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PLANNING AND ENVIRONMENT

by

Dale Leitch

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PREFACE

What was my objective in writing this thesis? Stated simply, it was to gain for myself a better understanding of what is involved in the term "environment", while at the same time gaining some understanding of how the planning profession could aid in dealing with that environment.[1] My hypothesis was that the environment is a much more complex entity than is generally believed and that planning must in some way, begin to deal with this complexity.

With such a wide-ranging topic the production of a "definitive" statement was not, of course, possible and indeed the thesis was not undertaken with the thought of attaining any final answers or conclusions. Furthermore, in order to allow for a process of internal self-correction during the preparation of the thesis, the title chosen was purposely a broad one.

It is inevitible that a work such as this be affected by personal biases. My academic background is the very general one of Environmental Studies. City

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[1] In the Preface and Introduction, the terms "planning" and "environment" are used in the generic sense. Their meaning within the thesis will be discussed in Chapter I.

Planning, which in large measure also involves a general approach, forms another part of my background. As a result of this strong general background, my interest in the environment has always been more with the relationships between things than with the things themselves.[2] The study of planning has strengthened my desire to apply this approach to situations in the real world rather than to be content with the approach as an intellectual viewpoint.

In the final analysis, the thesis, along with the profession of planning itself, is based on the assumption that man can consciously act to improve his situation in the environment.

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[2]The need for, as well as the essential characteristics of, this approach are well explained in; H. Winthrop, Ventures in Social Interpretation, (New York: Appleton Century Crofts Ltd., 1968), pp. 1-16.

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I would like to thank Professor M. Carvalho for his advice and encouragement during the preparation of this thesis and as well during my period of study at the Department of City Planning.

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INTRODUCTION

During the past decade, there has been a steadily increasing concern about the state of the man-environment relationship. The forthcoming United Nations Conference on the Human Environment, to be held in Stockholm in June 1972, is one indication of this growing concern. While the concern may be approaching global dimensions, it is certainly true that different societies have different perspectives on what action (if any) should be taken to alter this relationship. In this thesis however, the emphasis will be upon what can loosely be termed "North American society", first of all because it is the one in which the thesis is being written and secondly because it is the one for which most data are available.

The thesis is divided into five chapters. Chapter I will deal with the meaning of the terms "planning process" and "planning". The notion of "environment" which will be employed throughout the thesis will also be developed in this first Chapter. Chapter II will review the operation of the city planning profession within this notion of "environment". Chapter III will

discuss the basic properties of the natural environment and the ways in which mans' activities interact with and affect that environment. Chapter IV will trace the history, reasons for, and consequences of, society's increased concern for the environment. Finally, Chapter V will take cognizance of the environmental complexity revealed in Chapters III and IV and investigate the application of a social indicator approach to the environment.

CHAPTER I

SOME BASIC NOTIONS

Planning

The terms "planning process" and "planning" will often be employed in this thesis. Hence their meaning, as understood here, will briefly be set down.

Although the planning process must be conceived of as a whole, it can, for the purposes of discussion, be disaggregated into the following steps;

a) the identification of goals

b) the survey and analysis of the past and present, as well as the prediction of the future

c) the formulation of concrete, attainable objectives as a result of the survey and analysis

d) the development of specific programs to achieve these objectives, and

e) the implementation of these programs

The first two steps can be seen as involving an analysis or "taking apart" of elements in the environment, while the final three can be seen as involving a

synthesis or "putting together" of these elements. Furthermore, in order to account for continual changes in the environment and the accumulation of new knowledge over time, these "steps" in the planning process are inter-related by means of feedback loops. Thus in reality, the planning process exhibits on-going iterative properties.[1] This process then can be applied at any level - an individual business enterprise, a settlement, a region, a nation or even a world-wide basis. The primary concern in this thesis however, is its application on a settlement level.

Secondly, within this thesis, the term "planning" will refer to the conscious application, either in whole or in part, of this "planning process".

Environment

Planning, along with other disciplines and professions, deals with the environment. Other disciplines such as engineering and psychology study this environment from a particular or specialist point of view. Elements not relevant to their specialty are screened

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[1]Appendix A contains a diagrammatic representation of the "planning process".

out.[1] Planning, on the other hand, does, or at least should, concern itself with all aspects of the environ ment. Scottish biologist and town planner Patrick Geddes claimed that planners should employ a "synoptic vision" by which he meant that cities, regions, nations or whatever else was under consideration, should be seen and understood as wholes rather than as series of unrelated parts.[2] This definition of synoptic bears a close relation to the philosophical doctrine of holism put forward by J. C. Smuts, in which he claimed that the sensible objects and things of which we are aware in the world are actually active energy systems in space-time and hence should be seen more as events than as objects. Smuts thus called for a "holistic" view and claimed that

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[1] This is not to intimate that the specialist's point of view is somehow wrong or inadequate. Indeed, planning requires the insights of specialists. The point to be made is that by understanding how a specialist views the environment, the planner can come to a better understanding of his own position vis à vis the environment.

[2] P. Geddes, Cities in Evolution (New and Revised Edition), (London: Williams and Norgate Ltd. 1949.) p. 6.

Geddes also defined synoptic as the recognition and utilization of the points of view of all the specialists involved in the study of the environment. See p. 114, of Cities in Evolution.

> "Things are more than their apparent structures, and their 'fields' must be considered as complimentary to their full operation and understanding. A thing does not come to a stop at its bounding surfaces ....it is overflowing action it passes beyond its bounds, and its field is essential not only to its correct appreciation as a thing, but also to a correct understanding of things in general and especially of the ways in which they affect each other."[1]

In order to have a synoptic or holistic view of the environment, we must first have some notion, even if only an elementary one, as to what is involved in the term "environment". The remainder of the chapter will address itself to this task.

Geddes saw the world (and here we may substitute "environment") as composed of the "out-world" and the "in-world" - that is, the perceptible observable environment and the inner environment of thoughts, feelings and intellect.[2] He diagrammed this notion in the following manner;

out-world	1	4	facts	acts
in-world	2	3	memories	plans

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[1] J. C. Smuts, Holism and Evolution, (New York: Mac Millan Co., 1926), p. 336.

[2] P. Geddes, op. cit., pp. 205-213.

Geddes further perceived the "out-world" to be composed of a folk-work-place trilogy. "Folk" refers to the human occupants of an area and their social insitutions; "work" refers to their economic insitutions; while "place" denotes the physical, inanimate environment, both natural and man-made. These three elements inter-relate in a complex manner to produce;

WORK-PLACE	the physical area wherein one carries on his occupation - eg. field, factory or university.
FOLK-PLACE	all types and classes of residences
PLACE-FOLK	those people indigenous to a particular area
WORK-FOLK	one's fellow workers
FOLK-WORK	an individual's occupation
PLACE-WORK	the natural advantages of an area - that is, its intrinsic suitability

While Geddes' classification is useful, the ensuing discussion requires that the environment be viewed in a somewhat different manner. However, Geddes' classification will be supplemented and not supplanted. The alternative classification has been developed so as to provide for consistent terminology within the thesis. Hence it may or may not have more general application outside the bounds of this thesis.

What is sought here is a sharper differentiation than Geddes provides between that part of the environment shaped by man and that part not yet so affected. Given the fact that most of the earth, and indeed even the moon have been, to a greater or lesser extent, affected by man and his activities, the differentiation being sought is admittedly a somewhat artificial one. Nevertheless, its utility will hopefully become apparent as the thesis progresses.

In the present context, the environment is seen as consisting of the "human environment" and the "non-human environment". Further, each of these has a "biotic" (that is a living) component and an "abiotic" or non-living component. Thus:

HUMAN ENVIRONMENT (MAN)

biotic - man and his social, economic and political institutions

abiotic - man-made artifacts such as streets, buildings, machines

NON-HUMAN ENVIRONMENT (NATURE)

biotic - plants and animals (other than man)

abiotic - rocks, minerals and other non-living matter

As is the case with folk-work-place, the above categories are not mutually exclusive; they are complexly inter-

related to form a whole that will be referred to as the "inclusive environment". This altered classification then, makes explicit what is involved in Geddes' notion of "place". In turn, the Geddes classification clarifies the notion of "human biotic environment."[1] Hence;

HUMAN-BIOTIC	FOLK and WORK
HUMAN-ABIOTIC	1 aspect of PLACE
NON-HUMAN-BIOTIC	1 aspect of PLACE
NON-HUMAN-ABIOTIC	1 aspect of PLACE

The major <u>relationships</u> within the inclusive environment can be described in the following manner;[2]

1. <u>The human biotic/human abiotic relationship</u> - This relationship has long been of prime concern to the profession of architecture and is becoming of increasing interest to the disciplines of sociology and psychology.
2. <u>The non-human biotic/non-human abiotic relationship</u> - For the purposes of this thesis, it is assumed that this relationship is adequately taken care of by natural processes.

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[1] For a diagrammatic representation of these two classifications see Appendix B.

[2] Appendix B Diagram (ii) shows these relationships graphically.

3. <u>The human abiotic/non-human abiotic relationship</u>
<u>The human biotic/non-human biotic relationship</u>

These two relationships can be considered together as the "human/non-human environment relationship". It is this relationship which is of primary consideration in the thesis.

CHAPTER 11

THE PLANNING PROFESSION AND THE ENVIRONMENT

In the previous chapter we saw that Geddes called for the use of a synoptic vision by planners, a vision which would conern itself not only with the interrelationships of folk, work and place, but also with the various specialist points of view involved in understanding the inclusive environment. Restated in terms of the altered notion of environment developed, we can say then that the planning profession should concern itself with the interrelationships between the human environment, both living and non-living, and the living and non-living components of the non-human environment.[1] In the planning profession, as in many areas of human endeavor however, there is a significant gap between what some feel <u>should</u> occur and what actually <u>does</u> occur. Thus it is important to understand how planning, as a professional operation, has conducted itself within the notion of environment developed above.

