which do not want to be regulated, on a state or local level, will use economic blackmail to water down local development and ecological controls. If national goals are set, and maintained, local communities will have much greater success establishing the tough controls and regulations which will provide for sustainable development.

Through the use of impact assessment and carrying capacity analysis, planners can give strength to the land use controls which they desire to implement. More importantly, these tools, along with traditional planning tools, allow the planner to apply a holistic approach to controlling development and protecting the ecological basis for human survival and prosperity.

CASE STUDY

The following case study examines a community which utilized the concept of

carrying capacity to facilitate development plans and regulations in order to preserve the character and environmental integrity of their town.

CITY OF SANIBEL, FLORIDA:[28]

Sanibel is a low-lying sand barrier island just offshore from the City of Fort Myers in Lee County, Florida. Long world famous for its shelling beaches, Sanibel developed slowly during the first 63 years of this century. In 1960, when Hurricane Donna passed just to the east of the island, the permanent population on Sanibel was approximately 30. In 1963 a 2-1/2 mile causeway was extended to the island, thus opening the island to automobile access and an accelerated pace of growth and development.

On November 5, 1974, the residents of Sanibel voted to incorporate, and on December 16, 1974, the City of Sanibel assumed responsibility for the public health, safety and welfare of the island and immediately set out to prepare a comprehensive plan for the island. The City of Sanibel was formed in response to Lee County's laissez-faire approach to the development of the island, and is one of the earliest examples of carrying capacity planning.

The planning process employed by the City was based on Ian McHarg's Design With Nature, and the well known Medford, New Jersey, plan. Detailed surveys of the

---

[28] The following case study example is adapted from Charles L. Siemon, "Carrying Capacity Planning: Rx for the Future?," in Implementation of the 1985 Growth Management Act: From Planning to Land Development Regulations, ed. Barbara C. Brumback and M.J. Marvin, (Fort Lauderdale: FAU/FIU Joint Center for Environmental and Urban Problems, 1989), 9-38.

natural and built environments were carried out, and projections were made as to the impact of various levels of growth on the natural and built environments and the fiscal integrity of the city. Pursuant to the dictates of its charter, the city decided that new growth and development should be limited to that which could be supported by existing and planned public service infrastructure. The Sanibel City Council determined that its carrying capacity plan would have to account for the character of the community. Since Sanibel was a medium-intense, semi-tropical resort characterized by natural resources (including the Ding Darling National Wildlife Refuge), the city determined that its character could only be maintained if the total number of residential and hotel housing on the island were limited to 7,000-9,000 dwelling units (far less than the 35,000 dwelling units that Lee County's zoning would have permitted).

Chief among the limiting factors (i.e., water and sewer facility capacity) was hurricane evacuation. Sanibel had been overtopped by hurricanes on at least four separate occasions during the last century. The city council decided from the outset that as a matter of policy, each resident and visitor should have a reasonable opportunity to evacuate from the island in the event of a hurricane.

Sanibel Island had a restricted capacity for the evacuation, since the capacity of the causeway and bridge leading to the island was finite, and the hurricane evacuation warning period was limited. Carrying capacity was derived from a careful analysis of the capacity of the island's access system available for evacuation after a hurricane warning period was posted.

The narrow two-lane causeway to the mainland was determined to have an

evacuation capacity of approximately 650 vehicles per hour. That number of vehicles was then translated into a total number of households that could be accommodated (assuming that each household would evacuate in its own automobile so that valuables and pets could be protected during evacuation.

Calculations based on household sizes and the number of hours available for evacuation yielded a maximum number of dwelling units that could be developed and still have a reasonable evacuation opportunity available to all residents of the island.

Hurricane evacuation, however, was only one of several "limiting factor" analyses that were carried out for the city in its carrying capacity analysis. The consultants also considered the capacity of the island's existing and planned roadway system, the capacity of natural lands to absorb further development, the capacity of the island's potable water sources, and a number of subjective measures of the quality of life. The city council reacted to the conclusions of the study by imposing a density limitation on development that ensured that the population on the island would not exceed its carrying capacity. Supportable growth was then allocated throughout the island on the basis of environmental character and the availability of public services.

Limiting growth and development to an amount that did not exceed the carrying capacity of Sanibel's natural and built environments has proven to be very successful in protecting the social, economic and environmental character of Sanibel. Moreover, the fiscal benefits of a carefully and reasonably planned community have been translated into very significant increases in land value.

As a land planning experiment, Sanibel was an ideal laboratory because it was an

island, uninfluenced by the land use decision of its neighboring municipalities. Nevertheless, the experiment still serves as a sound demonstration of the value of carrying capacity planning because it worked.