The greatest impetus to the development of a city planning profession in North America is generally considered

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[1]A diagrammatic representation of the area planning involvement is shown in Appendix B.

to have been the Chicago World Exhibition of 1893 with its revival of classic styles in architecture and city design. The broad paved roads, reflecting pools, green areas, statuary, massive buildings, electrification and hidden utilities, fired the imaginations of many who came to see the Exhibition. These people took back with them to their own towns and cities, a desire to improve their communities by similar, if smaller scale, means. This era of planning history, dating from about 1893 until about 1912 was known as the City Beautiful Movement.[1] At this time then, the emerging profession of city planning was in effect, architecture on a city-wide scale, and its efforts were directed towards the production of design drawings, according to strictly determined design principles, for the future physical growth or improvement of a city. There was also a sincere belief that the social and economic (that is the human biotic, or work and folk) problems being exposed by social workers and others interested in the city, could be solved by the designed improvement of the human abiotic environment. While the belief that such a properly de-disgned environment could determine human behaviour, was an over reaction, it is certainly true that the manipulation

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[1] Mel Scott, American City Planning Since 1890, (Berkeley, University of California Press, 1969) pp. 47-110.

of the human abiotic environment can facilitate, influence and even make possible and probable some types of human behaviour.[1] However, within this view of planning's relation to the environment, it was not possible to explain why "undesirable" socio-economic conditions persisted in "properly" designed environments or why favourable conditions could sometimes be found in the most "undesirable" human abiotic surroundings.

In 1899, during the era of the City Beautiful and again in 1923, Geddes came to America on lecture tours. Although he had a profound effect on some individuals in the planning movement, his views were not greatly recognized or applied.[2] The reasons for this lack of recognition are legion[3] and include the fact

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[1] See: E.T. Hall The Hidden Dimension, (New York: Doubleday and Co. 1966)

R. Sommer, Personal Space: The Behavioral Basis of Design, (Englewood Cliffs: Prentice-Hall, 1969)

[2] American urban historian and social critic Lewis Mumford is one of the most ardent followers of Geddes' thought and acted as Geddes' aide during his second lecture tour of the United States. See P. Boardman, Patrick Geddes: Maker of the Future, (Chapel Hill: University of North Carolina Press, 1944), p. 412.

[3] J.E. Page, S.J., The Development of the Notion of Planning in the United States 1893-1965, PhD. Dissertation, (University of Pennsylvania 1966), pp. 84 - 85.

that the United States, based largely on a system of stiff competition, was not ready early in the Twentieth Century, for a point of view which stressed the importance of co-operation. Furthermore, cities and counties in the United States were delegated so little power by the Federal government that, even if they had wanted to, they could not have effectively applied Geddes' ideas. In addition, Geddes' mercurial mind, along with his complex and often rambling presentations, resulted in what has come to be called "a failure to communicate."

Nevertheless, within the restrictive bounds set for them, American city planners, particularly after the heyday of the City Beautiful, were attempting, in a crude way to employ a synoptic view by engaging in what they termed "comprehensive planning." This approach was synoptic in the sense of utilizing the viewpoints of the various specialists involved in city-building. Thus there was constant discussion as to what should constitute the "elements" of the comprehensive physical plan of a city. Hancock relates that between 1910 and 1920, the major "elements" included financing and administration, zoning-planning law, streets, transportation, industrial, recreation and land planning and housing.[1]

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[1] J. Hancock, "Planners in the Changing American City, 1900-1940", Journal of the American Institute of Planners, XXXIII (September 1967), p. 295.

This orientation towards the elements of the human abiotic environment on the part of the planners, was due in large part to the fact that early membership in the realm of professional planning was heavily represented by the professions of engineering and architecture. In 1917, the 76 man roster of the American City Planning Institute, now the American Institute of Planners (A.I.P.), consisted of 23 engineers, 18 landscape architects, 12 lawyers, 10 architects, 6 realtors and 7 others.[1] Hence as Page relates;

> "The planners were only seeing one facet of life, that which they were trained to perceive. Quite naturally, they construed 'comprehensiveness' within the ambit of what they thought constituted the important elements of city life."[2]

The comprehensive plan, or as it is presently known, the "master plan" or "development plan", has continued to deal primarily with the human abiotic environment. The master plans produced today however, have a greater appreciation than did the earlier comprehensive plans, of the complexity of this environment. Earlier plans saw the relevant "elements" in a static relationship with each other, while later plans have

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[1] Ibid., p. 296.

[2] J.E. Page, S.J., op. cit., p. 195, footnote 24.

been more aware of the dynamic nature of these relationships, largely because of the tremendous powers of calculation provided by the development of the computer during and after World War 11.

As a practicing profession then, city planning has attempted to improve conditions in the human biotic environment by manipulating elements in the human abiotic environment. There has however, been an increasing understanding of this environment, for;

> "Each generation had the experience of the previous generation of effort to build upon. Each generation was forced by circumstances to get a better grasp of just how complex 'comprehensive' really was."[1]

What then of concern for the non-human environment in the profession of city planning? As indicated above, landscape architects, along with engineers and architects, figured prominently in the early development of the planning profession. Their influence was seen in the inclusion of recreation as one of the "elements" of a comprehensive plan. By means of parks and park-like areas, the non-human environment was introduced into the human environment in order to provide beauty and ostensibly to improve the "health" of the city. This was especially true in the development of new towns and

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[1] Ibid., p. 195, footnote 24.

suburban residential areas, one of the most famous of which in the United States was Radburn, New Jersey.[1] In Radburn, begun in 1928, the houses faced onto large, landscaped interior parks which were contiguous with the individual lots. It was assumed that these inner parks would be used for recreation and that here, children would be protected from automobile traffic. In Winnipeg, the Wildwood area of Fort Garry was designed in a manner similar (although not identical) to that of Radburn.[2]

Thus city planning has made use of the non-human environment but as a study by Galloway and Huelster shows, has rarely considered the effects that developments in the human environment would have on its non-human counterpart.[3] By means of a social science technique known as content analysis, these authors have analysed the American professional city planning literature covering the years 1950-1969 to ascertain the extent to which city planning has concerned itself with these effects.

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[1] The use of the non-human environment in the design of living areas is closely connected with the Garden Cities Movement begun in England in the late 19th.Century by Ebenezer Howard. See C. Stein and H. Wright, Towards New Towns for America, (New York: Reinhold Co. 1957)

[2] For comparison of Radburn and Wildwood see;
V.J. Kostka, Neighbourhood Planning, (Winnipeg, 1957), pp. 104-107.

[3] T. Galloway and R. Huelster, "Planning Literature and the Environmental Crises", Journal of the American Institute of Planners, XXXV11, July 1971, pp.269-274.

The literature analyzed included the Journal of the American Institute of Planners, the annual A.I.P. conference proceedings, and the American Society of Planning Officials monthly Newsletter. The former is the journal of the professional planning organization in the United States, while the latter is the organ of a semi-professional planning organization.

The researchers stated that during the interval studied, the city planning profession had given only marginal attention to the effects on the non-human environment. The authors claimed that such marginal attention was due to the lack of adequate knowledge of these effects and as well to a general unconcern for them in most of the disciplines and fields closely allied with planning.

Galloway and Huelster thus drew the conclusion that the profession of city planning has followed, and not led, the increasing societal interest in the relationship between the human and non-human environments.[1] Within the time period considered by the researchers, their conclusion is valid insofar as it applies to the profession as a whole. It must be remembered however,

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[1] The development of "environment" as a social issue is discussed in Chapter 1V.

that certain individuals within the realm of planning have made this relationship their special interest. For example, landscape architect-planners such as Ian McHarg and Carl Steinitz have developed techniques to ensure that, as far as possible, developments in the human abiotic environment are compatable with conditions existing in the non-human environment.[1] That their work is not mentioned by Galloway and Huelster can be attributed to the fact that neither McHarg nor Steinitz contributed articles to the publications analyzed.

Furthermore, the profession as a whole is now giving more concern to the relation between the human and non-human environments. In March of 1971, the American Institute of Planners adopted an official policy statement which gave recognition to the importance of considering this relationship in applications of the planning process.[2]

Hence, an understanding of what is involved in the term "environment" must include a basic knowledge of the processes operating in the non-human environment.

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[1] See: Ian McHarg, Design With Nature, (Garden City: The Natural History Press, 1969).

[2] This policy statement is reproduced as Appendix C.

CHAPTER 111

MAN IN THE BIOSPHERE

Along with other living organisms, man exists in a thin envelope of air, water and soil known as the biosphere. Its bounds are set vertically in the atmosphere at about 6.25 miles, downward to the known depths of the ocean (about 36,000 feet) and into the first few thousand feet of the earth itself where living organisms have been found.[1] However this envelope of life has an irregular shape, since it is surrounded by a transition region in which some dormant life forms as spores may be present. This occurs for example, in parts of Antarctica and the hottest deserts.

Properties of Non-Human Ecosystems

Within the limits of the biosphere exist its life support systems - the major ecosystems such as oceans, grasslands, marshes, forests, lakes and rivers. An ecosystem is considered to be a unit of biological organization made up of all the biotic components (plants, animals and

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[1] J. McHale, "World Facts and Trends", Futures, Vol. 3, (September 1971), p. 221.

microbes) in a given area, interacting with the abiotic or non-living components (water, gases, minerals, wind, light and heat) in an energy-dependent fashion.[1] Within ecosystems can be identified major cycles such as the energy cycle, water cycle, oxygen cycle, nitrogen cycle and as well, various mineral cycles.

Ecosystems, whether oceans or forests, all receive the bulk of their energy in the form of sunlight. This energy is used in the photosynthetic process in which the carbon dioxide in the atmosphere is assimilated into energy-rich carbon compounds. The flow of energy through any ecosystem is a one-way process in which energy losses occur along each link in the food chain. For example, in Lapland reindeer lichen capture energy from the sun and through photosynthesis, this energy serves as a food base for reindeer which in turn are eaten by men. Furthermore, during photosynthesis, plants take up a number of inorganic elements and compounds including nitrogen, and phosphates. These nutrients are passed along in the food chain as well, but unlike energy, are not diminished and may even become more concentrated. In addition, decomposers such as bacteria and fungi release basic elements back into the abiotic environment, thus making them available for

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[1]For the basic concepts of ecology see;
E.J. Kormondy, Concepts of Ecology, (Englewood Cliffs: Prentice-Hall Inc. 1969)

re-use by the biotic components.

Hence because ecosystems are fundamentally circular processes, they are subject to numerous feedback effects and thus exhibit non-linear responses to change. For example, if the nutrient level of water becomes so great as to stimulate the rapid growth of algae, (in a process known as eutrophication), the dense algal population cannot be long sustained because of the built-in limitations of photosynthetic efficiency. The light required for photosynthesis that can reach the lower parts of the algal layer becomes sharply diminished as the thickness of the layer increases. Hence the overgrowth of algae quickly dies back, again releasing organic debris that stimulates further growth. Although eutrophication is a natural process that occurs over a geological time span, the organic wastes disposed of by man vastly increase the rate of this natural process.[1]

The feedback characteristics of ecosystems result in amplification and intensification of processes. Because, in food chains, small organisms are consumed by larger ones, the concentrations of certain substances in the bodies of animals at the top of the food chain results. Smaller organisms always have a much higher

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[1] The most widely known case of accelerated eutrophication is Lake Erie. In this regard see: C.F. Powers and A. Robertson, "The Aging Great Lakes", Man and the Ecosphere, (San Francisco: W.H. Freeman and Co. 1971), pp. 147-155.

metabolic rate (that is, rate of food use) than larger ones, so that the amount of their food oxidized relative to the amount incorporated into their body is greater. As a result, animals at the top of the food chain must consume a larger number of organisms lower down in the food chain. Therefore, any non-metabolized material present in the lower oganisms will become concentrated in the body of the top one.

Another important property of ecosystems is that of succession. This is a slow but orderly process of development in which each species alters its physical environment and that of its associates such that it eventually precludes its own and sometimes others existence, while in the process, providing a new set of conditions which can be tolerated by some other species. Thus an open field no longer cultivated, goes through a series of different stages which may eventually result in a stable or climax ecosystem, providing there is no interference from man or any cataclysmic natural event such as an earthquake. A climax ecosystem results when no other combination of species is able to replace the one presently existing. Although the stability of the climax is not fully understood, it relates

to its greater complexity. Thus the more advanced the ecosystem, the more complex its function and the more diversified its flora and fauna. With such complexification then, there is less likliehood that any major change in one component will adversely affect the entire ecosystem. Thus a climax ecosystem has a great deal of internal resiliance. Although such resiliance is not infinite, it allows incremental changes to be absorbed.

Human society, through its technology, is one of the prime agents of change in non-human ecosystems.[1] Particularly through his agricultural and industrial activities, Western man has produced significant effects on these ecosystems. Such effects have caused further changes, both intended and unintended, in the human environment. Some of these effects will be discussed next, not in an attempt to catalogue every environmental change induced by man, but rather to demonstrate the fundamental interrelatedness of the human and non-human environments.

Agriculture and ecosystems[2]

When man lived as a hunter, fisherman and collector

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[1]"Technology" can be defined as "... the combination or totality of techniques employed by people or at a given period for the purpose of adaptation to their (non-human) environment." H.P. Fairchild, Dictionary of Sociology and Related Sciences, (New Jersey: Littlefield Adams) p. 317.

[2]See L.R. Brown, "Human Food Production as a Process in the Biosphere" Scientific American, Vol. 223, (September 1970), pp. 160-174.

of wild plants, his numbers were small and his technology extremely limited, with the result that the impact on the biosphere and its ecosystems was correspondingly small. With the domestication of plants and animals some 9000 - 11,000 years ago however, man began to shape the biosphere to his own ends. In agriculture, he was able to achieve this by halting ecological succession in its earliest stages when productivity is high, thus preventing a particular ecosystem from moving to its more stable and less productive stages. This ability to expand the capacity of the earth for food producing resulted in increases in human population which necessitated further alteration of the biosphere in order to meet food needs. Increased productivity meant also that some people could be freed from agricultrual duties - thus resulting in specialization of human activities and the establishment of permanent settlements.

Until the Twentieth Century, increased need for food was provided primarily by expanding a nation's frontiers and bringing under cultivation, previously undisturbed land. As a result, croplands now occupy some 10% of the earth's total land surface. In this Century, the disappearance of accessible frontiers has necessitated the more intense cultivation of existing

croplands. This has been achieved with the production of higher-yielding plant species and as well by the extensive use of chemical fertilizers and the chemical control of diseases, insects and weeds. Thus increased production has been achieved by preventing ecosystems from moving to their more stable and less productive stages. Modern agricultural controls reduce the number of non-human organisms competing with man for food. Such a practice results in decreased complexity of the ecosystem - in effect - large monocultures which, while resulting in greater food production, also lead to a decline in the resiliance of the ecosystem. As long as there is sufficient resiliance, such agricultural practices can proceed successfully since through the use of pesticides, fertilizers and so on, a crop can be returned to its simplified equilibrium condition of one crop and no competitors.

However, because of the aforementioned properties of ecosystems,[1] poisons used to control pests have effects on populations other than those they were designed to control. Hence, pesticides not only reduce the incidence of specific pests, but also of their competitors and predators. Over a number of years then, the pest population

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[1] Supra., pp. 21-24.

may become resistant to a particular pesticide because the most persistent of the species have survived previous applications. The use of pesticides has significant short-range advantages such as increases in crop yields and improved quality of crops. In addition, there is a reduction in the frequency of years with very low crop yields with the result that there may be a corresponding reduction in the cost of producing food. However, over the long term, there arises a need for either a heavier application of pesticides or the development of new ones.

Furthermore, it is well known that high concentrations of pesticides have acute effects on non-human life. Although it has been established that even the most remote human populations have traces of certain pesticides (notably D.D.T.) in their body tissues, the effect on the general population of these concentrations is not known adequately. This very uncertainty itself however, may produce anxieties which generate harmful effects. Except in cases of direct contamination through the handling or application of pesticides, these substances become concentrated in man by the contamination of the food chains he uses.

In light of the above-mentioned benefits of pesticide use, it becomes important to ask how the human need

for these benefits can be balanced against the damage caused to the non-human environment and the possible, but largely undetermined, long-range damage to humans. Three possible approaches include:[1]

- restrict the use of persistent, broad range pesticides such as the chlorinated hydrocarbons (D.D.T., dieldrin, aldrin, endrin, toxophene, lindane and chlordane).
- replace these pesticides by others that are aimed at specific pests and that are not persistent in the soil, water or air.
- regard pesticides as just one of a wider range of alternatives, including pest-resistant crops, the use of natural enemies to control pests and the sterilization of pests.

Particularly in countries such as the United States and Canada, modern agricultural techniques of chemical control, fertilization and mechanization have made it possible for fewer and fewer farm workers to produce the required agricultural output. This has been one of the factors operating in the population movements from rural to urban areas, with consequent intensification of problems for both areas. In the final analysis then, the modification of the non-human environment through changing agricultural practices has a profound effect on the human environment.

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[1] O.C. Herfindahl and A.V. Kneese, Environmental Quality, (Baltimore: Johns Hopkins Press, 1965) pp. 47-50.

Industry and Ecosystems

The non-agricultural activities of man have also had a significant impact on the ecological systems making up the biosphere. Before 1800, sources of power were limited to human and animal power, the burning of wood and as well, animal or vegetable oils, all of which represented the conversion of recently stored solar energy. Adverse effects on the biosphere were thus small. With the discovery that coal, when processed into coke, could be substituted for charcoal in the process of reducing iron, there occured rapid expansion in industry.[1]

Present-day industries produce a great many wastes which interact with and affect the biosphere in complex ways not yet fully understood. The three major recipients of these industrial wastes in the biosphere are the atmosphere, the hydrosphere (the water on the earth's surface) and the lithosphere or solid portion of the earth.

The atmosphere

In releasing the enrgy of fossil fuels such as

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[1]H. Brown, "Human Material Production as a Process in the Biosphere", Scientific American, Vol. 223, (September 1970,) p. 196.

coal and oil, man is, in effect, racing the slow cycles of the non-human environment, with consequent effects on the cycles themselves. The production of energy from fossil fuels results in the following wastes being discharged into the atmosphere; carbon dioxide, sulfer oxides, hydro-carbons, nitrogen oxides and solid particles. The major sources for these emissions besides industries include automobiles, electric power plants, space heating and refuse disposal.

The emission of carbon dioxide produces the greatest effect on the atmosphere and indeed its increase is the only one that has been accurately documented on a world-wide scale. From 1860 to the present, the concentration of CO_2 in the atmosphere has increased from 290 ppm (parts per million) to about 320 ppm or about 10%.[1] It has often been claimed that one of the consequences of such an increased concentration would be a world-wide rise in temperature since the carbon dioxide would produce a "greenhouse effect" by reducing the amount of heat energy lost by the earth to outer space. However, although the increase in concentration is certain, the effect on climate is still undetermined because of counter-active effects of changes in the degree of cloud cover and in turbidity of the atmosphere.