This is an excellent example of the holistic or systemic approach to planning which is necessary to achieve true comprehensive planning and sustainable development. Carrying capacity analysis is one method that has been shown to work.

There are, of course, drawbacks to carrying capacity analysis including the fact that there is little reference material available, aside from collective experience and examples done by planning agencies, on exactly how to complete an analysis. Carrying capacity analyses are not easy to do, depending on the complexity attempted. Methods for measuring capacity range from subjective interpretations of natural resource inventories to simple arithmetic calculations to complex computer modeling techniques. Just as in any analysis, the variable selected and assumptions made greatly influence the reliability of the results.[29]

Besides the technical difficulties encountered in carrying capacity analysis, as well as other forms of analysis, there is the political and legal problems which must be dealt with. Political resistance will likely come from the pro-growth community if carrying capacity results are translated into growth management policies.[30] Legal challenges to any tough growth management policies should also be expected and planned for. If the policies are written well and provide specific information, planners can limit the legal

---

[29] Schneider, 8.

[30] Schneider, 9.

challenges which could result in the weakening or elimination of the growth controls.

There are also many concerns directed at the equity issues resulting from limiting the amount of growth. In Sanibel, the planning program of the city has resulted in very significant increases in land value. Opponents of carrying capacity planning argue that it shuts off future development when an area is deemed "full," which in turn may drive up prices for existing housing. Poor people with no power to control resources will be forced to live elsewhere.[31]

This is a legitimate concern and one that planners must face. In pursuing sustainable development will low income individuals and families be removed from attaining the quality of life and other benefits that result from well planned development practices. Not necessarily, but the issue will have to be addressed directly. For example, Sanibel Island has limited its dwelling units to between 7,000 and 9,000. To provide equity, city officials could designate that a certain percentage of available housing be for low income families. It may not be a perfect solution, but it can and does work.

For sustainable development, this type of analysis and planning is the right activity at the right time. More needs to be done, and with case studies like the City of Sanibel, Florida available, other communities can begin addressing their environmental, social and economic needs and concerns in ways which provide sound planning solutions.

---

[31] Siemon, 30.

CONCLUSION

This paper has attempted, and I believe, succeeded in defining sustainability and sustainable development in terms which planners can more easily understand and utilize. It remains, however, a difficult and challenging concept to understand or act upon.

Through the understanding of ecological processes which are at the basis of all life, humans can begin to truly understand the importance of approaching growth in a holistic manner. Life of all kinds is intimately linked, and what is detrimental to one form of life will eventually have a negative effect on other (human) life.

Four environmental principles help to sum up the need for humans to understand, respect and protect the natural world.

1. Nothing actually disappears when we throw it away.
2. all systems and problems are ultimately if not intimately inter-related.
3. We live on a planet whose resources are finite.
4. Nature has spent literally millions of years refining a stable ecosystem.[32]

By understanding and accepting the concepts which form the basis for these four principles, planners will be well prepared to enter the sustainability battleground. Agriculture, biology, and ecology have been dealing with sustainability for a long time. It is time for the social scientist to employ the same processes and criteria to issues which humans, the most social of all animals, are facing.

---

[32] Park, 62.

Development which provides for a variety of activity, life forms, and habitats will be sustainable development. Controlling the type, rate and location of human growth will ensure that other life forms and their habitats can survive. This survival is necessary for the long-term prosperity of humanity as well as for the intrinsic value of the maintenance of all life.

Sustainable development can be achieved with hard work and clear goals. Planners can play an important role in moving our society toward sustainability through various methods of land use controls, their role as educators, and finally through their understanding and abilities to quantify the needs of ecological systems versus man-made systems. They however, cannot do it alone. Major shifts in human values and attitudes, as well as changes in institutional and economic policies will be necessary before any prolonged and positive movement toward sustainability can truly begin.

Works Cited

Benbrook, Charles. "Protecting Iowa's Commonwealth: Challenges for the Leopold Center for Sustainable Agriculture." Journal of Soil and Water Conservation. Mar./Apr. 1991, vol. 41, no. 2, pp. 89-95.

Brumback, Barbara C. and M. J. Marvin, ed. Implementation of the 1985 Growth Management Act: From Planning to Land Development Regulations. Fort Lauderdale: FAU/FIU Joint Center for Environmental and Urban Problems, 1989.

Chisholm, Ann. Philosophers of the Earth: Conversations with Ecologists. New York: E. P. Dutton & Co., Inc., 1972.

Guralnik, David B., ed. Webster's New World Dictionary of the American Language, 2nd edition. New York: Simon & Schuster, 1986.

McHale, John. The Ecological Context. New York: George Braziller, 1970.