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[1] S.F. Singer, "Human Energy Production as a Process in the Biosphere", Scientific American, Vol. 223, (September 1970), p. 183.

Hydrocarbons are one of the most well-known emissions and are produced by the processing and combustion of petroleum in the internal combustion engine. When hydrocarbons react with nitrogen oxides in the presence of ultra-violet radiation, photochemical smog is produced. Human activities account for only 15% of total hydrocarbon emissions, with the balance being emitted from forests and other vegetation as well as from the processes of bacterial decomposition in the form of methane.[1] However, the 15% due to human activities is concentrated in urban areas which themselves may have peculiar meteorlogical conditions such as temperature inversions which intensify the effects of the smog. Los Angeles is the classic example of this situation. Photochemical smog has also been shown to result in the inhibition of photosynthesis in certain types of trees growing at considerable distances from urban areas. It has been claimed that smog concentrations of as little as .15 ppm have caused a 20% inhibition of photosynthesis within 60 days. This in turn is thought to impede the flow of protective pitch within the tree resulting in reduced resistance to insect pests.[2]

Sulfer products when removed from the atmosphere

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[1] Ibid., p. 186.

[2] Time Magazine, April 13, 1970, "City vs. Forest", p.55.

by precipitation increase the acidity of the rainfall and as a result, small lakes and rivers may show increased acidity that endangers their ecosystems. Winthrop claims that rain falling on Norway is saturated with sulfuric acid emitted from the factories of Britain and Europe, with the result that Norway's deer are growing smaller, since the acid is stunting the growth of lichen, their main source of food.[1]

The hydrosphere

Although the effect of industrial wastes on the hydrosphere has been studied more thoroughly than effects on the atmosphere, generalizations must be treated with caution. This is so because the causes and effects of wastes on water vary greatly from region to region and because a complex variety of substances and biochemical reactions is involved.

Wastes discharged into water can be classified either as degradable or non-degradable. Degradable or organic wastes are produced by the food, pulp and paper and chemical industries; as well, domestic sewage can be classified as degradable. When such organic wastes are

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[1]H. Winthrop, "Total Environmental Management", Futures, Vol. 2 (December 1970), p. 332.

released into a clean body of water, the bacteria in the water feed on the wastes breaking them down into inorganic compounds such as nitrogen, phosphorus and carbon. This process is termed "aerobic degradation"[1] and consumes some of the oxygen dissolved in water. If the amount of organic wastes becomes excessive, the water may no longer be able to supply sufficient oxygen for this process. Degradation will still occur however, but will employ oxygen found in substances such as nitrates and sulfates. As a result, gaseous by-products are produced, the water takes on a foul odor and looks black and bubbly. Such foul odors emanating from the Thames River in 19th Century London, resulted in the halls of Pariament being hung with sheets soaked in quicklime in an attempt to assuage the odor. When the stench became too offensive, Pariamentary recesses were called.[2] Plant nutrients, such as nitrogen and phosphorus, that are produced by aerobic degradation, may cause eutrophication.[3]

When the levels of oxygen dissolved in a body

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[1] Herfindahl and Kneese, Environmental Quality, p. 10.

[2] Ibid., p. 11.

[3] Supra., p. 22.

of water are low human activities such as boating and swimming can still be carried on safely. Because the degradation process lowers the aesthetic quality of a water body however, people are less likely to find these waters attractive for recreation.

Non-degradable substances placed in the hydrosphere include inorganic substances such as inorganic solid material, ordinary salts and the salts of numerous heavy metals. In large quantities these substances result in unpleasant taste, as well as corrosion and hardness in water. Also non-degradable are synthetic organic chemicals produced by the modern chemical industry. These enter water as industry effluent, from household uses (notably detergents) and agricultural uses. The bacteria in water cannot effectively attack the complex molecular strucutre of these substances. As a result, these synthetic chemicals and inorganic salts of metals are carried long distance in virtually unchanged form and are taken up into food chains. For example, mercury from industrial processes in Saskatchewan found its way into Lake Winnipeg and became concentrated in high enough levels in fish to arouse concern as to the safety of this fish for human consumption. As a result, commercial fishing was banned in Lake Winnipeg,

thus depriving a number of people, at least temporarily, of their livliehood.

Concentrations of these chemicals and metals have seldom reached high enough levels in public water supplies to present a severe danger to public health. Indeed, the establishment of direct cause-effect relationships between the presence of these substances in water for human consumption and the health of the general population is difficult because the substances enter the body in a number of complex ways - through water as well as through food and air. The situation is further complicated since it is thought that the presence of some of these substances in water may have a beneficial effect on human health; thus,

> "Several investigations have found a negative correlation between hardness of the drinking water of an area and death rates from degenerative cardiovascular diseases, i.e., soft water was associated with higher death rates. These variations are unexplained on dietary, racial or social bases. They have been observed in Japan, England, South Africa, The Canary Islands, Australia and the United States. Although the correlation appears to exist, its causative factors remain unexplained as of 1961."[1]

In the final analysis then, industrial wastes

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[1]California Water Control Board, Water Quality Criteria, (Sacramento, California, 1964), quoted in Herfindahl and Kneese, Environmental Quality, p. 18.

discharged into the atmosphere and hydrosphere have clearly demonstrable effects on the non-human environment. The human environment is thus affected to the extent that it makes use of the non-human environment. The attractiveness of certain natural areas for recreation may be significantly decreased and can range from the prohibition of swimming on one's favourite beach to the decrease in certain types of wildlife. Furthermore, those groups such as commercial fishermen and tourist lodge operators, whose livliehood depends directly on the non-human environment, are adversely affected, as are those people who make use of their products and services. However, direct effects on the health of the general human population are much more difficult to ascertain, since man is in the position of being exposed for prolonged periods to very low concentrations of these contaminants. The chronic effects on man of such extended exposure are just not adequately known.

The lithosphere

Along with the atmosphere and the hydrosphere, the lithosphere is a major recipient of wastes from human activities. It is most often solid wastes such as garbage, trash and old automobile bodies that are disposed

of on or beneath the earth's surface, although other wastes such as highly contaminated liquids or radioactive matter, may be disposed of in subterranean pits. Brown estimates that the amount of solid wastes disposed of per capita per year in the United States amounts to almost one ton.[1] The areas where the disposal of the more common materials occurs, are not only unsightly and destructive of surrounding property values, but also, run off from them may contaminate ground water supplies. Also, they provide breeding grounds for vermin. Effects on the human environment can thus be significant.

Many of the materials thrown away can, however be recycled; the principle of recycling is to regard the wastes as raw materials to be utilized. Hence the recycling and re-use of these materials through the economic production systems of the human environment can be seen as somewhat analagous to the cycles of elements such as nitrogen and phosphates in the non-human environment.[2] A crude form of recycling is the sanitary land fill in which untreated solid wastes such as garbage and trash are buried daily in layers,

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[1] H. Brown, "Human Materials Production as a Process in the Bioshpere", Scientific American, Vol. 223, (September 1970), p. 206.

[2] Supra., p. 21.

each layer being covered under several inches of compacted, impervious clay. In effect then, wastes are being used as construction material. In Winnipeg for example, the old Saskatchewan Avenue sanitary landfill site in the west end of the city has been turned into a useful park area.

However, as it becomes more difficult to find disposal locations within an economic hauling distance of an urban area, there is increasing pressure for more refined techniques of material recycling. Hence, techniques of metal shredding and compacting have been developed so that junked cars can be processed into a form suitable for recycling to the furnaces of steel manufacturers.[1] The cycling of wastes in domestic trash is complicated by economic factors since these wastes have to be transported to a cycling plant and also have to be separated into organic wastes, glass, metal and paper. This is considered an expensive undertaking and while some wastes are of high enough value that recycling is profitable - for example, scrap aluminum brings about $200 per ton - other materials such as scrap newspaper bring only about $5 per ton.[2]

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[1]Brown, "Human Materials Production as a Process in the Biosphere", p. 208.

[2]G. De Bell, The Environmental Handbook, (New York: Ballantine Books Inc., 1970), p. 215.

In order for recycling to be effective, DeBell claims that there is a need for legislation which would require the cost of disposal of a product to be incorporated into its price in the form of a tax.[1] In addition, legislation requiring the use of degradable or easily recycled containers - such as returnable soft drink bottles - is seen as a necessity. In the final analysis however, it is peoples' attitudes to a "throw away society" that must be redirected.

Pollution and Second Order Consequences

In summary, the placing of agricultural and industrial wastes into the bioshpere has negative effects on both the human and non-human environments. The examples mentioned above, plus a great many others not discussed, have most often been known by the term "pollution" which Webster's New World Dictionary has defined as making unclean, impure or corrupt. This emotion-laden term has been taken up eagerly by many concerned especially with the state of the non-human environment. It is well to remember however, that such pollutants can in fact be seen as normal by-products of man as a natural ecological agent and creative social

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[1] Ibid., p. 215.

being. Neither man nor any other organism can exist without producing wastes; hence man and his wastes are as much a part of the inclusive environment as are the microbe and its wastes. Thus the problem does not really lie in the production of wastes; rather it lies in their proper disposition. Hence an increasing emphasis on the treatment and recycling of wastes, will help to equalize the rapidly changing forces in the human environment with the more slowly changing forces operating in the non-human environment. In other words, there is a need for what is called a "balance" between the human and non-human environments. "Balance" however is a static concept which implies the measuring of equal parts of one static quantity against another fixed amount. We know that both the human and non-human environments are continually changing.