McHarg, Ian L. Design with Nature. New York: Natural History Press, 1969.

Office of Technology Assessment. Technologies to Maintain Biological Diversity, OTA-f-330. Washington D.C.: Government Printing Office, 1987.

Park, C. C. Ecology and Environmental Management. Kent: Wm. Dawson & Sons Ltd., 1980.

Reid, Walter V. and Kenton R. Miller. Keeping Options Alive: The Scientific Basis for Conserving Biodiversity. Washington D.C.: World Resources Institute, 1989.

Roberts, R. D. and T. M. Roberts. Planning and Ecology. London: Chapman and Hall, 1984.

Schneider, Devon M. , David R. Godshalk, and Norman Axler. The Carrying Capacity Concept as a Planning Tool. Planning Advisory Service Report #338. December 1978. Washington D.C.: American Planning Association, 1978.

Westman, Walter E. Ecology, Impact Assessment, and Environmental Planning. New York: John Wiley & Sons, 1985.

World Commission on Environment and Development. Our Common Future. Oxford: Oxford University Press, 1987.

Literature Reviewed

Allaby, Michael. A Guide to Gaia: A Survey of the New Science of Our Living Earth. New York: E.P. Dutton, 1989.

Benbrook, Charles. "Protecting Iowa's Commonwealth: Challenges for the Leopold Center for Sustainable Agriculture." Journal of Soil and Water Conservation. Mar./Apr. 1991, vol. 41, no. 2, pp. 89-95.

Budd, William W. "What Capacity the Land?" Journal of Soil and Water Conservation. Jan./Feb. 1992, vol. 42, no. 1, pp.28-31.

Chisholm, Ann. Philosophers of the Earth: Conversations with Ecologists. New York: E. P. Dutton & Co., Inc., 1972.

Clark, W.C. and R.E. Munn, eds. Sustainable Development of the Biosphere. Cambridge: Cambridge University Press, 1986.

DeGrove, John M., ed. Balanced Growth: A Planning Guide for Local Governments. Washington D.C.: ICMA, 1991.

Dixon, John A. and Paul B. Sherman. Economics of Protected Areas: A New Look at Benefits and Costs. Washington D.C.: Island Press, 1990.

Doyle, Derek. "Sustainable Development: Growth Without Losing Ground." Journal of Soil and Water Conservation. Jan./Feb. 1991, vol. 41, no. 1, pp.8-13.

Guralnik, David B., ed. Webster's New World Dictionary of the American Language, 2nd edition. New York: Simon & Schuster, 1986.

Jacobs, Harvey M. "Planning the Use of Land for the 21st Century." Journal of Soil and Water Conservation. Jan./Feb. 1992, vol. 42, no. 1, pp. 32-34.

McHale, John. The Ecological Context. New York: George Braziller, 1970.

McHarg, Ian L. Design with Nature. New York: Natural History Press, 1969.

McHarg, Ian L. "Green the Earth, Heal the Earth." Journal of Soil and Water Conservation. Jan./Feb. 1992, vol. 42, no.1, pp. 39-41.

National Research Council. Ecological Knowledge and Environmental Problem-Solving: Concepts and Case Studies. Washington D.C.: National Academy Press, 1986.

Odum, Eugene P. Basic Ecology. Philadelphia: Saunders College Publishers, 1983.

Office of Technology Assessment. Technologies to Maintain Biological Diversity, OTA-f-330. Washington D.C.: Government Printing Office, 1987.

Park, C. C. Ecology and Environmental Management. Kent: Wm. Dawson & Sons Ltd., 1980.

Reid, Walter V. and Kenton R. Miller. Keeping Options Alive: The Scientific Basis for Conserving Biodiversity. Washington D.C.: World Resources Institute, 1989.

Roberts, R. D. and T. M. Roberts. Planning and Ecology. London: Chapman and Hall, 1984.

Sargent, Frederic O., et. al. Rural Environmental Planning for Sustainable Communities. Washington D.C.: Island Press, 1991.

Schneider, Devon M., David R. Godshalk, and Norman Axler. The Carrying Capacity Concept as a Planning Tool. Planning Advisory Service Report #338, December 1978. Washington D.C.: American Planning Association, 1978.

Shen, Susan. "Biological Diversity and Public Policy." Bioscience. Nov. 1987, vol. 37, pp.709-712.

Spirn, Ann W. "Designing with the Land." Journal of Soil and Water Conservation. Jan./Feb. 1992, vol. 42, no. 1, pp. 35-38.

Westman, Walter E. Ecology, Impact Assessment, and Environmental Planning. New York: John Wiley & Sons, 1985.

World Commission on Environment and Development. Our Common Future. Oxford: Oxford University Press, 1987.