Furthermore, the properties of non-human ecosystems - non-linear responses to changes, amplification and intensification of processes and as well, diversity and complexity,[1] have resulted in unintended or second order consequences of human activities. For example, when the industries in Saskatchewan discharged mercury into water connecting

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[1] Supra., p. 22.

with Lake Winnipeg, it was not done with the express knowledge that such action would cause hardship for Manitoba fishermen.

Man has allowed these second order consequences to manifest themselves because technical developments, particularly in their early stages, have tended to be viewed as answers to an agreed problem and have thus tended to be judged in terms of their adequacy in solving that problem alone. Once these developments are put into operation they are difficult to remove, as cities that have attempted to restrict automobile use can well attest.

Technical advances such as automobiles, pesticides and fertilizers have always been closely linked with the notion of progress and indeed they have resulted in numerous benefits. Association with progress however, has meant that there have been biases against attempting to anticipate second order consequences of these advances.[1] It must be remembered though, that at the outset, such consequences are not always easily deduced and in many cases may be little more than matters

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[1]See Appendix D for a listing of some of the second order consequences that the automobile has produced in the inclusive environment.

of informed speculation. There is also a need to recognize that ethical questions may enter here - if a proposed development has demonstrable benefits for the human environment, but second order consequences on the inclusive environment that are highly uncertain or even unknown, should such a development be proceeded with? To solve this dilemma would require the knowledge of a particular case and hence it cannot be resolved in the abstract.

In the past decade however, there has been a growing general concern for the consequences of societys' activities, particularly as they affect the non-human environment. This has been popularly expressed as a concern for "environmental quality", a term which, as the Stanford Research Institute states, does not really refer to a specific problem.[1] It can be seen rather as a "problem classifying concept" for a group of more tangible problems, some of which have been discussed above. Hence the classifying concept is formed by abstracting common characteristics of these more tangible problems. In the case of environmental quality, the problems all deal with some aspect of the human/non-human environment relationship and further, revolve around the assumption that there can occur an improvement in that

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[1] O.W. Markley, D.A. Curry and D.L. Rink, Contemporary Societal Problems, (Menlo Park: The Stanford Research Institue, 1971), p. B-15.

relationship.

The concern has become so widespread (although not unanimous) that environmental quality has emerged as a social and political issue in North America.

CHAPTER 1V

THE ENVIRONMENT AS A SOCIAL ISSUE

A social issue is seen as a question or situation that has aroused concern within society and requires social or public (as opposed to individual) decision and action for its resolution. In North America, concern for the relationship between the human and non-human environments has become a social issue and as well a political one, as shown by the recent passage of legislation in Canada and the United States on air and water quality, highway beautification, solid waste management, and the establishment of open space reserves, parks, wildlife and wilderness areas.[1] What then are some of the factors that have caused this concern to arise?

Prior to the 1960's, preoccupation with national goals of employment, economic growth and defence in the context of the Cold War effectively prevented a widespread concern for issues relating to the human/non-human environment relationship. It must be remembered however that select groups of the public-at-large have always

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[1]N. Beckman, "Planning and Urban Development; Legislative Review - 1968-69", Journal of the American Institute of Planners, XXXV1, (September 1970), pp. 345-359.

evinced concern not only for the preservation of the visual beauty of the non-human environment, but also for its wise human use.[1] Furthermore, the public domain through early concerns for public (or environmental) health and conservation, has concerned itself with the relationship of man to the non-human environment. The histories of these two movements will be briefly reviewed in order to illustrate the background of the present concern for the human/non-human environment relationship.

The Environmental Health Movement

In the first half of the 19th Century, biomedical knowledge was unable to segregate unhygenic conditions of the human abiotic environment from the specific agents of disease. Although the disagreeable filth and odor were not the direct causes of the infectious diseases which concerned the public health officers, the lack of adequate sciences of micro-biology and immunology forced these officials to pursue the only course open to them - the sanitization of the human abiotic environment

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[1] A partial list of such groups formed in the United States prior to the 1960's is included as Appendix E.

in municipal areas. The environmental health movement was thus born in the rapidly growing industrial cities of the 19th. Century where offensive and unsanitary living conditions were the lot for most workers.

These conditions were of course not amenable to the efficiency of workers on the job. Hence, some benevolent capitalists in England and America who wanted to be assured of healthy, happy and thereby productive workers, constructed model villages adjacent to their factories. The most notable of these villages included Sir Titus Salt's Saltaire, built in 1852 in connection with his textile mill; Cadbury's Bourneville constructed in 1895 and W.H. Lever's Port Sunlight founded in 1887. In the United States, Pullman built Pullman, Illinois, south of Chicago in 1881. Villages such as these were so few however, that they contributed little to the melioration of the overall problem of poor living conditions.

Advancements in biomedical research in the second half of the 19th. Century made it clear that infectious diseases were linked to specific disease-causing (or pathogenic) organisms. Hence, public health officers began to discriminate between the agents of the disease

which as practical scientists, they saw as their prime concern, and the aesthetically noxious conditions which could be classed as irrelevant to public health science. For example, if public water supplies were free from parasites or pathogens, they could be pronounced "pure", disagreeable taste, smell or colour lay outside the professional concern of the public health officer.

By the mid 20th Century, infectious diseases such as yellow fever and malaria that had long preoccupied public health officials in North America, were being brought under control.[1] In addition, the research conducted in the biomedical sciences and in psychology and psychiatry provided evidence that chronic psychosomatic and mental illnesses were linked to external environmental conditions possibly unrelated to infectious or toxic elements. Those involved in environmental health also began to uncover evidence suggesting that the ill effects caused by events such as the "killer smogs" at Donora Pennsylvania (1948) and London England (1952) could not be traced to any single, simple source, but rather resulted from the increasingly large number of substances discharged

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[1] L. Williams, "Pesticides: A Contribution to Public Health", American Journal of Public Health, Vol. 54, (Supplement to January 1964), pp. 32-37.

into the non-human environment by human industrial processes and technical innovations such as the automobile.[1] As McDermott relates, it was difficult to isolate definite cause-effect relationships;

> "Some authorities suspect that two or more components may act synergistically in the lung to cause damage that might not result from exposure to any one of them. So far however, there is no direct evidence that continued exposure to urban air can start the disease. .... once the process does get its start, there is excellent evidence that .... smog affect(s) it adversly."[2]

Once again the field of environmental health extended beyond the bounds of concern for pathogenic organisms, with resulting conflicts in the profession itself. One group saw the profession's concern as being with continued study in biomedical fields of toxicology (the science of poisons), parasitology (the science of parasites) and epidemiology (the study of the causes and controls of epidemics), since they felt that the improvement of human health would be more confidently advanced by focusing on specific and known pathogenic factors, rather than broadening investigation to include aspects not capable of being subjected to

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[1] Supra., p. 31

[2] W. McDermott, "Air Pollution and Public Health", Man and the Ecosphere, (San Francisco; W.H. Freeman and Co. 1971), p. 142.

rigorous experimental and laboratory control. The other faction felt that public health science had to broaden its base and concern itself with a more inclusive notion of the environment. As Lee commented on the movement's conflict;

> "The operational agencies emphasize the physical and chemical factors in the environment and the consequences of their operation. However, physical and chemical stresses not infrequently result in psychological manifestations, if only because of the threat they offer to personal well-being. The pyschological attitude of the person, in turn, may predispose him to exposure to such agents as well as affect his reaction to their operation."[1]

Thus environmental health science professionals have been unable to agree unanimously as to the dimensions of their concern for environment. Nevertheless, those involved in the biomedical aspects have continued with necessary laboratory studies, while the other group has merged with scientists concerned with human/non-human environment relationships on a larger and less scientifically exact scale. Emissions into the biosphere from human activities have effects on both the human and

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[1] D. Lee, "Environmental Health and Human Ecology", American Journal of Public Health, Vol. 54, (Supplement to January 1964), p. 9.

non-human environments and thus serve to link the interests of environmental health scientists and conservationists.

The Conservation Movement

The conservation movement in the United States is even more difficult to define operationally than the environmental health movement since historically, there have been three interpretations of the term "conservation". G.R. Hall has characterized these three different viewpoints by the terms Neo-Malthusian, technican and naturalist.[1]

Neo-Malthusians point to the continually decreasing doubling times of human populations and the large amounts of raw materials being consumed, thus concluding that the developed nations will either have to limit population growth or revise the expectation of continual increase in living standards. Thus this group claims that unless the human environment adjusts its wants to the capabilities of the non-human environment, the results will be

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[1] G. R. Hall, "Conservation as a Public Policy Goal", Yale Review, LI, (March 1962), p. 400-413.

disastrous. Even though millions of dollars are spent annually on the search for new deposits of raw materials, there is no certanity that sources or substitutes will continue to be found, claims this group.

Secondly, Hall states that the technican group is optomistic about increasing living standards by improving the efficiency of resource use through the application of scientific techniques. The technicans answer the neo-Malthusians by claiming that if more resources are required to increase living standards, then more money should be invested in minerals, forests, water resources and so on. This second group takes the view that a nation's resource base is not a fixed sum, but is to a large extent determined by costs and prices which serve as incentives for people to economize on the use of scarce resources by adjusting the types of materials consumed and as well by developing more efficient methods of resource extraction. For example, the ability to process low grade ores is expanding with the result that copper ore containing only .4% copper is being processed.[1] This ability to process low grade materials

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[1]Brown, "Human Materials Production as a Process in the Biosphere", p. 208.

has the advantage that such materials are usually found in large quantities, unlike high grade ores. However, the processing of lower grade ores requires a large amount of energy and produces a great deal of waste material for each pound of metal produced. Oil exploration on the ocean floor is another example of employing more sophisticated technology to extract resources.

The third group of conservationists, the naturalists, oppose the transformation of raw materials and hence see conservation more in the sense of preservation. The naturalists emphasize the need to change consumer taste, since in their opinion, present day life places too high a premium on manufactured commodities and too low a value on scenery, wilderness, virgin forests and other non-human phenomena. Aldo Leopold sums up the approach of the naturalists in the following quotation;

> "The opportunity to see geese is <u>more important</u> than television and the chance to find a pasque-flower is a right as inalienable as free speech."[1]

The conservation picture is complicated by the

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[1] Quoted by B. Roueche, <u>What's Left-Reports on a Diminishing America</u>, (Toronto: Little, Brown and Co., 1968) (underling added)

fact that these three groups are not mutually exclusive; rather they overlap to various degrees, depending on the issue at hand. For example, both naturalists and technicans would be interested in the establishment of a reforestation program for a burned-out area; their interests would diverge however, on the question of what to do with the new forest. The naturalist would want it to remain in its natural state whereas the technican would propose a management program that would be most effective for producing timber. The contribution of these groups to environment as a social issue are best reviewed by reference to the history of conservation in the United States.

The roots of the conservation movement in the United States can be traced back to early government concerns as to how timber growing might be encouraged and existing timber protected. Thus in 1881 the American Congress established the Division of Forestry. In the 1870's and 1880's spokesmen had also advocated the preservation of some of America's more scenic natural areas before they were consumed or transformed in the process of settlement and industrialization. As a result in 1872, Yellowstone was set aside as the first National Park to be maintained untouched as a form of natural

museum. This then was conservation in the naturalist mode.

With the closing of the American frontier in the 1890's, there was increasing concern for the wise use of forest areas since changed production conditions (such as the use of railways in logging - a more efficient method than using oxen) were thought to threaten the continued existence of forest areas. Such changing conditions then and their possible undesirable effects, provided the major stimulus for early technician-conservation thought. The pioneers of this group such as Gifford Pinchot and Major John Wesley Powell were usually engineers, scientists or else had been otherwise technically trained. Hence they were fascinated by the possibility of increasing supplies of raw materials by rationalizing production. Their idea of conservation contrasted sharply to that of the naturalists, for as Huth said of the technicans :

> "Their antagonism was directed against all varities of conservation which were not strictly utilitarian or economic. Conservation with out the utilization of natural resources seemed futile to (Pinchot) and his friends."[1]

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[1] H.Huth, Nature and the American, (Berkeley: University of California Press, 1957),p.182.

In 1908, President Theodore Roosevelt called a White House Conference on Conservation which marked the beginning of a concerted national policy of conservation as defined by the technicans. The Tennessee Valley Authority (T.V.A.) created in 1933, was the first American effort at planning at the national scale and also embodied one of the most significant efforts at technican-conservation. Measures were taken to control floods in this poverty-stricken area and as well to harness the Tennessee River in order to generate power. Electrification was only one of the factors involved in the project; in addition, agricultural experts taught farmers proper methods of soil conservation in order to improve production, stop soil erosion and avoid loss of topsoil. The Authority also set up demonstration farms to exhibit these techniques. Reforestation once more became possible since watersheds were protected, floods were avoided and water supply was placed under control. Also, Federal forest management techniques served as models for the management of privately owned forest areas.

By mid 20th. Century, the technican-conservationists had largely abandoned the term "conservation" and used instead the term "natural resources administration".

Furthermore, resource economists claimed that technological advances and the development of substitutes made it unlikely that the nation would run out of raw materials. Hence conservation came to be equated almost exclusively with the naturalist viewpoint through aesthetic and ecological concerns.

In the 1960's then, the naturalist conservation movement continued its tradition of crusading for the conservation (i.e. preservation) of the non-human environment. At this time also, the membership of the older conservation groups such as the Sierra Club and the National Audobon Society increased significantly and in addition, countless new groups were formed. Many of these new organizations were formed in response to specific local issues. Not surprisingly, much of this early increased concern by the general public focused on more obvious visual symptons of "pollution" such as the plethora of billboards, mountains of junked cars and the visual effects of water and air pollution.[1] This increased public interest was attributable in part, claims Caldwell to the ability of North American society

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[1] P. Blake, God's Own Junkyard, (New York: Holt, Rinehart and Winston, 1964).

to move to higher levels of dissatisfaction, because of the enlargement of popular choice resulting from increased economic and geographic mobility.[1]

However, the increased interest in the conservation movement has caused it to move into wider social and political realms. A number of the conservation groups have gone to court representing the conservationist viewpoint in cases involving the proposed human destruction of unique non-human environments. Thus the proposed jetport in the Florida Everglades was opposed principally by the National Audobon Society with the result that the project has been abandoned and the search for a less controversial site begun. That such involvement with controversial issues has resulted in a broadening of the conservationists' viewpoint is confirmed by Joseph Sax who claims that;

> "We can state a principle which says that people cannot embezzle funds from their employers. We can't deal with the environment in that way. .... We don't want to say for example, never fill a marsh, cut a tree or dam a river. We are always looking for some subtle balance between industry and nature,.... between preservation and development."[2]

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[1] L.K. Caldwell, Environment: A Challenge to Modern Society, (Garden City: Natural History Press, 1970), p.49.

[2] J. Main, "Conservationists at the Barricades", Fortune, LXXXI, (February 1970), p. 150.

The naturalist viewpoint of conservation has thus been considerably altered in attempting to place its goals within the framework of the inclusive environment rather than simply the non-human environment.

Some Recent Legislation

Some conservation groups in the United States, such as Friends of the Earth, have deliberatly given up their tax-exempt status in order to be able to lobby for new environmental laws and elect sympathetic politicians. In Canada, Pollution Probe has endorsed civic candidates, who in the opinion of the organization, take an enlightened stand on issues relating to the relationship between the human and non-human environments.

The Clean Water Act was passed by the Canadian Parliament in 1970, while in 1971 it passed the Clean Air Act. Further, in 1971 a Ministry of the Environment was established in the Federal Cabinet. In the United States, the President established a cabinet level Environmental Quality Council in 1970 and as well signed the National Environmental Policy Act (N.E.P.A.). The passage of legislation is in itself however, no guarantee of effectiveness, as an examination of N.E.P.A. demonstrates.

This Act has as its purposes;

> "To declare a national policy which will encourage productive and enjoyable harmony between man and his environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the nation; to establish a Council on Environmental Quality."[1]

Under the terms of N.E.P.A. all agencies of the Federal government are required to prepare detailed statements on legislation or other major action significantly affecting the non-human environment. These "impact statements" are then to be reviewed by the Council for Environmental Quality and in addition are to be made public in order that concerned citizens and groups can comment on the statement. It is significant to note that the Courts have disallowed one project (a dam in Arkansas) on the basis of the contents of its impact statement. In the case of the Environmental Defence Fund vs. Corps of Engineers, the Court found the Corps' planning deficient because of its failure to utilize a systematic, interdisciplinary approach which would ensure the integrated use of the natural and social sciences

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[1]A. Satterwaite, "Environmental Review - How can it be More than a Ritual", Planning 1971, (Chicago: American Society of Planning Officials), p. 97.

and the environmental design arts in the planning of the dam. Such cases are not likely to be frequent under this legislation however, since each Federal agency itself determines which of its projects it sees as having significant environmental impact. Thus, unless a proposed action has already aroused considerable public controversy, an impact statement is not likely to be filed.

The Human/Non-Human Conflict

Although it is clear that much of the growing interest in the consequences of society's activities on the non-human environment is based on sound ecological principles, it must be remembered that this issue has by no means been unanimously accepted as one of high priority.[1] Robert Wood has charged that this increased interest has overshadowed, and in effect pre-empted, earlier concern for the problems of the human environment of urban areas.[2] He refers specifically to the unmet objectives of housing production which were first formulated as a result of the "crisis of the city" emanating from the 1967 Detriot and Newark riots. Wood concludes

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[1] A. Etzioni, "The Wrong Top Priority" Science, Vol. 168 (May 22, 1970), p. 921.

[2] R. Wood, "Housing and Environmental Escapism" Journal of the American Institute of Planners, XXXVI (November 1970), pp. 422-426.

that the American government has had a disturbing tendency to replace objectives rather than to fulfill them.

Such a point of view is significant since it serves to remind us again that operationally, planners must view the environment inclusively rather than in terms of a human/non-human dichotomy.

The mounting number of litigations, federal investigations and demonstrations by activists against proposed urban projects in the form of power plants, jetports, housing programs, harbour developments, and freeway construction are posing significant difficulties for many large urban areas. As one example, The Port of New York Authority has, over the past decade, considered more than 20 technically feasible sites for a new jetport to augment the increasingly overloaded facilities at J.F.K. International on the shores of Jamaica Bay.[1] None of the sites gained political approval; as well, public sophistication in mobilizing community and political groups has grown in direct proportion to emerging public interest in the human/non human environment relationship. The Authority was thus

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[1]D.C. McGrath Jr., "Jamaica Bay and Kennedy Airport", Journal of the American Institute of Planners, XXXV11, (July 1971), pp. 243-253.
S. Ebbin, "The Jamaica Bay Study", The Futurist, V1, (February 1972), pp. 27-29.

forced to consider the alternative of extending runways into Jamaica Bay, which is designated as parkland, contains a wildlife sanctuary and is also a significant breeding ground for fish life and crustacea. In addition, the portions of New York City bordering on the Bay are grossly undersupplied with recreation facilities, a situation which could be aided by the recreational use of at least a portion of the Bay. Residents in the vicinity of the airport would be exposed to higher noise levels if the present facility were to be increased in size.

However, on the basis of the recommendations of an independent, interdisciplinary study of this situation carried out for the port of New York by the National Academy of Sciences in 1970-71, the Authority decided not to seek permission to extend the airport into Jamaica Bay. Hence, although the non-human environment will not be disrupted more than at present, the problem of air traffic congestion and its second order consequences on the human environment is still unresolved.

While such an outcome may ultimately prove beneficial because it results in critical re-examination of the effects of human activities on the non-human environment and hence in turn, on man, there is a lag

time during which those most needing added facilities are those most adversly affected. What occurs then is a conscious change in one part of a system (a city decides not to increase the size of its airport) without mutually accomodating changes in other parts of a system (the city still requires a larger airport in order to maintain its competitive position with other cities).

In any such conflict between the human and non-human environments the benefits and costs are inequitibly distributed. Those groups calling for the saving of wildlife areas from human encroachment can be seen acting in part as advocates for the equal right of wildlife in the non-human environment to exist. These groups also claim that their actions are a necessary first step in slowing down or re-directing economic growth and its undesirable consequences on the non-human environment. The situation is complicated however, by the fact that through preservation, many of these groups derive direct benefits for the pursuit of their own acitivities - for example the study and appreciation of wildlife in undisturbed settings or the sailing of yachts on pristine waters. Those groups that do not have such interests or assets, do not directly benefit from preservation nor from any slowdown in economic growth. Indeed they may

suffer tangibly as a result of it. Anthony Crosland, British Labour M.P., has stated in reply to suggestions that economic growth be halted because of effects on the non-human environment;

> "My working class constituents have their own version of the environment which is equally valid and calls for economic growth.. ... They want cars,... and they want package tour holidays... even if this means more noise of night flights and eating fish and chips on previously secluded beaches - why should they too not enjoy the sun?"[1]

In the final analysis then, it may ultimately be beneficial to delay or even to cancel the development of certain facilities in the human abiotic environment in an attempt to re-order societal priorities and ostensibly to give non-human species the right to exist. However, this action cannot easily be reconciled with the fact that its tangible, short-term benefits are often of the type that accrue only to a minority of the population with the interest, money or leisure time to enjoy them.

The Human/Non-Human Relationship as a Meta Situation

This review of some of the aspects of the human/

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[1] A. Friendly, "Crosland Blasts Environmental Hypocrisy", The Winnipeg Free Press, (January 25, 1971), p. 11.

non-human environment relationship, while it has not been intended as exhaustive, has given some indication as to what is involved in thinking holistically about the inclusive environment.[1] It has been shown that except in restricted circumstances, there is no "solution" in a finite sense to problems emanating from this relationship. Generally, it was found that conflicts occured at the interface between the human and non-human environments and that attempts to respond to these conflicts resulted in friction within the human environment because these responses did not affect all groups in society in the same manner.

The human/non-human environment relationship can thus be seen as composed of a group of complex, multi-dimensional problems. Chevalier has called these "meta-problems" and has defined them as problems that affect a large number of groups and individuals with varied and conflicting interests, so that they encompass multiple and conflicting ends and essentially immeasurable connections between ends and means.[2] Furthermore, these

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[1]The human/non-human environment relationship is further complexified if individual, as well as societal responses are studied. In this regard see;

H. Proshansky, W. Ittelson and L. Rivlin (Eds.), Environmental Psychology, Man and His Physical Setting, (New York: Holt, Rinehart and Winston) 1970)

[2]M. Chevalier, A Strategy of Interest Based Planning PhD. Dissertation, (University of Pennsylvania, 1968)

meta-problems affect, directly or indirectly, every part of the total society yet are not the primary interest or responsibility of any one major organization in society. Hence, pollution, problems of conservation vs. development and others, are all meta-problems composed of numerous sub-problems. In addition, these meta-problems themselves are not mutually exclusive but interact with each other in complex ways, resulting in what can be termed a "meta-situation."

Such complexity makes it evident that while Geddes' ideal of seeing a situation as a whole can be discussed within the bounds of a thesis, it cannot be so easily applied, in an operational sense by the planner. In other words, with a meta-situation such as the human/non-human environment relationship, it is not easy to make the transition from the "in-world" to the "out-world"[1] without in the process, losing much of the complexity. However, we have seen some of the penalties to be incurred for taking too-narrow view of this complex situation. What approach then can the planning profession take so as to retain at least a measure of this complexity while at the same time, remaining operationally useful?

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[1] *Supra.*, p. 6

CHAPTER V

DEALING WITH THE INCLUSIVE ENVIRONMENT

We have seen that historically, city planning did not often consider the effects that developments in the human environment would have on the non-human environment. This occured because such a consideration was not one of the goals towards which the planning process was oriented. Subsequent discussion showed however that for various reasons, concern for these effects has become a goal of society in general and as such, is gradually being incorporated into applications of the planning process. As a result then, the planning process, more so than ever, involves not just the planner, but a great many specialists.

The planning profession's contributions to the human environment have taken place chiefly (although not exclusively) in the program formulation stage of the planning process. Here, plans of the human abiotic environment, comprehensive and otherwise, have been produced and have been the vehicles by which specific objectives have been carried out.

In dealing with the more complex relationship between the human and non-human environments, the planning profession continues to play a significant role in the program formulation (or design) aspects of the planning process, as the work of McHarg and Steinitz demonstrates.[1] The profession can however play an increased role in the planning process by aiding in the formulation of goals and objectives.

In our society the major decisions to be made within these stages of the planning process are policy decisions, and as such, are made in the political arena. Nevertheless, planners, who do not normally make committments to policy, can aid in making of such committments by providing the decision-maker with a synopsized view of a particular situation as it has been surveyed and analyzed by specialists.[2]

Goals and Objectives

If the planning profession is to aid in the formulation of "goals" and "objectives," there must first of all be an agreement as to what these terms mean.

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[1] Supra., p. 19.

[2] See: J. Friedmann, "Planning as a Vocation", (Part 2) Plan, Vol. 7., No., 1. 1966. pp. 8-26.

Goals are seen essentially as long term directives rather than as end states to be achieved at some future time. As Robert Young states:

> ".....a goal is an ideal and should be expressed in abstract terms; it is a value to be sought after, not an object to be achieved."

An objective on the other hand claims Young is "... explicit, attainable and measurable."[1]

The goal of "improvement in the human/non-human environment relationship" is thus broad but vague. Hence it receives a high degree of consensus since the notion it embodies is so flexible that each group or individual can read his own meaning into it. As new insights are gained through feedback and the input of new information over time, the goal itself takes on emergent properties; its scope and inter-relatedness with other aspects of life increase. Hence society will never "reach" in a finite sense, a goal of "improvment in the human/non-human environment relationship."

Policy makers do require however, an indication of the direction in which events in the real world are moving relative to the goal. To achieve this, a goal

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[1]R.C. Young, "Goals and Goal Setting", Journal of the American Institute of Planners, XXXII, (March 1966), p. 78.

must be broken down into constituent elements that can be evaluated, preferably in a quantitative fashion. The quantitative indicators developed can then be employed in the formulation of attainable objectives. Thus a single indicator can be used to assess the degree to which a particular objective has been attained, while the aggregate of indicators can give an idea of the real world situation in relation to the goal.[1]

The Use of Indicators

The need for an indicator approach in dealing with the inclusive environment has been stated by Winthrop in the following way;

> "....if co-ordinated planning is to be said.... to have resulted in an improvement of the quality of the environment, then we shall have to develop a new set of social indicators, uniquely adapted to ecological objectives in the widest sense of the term. These indicators will have to provide firm evidence of the fact that total environmental management has resulted in improving specified aspects of our total environment....."[2]

The advantages and disadvantages involved in the use of indicators can be understood more clearly by examining the recent evolution and application of social

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[1]See Appendix F for a diagrammatic representation of the relation between goals, objectives, indicators and the real world.

[2]H. Winthrop, "Total Environmental Management", Futures Vol. 2 (December 1970), p. 337.

indicators.

Social Indicators

Social indicators are made up of statistics, statistical series and all other forms of evidence that permit an assessment of present position and future direction. In addition, they can be used to evaluate specific programs and determine their impact. Although precise definitions of indicators have not been formulated, the following are offered as a beginning;

> "A social indicator is a statistic of direct normative interest which facilitates concise, comprehensive and balanced judgements about the condition of major aspects of society."[1]
>
> "Social indicators are quantitative measures of social conditions designed to guide choices at several levels of decision-making".[2]

Even though indicators are quantitative measures, not all statistics are indicators. Indicators are time

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[1]U.S. Department of Health, Education and Welfare, quoted in D. Plessas and R. Fein, "An Evaluation of Social Indicators", Journal of the American Institute of Planners, XXXVIII, (January 1972), p. 43.

[2]I. V. Sawhill, quoted in Ibid., p. 43.

series that allow comparison and permit the identification of trends. Thus they can be used to monitor change over time. Indicators then, are fundamentally different from standards and criteria, because while the former are observations on the present (and sometimes past) state of the real world, the latter are variables or constants depicting desirability.

As with economic indicators, a number of social indicators could be arrayed together to produce a "social account" although some writers disagree with this term because it suggests precision and book-keeping methods which are misleading when used with the adjective "social". The term "social mapping" has been suggested as an alternative.[1] It must be cautioned here that the distinction between "economic" and "social" - while having many uses - cannot be carried to extremes. Although economic information deals with nothing completely, it tends to touch everything, often significantly, since there are few social ends to which scarce economic resources do not need to be allocated. Thus, while the term "social indicators" is usually used in the residual sense of "non-economic indicators", the distinction is not always

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[1] I. Galnoor, "Social Information for What?", The Annals, Vol. 393, (January 1971), p. 4.

that clear-cut.[1] Ideally, the attempt is to integrate social and economic considerations at a higher level of abstraction, rather than forcing one kind into the mold of the other. Such a view then, follows directly from the earlier notion that the environment must be understood holistically. Nevertheless, social indicators can fill informational gaps in the knowledge of the "non-economic" aspects of society.

Modern nations such as the United States maintain elaborate machinery for measuring economic performance; the President's Annual Economic Report, along with the accompanying reports of the President's Council of Economic Advisors, have become important institutions. In addition, the Council's monthly Economic Indicators, published by the Joint Economic Committee of Congress, provides a carefully organized set of 37 charts and tables that aids private and public decisinn-making, even by those who disagree with specific presidential proposals. Undoubtedly such measures are essential to the health and control of the economy. However, there has been a dearth of such measures or comparable social indicators to gauge the quality of these economic phenomena.

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[1]Indeed, the opposite of "social" is not "economic", it is "individual".

Consequently, in 1962, Raymond Bauer of the Harvard Business School posed the question "if we have highly organized economic indicators, why can't we set up a system of social indicators as well?" As a result of this questioning, plus a call from the President's Science Advisory Committee for the collection of basic behavioural data that would be comparable, systematic and periodically gathered, a book entitled Social Indicators was published in 1966 with Bauer as editor. The volume was sponsored by the National Aeronautics and Space Administration as part of an effort to appraise the impact of outer space exploration on American society. However, it focused more widely on the nature of the indicators now employed and the need for new ones.

Hence early concern for the formulation of social indicators was centered mainly in the United States. An operational need for such indicators was first voiced when the United States Bureau of the Budge introduced the Planning-Programming-Budgetting System (P.P.B.S.) and found that the weakest links in the benefit-output-cost analyses were the lack of systematic, comparable and periodically gathered social data. As a result, in 1966, the task of collecting "trans economic" data was

given to the Department of Health, Education and Welfare (H.E.W.). Under this program H.E.W. substantially improved its monthly H.E.W. Indicators (similar in format to the Economic Indicators) and as well, its H.E.W. Trends.

Early in 1969, H.E.W. issued a document entitled "Toward a Social Report" which contained information on health and illness, social mobility, the human abiotic environment, income and poverty, public order and safety, learning, science and art, and participation and alienation. More recently, a National Goals Research Staff was established in the White House to prepare an annual social report and to set social goals and indicators for 1976 and 2000. Its finished report entitled, Toward Balanced Growth: Quantity with Quality, deliberatly avoided choosing goals and instead set forth a number of alternative options that the American people might select.

The awareness of the need for social indicators has now spread beyond the United States. Thus in Europe, the O.E.C.D. has started research on the measurement of changes in the national "level of living."[1] Related work

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[1] "A New System of Natinnal Account", O.E.C.D. Observer, No. 44 (February 1970), pp. 27-31.

is also being done in England and Austria.

On a global scale, the United Nations has attempted to sum up the major trends in social conditions and social programs in its 1963 Report on the World Social Situation. Unfortunately, this report is unduly confined to the standard of living concepts developed a decade earlier. "Social" is used to refer to certain minimum welfare concepts (as in the pharse "social worker") rather than to major aspects of society. Of course it must be remembered that if a single country such as the United States finds difficulty in collecting social indicator information, the problems are going to be multiplied manyfold for an international agency.

Two Viewpoints on Indicator Use

Among those groups interested in the development of social indicators, a basic underlying dispute concerns the necessity for immediate action in the environment versus the necessity for scientific validity. Those inclined to the latter view are liable to be research-oriented scientists who claim that rigorous theory construction and scientific hypothesis testing must precede real-time application of indicators (i.e. a deductive

approach). Those taking an action view are more heuristic[1] in approach, claiming that;

> "Rather than do nothing, it is preferable to start out with bad data, warn everyone about the defects and limitations and aim at 'gradual improvement through use'".[2]

Because implementation is an integral part of the planning process and because the inherent complexity of the inclusive environment demands an heuristic approach, the action view towards the development of indicators is most favoured by the planning profession. This is not to intimate however, that the action and scientific points of view are mutually exclusive; in reality they are mutually dependent. Planning inclines to the action view while at the same time attempting to employ insights gained by the deductive approach.

In addition another major concern of all groups involved in the development and use of social indicators is the problem surrounding the quantification of indicator concepts. Quantification is really the major

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[1]"Heuristic" is defined here as: "Serving to guide, discover or reveal; specif; valuable for stimulating or conducting empirical research but unproved or incapable of proof-"

From: Webster's Third International Dictionary.

[2]R. Bauer, quoted in Plessas and Fein, "An Evaluation of Social Indicators", p. 44.

"selling point" of indicators, since jurisdic tions at any level rarely become concerned with situations until they have learned to measure them.

The Problem of Quantification

Although the trend has been lessening somewhat, the notion certainly has been harboured that things which can be easily counted are somehow more important than things that have not been counted. This is reflected for example, in an economic indicator which has been claimed by some to give a measure of societal well-being, namely the Gross National Product (G.N.P.). Although it measures the quantity of output in money, it tells nothing of the quality of goods and services produced. Hence, it increases with increases in delays, wastes, unnecesary repairs and redundant and short-lived products. In addition, the G.N.P. does not account for the situations mentioned earlier where the same activity may have widely diverging effects on different groups of people; nor does it account for any adverse effects on the non-human environment.

The "solution" here is not one of doing away with the G.N.P. and related figures, but rather of developing measures to complement them, measures which

will take into account factors glossed over by "economic" indicators. The inclusion of such "Social" content is probably best achieved by numerical indices. This may appear paradoxical, since "social" aspects are usually thought of as being "soft" and hence somehow more humane than numbers. However, the great volumes of information required to produce social indicators and to relate them to other aspects of society calls for selectivity, rapidity, condensation and generalization of knowledge, qualities which are for the present at least, best attained by numerical means.

In the short term it is certainly easier to develop numerical techniques for some types of data than for others, particularly when it is remembered that indicators such as the G.N.P. were developed to measure large quantities of like or similar units, whereas social indicators attempt to measure more complex phenomena. Nevertheless, it is felt generally that the difficulty found in quantifying certain data does not arise from anything intrinsic to the phenomenon in question, but rather stems from the state of development of our ways of making and expressing observations of it.[1]

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[1]R. Bauer, Social Indicators, (Cambridge: The M.I.T. Press, 1966), p. 134.

Indicators and the Human Environment - An Example

By means of social indicators, J.O. Wilson has attempted to determine the quality of life on the state level.[1] However, Wilson did not consider the inclusive environment but dealt only with the human environment. Further, because the purpose of the study was only to develop indicators, no attempt was made to employ these indicators in the formulation of attainable objectives.

Wilson employed what are known as "surrogate indicators", so called because they can be formulated from existing statistical series such as the information contained in censuses. Because of present difficulties in directly measuring aspects of "quality", the use of these indicators is a useful first step. Hence, well-known and rudimentary statistical techniques of cross tabulation, covariance and regression analysis can be brought into play so that the statistical information implicit in present data collection systems is made to yield something closer to a realistic estimate of the

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[1] J.O. Wilson, The Quality of Life in the United States, (Kansas City: Midwest Research Institute).

situation than can be had from a mere congeries of facts. Such work however, must be subjected to the caution that if the basic figures are known to be unreliable, then the application of statistical procedures may leave the unwitting impression of precision and reliability, unless conscious steps are taken to delineate weaknesses in the data.

Wilson employed the President's Commission on National Goals - 1960 in order to delineate areas for measurement. The nine areas for which he developed social indicators included;

1. Individual Status: enhancing personal dignity, promoting maxium development of capabilities, and widening the opportunities of individual choice.

2. Individual Equality: Eliminating discrimination on the basis of race.

3. State and Local Government: Developing an informed and involved citizenry, improving the quality of public administration, increasing collaboration and the sharing of power among all levels of government, and improving the professionalism of state legislatures.

4. Education: Improving the quantity and quality of education.

5. Economic Growth: Increasing both the quality and quantity of growth, including capital investment in the public sector, improving the standard of living, and providing education for a more capable and flexible work force.

6. Technological Change: Increasing the effort in research and the availability of manpower and facilities to maintain economic growth and improve living conditions.

7. Agriculture: Improving the quality of life in the agricultural sector.

8. Living Conditions: Alleviating general poverty and the decayed conditions of the cities.

9. Health and Welfare: Improving the levels of welfare assistance, vocational rehabilition, and provision of medical services in both the public and private sectors of the economy.

In this first stage then, Wilson gave broad definitions to each of the nine goals or grand abstractions; these definitions were then broken down into constituent elements that could be evaluated statistically. For example, he assumed "living conditions" to be measured by the following;

A. Remedy Slum and Poverty Condition
   - total state technical assistance expenditure per poor person
   - economic opportunity assistance expenditure per poor person
   - percent of families with incomes under $3000
   - percent of sound housing units with plumbing facilities

B. Reverse the Process of Decay in Larger Cities
   - per capita general expenditure of state and local governments for housing and urban renewal
   - weighted index of crime rates

C. Relieve Need for Low Income and Minority Groups to Concentrate in Central Cities
   - weighted index of median family income in central cities as a percent of S.M.S.A. median family income

D. Expand Parks and Recreation as Necessary to Meet Demand
   - per capita recreation area

Once these statistics were collected they had to be weighted - that is, how much weight should be given to "% of families with incomes under $3000"versus "% of sound housing units with plumbing facilities"? In this study, Wilson used a statistical technique known as factor analysis in order to determine weights, which were then aggregated to produce a score for each of the nine indicator areas. Each state's result for each of the nine indicators was then ranked from 1-50.

Thus Wilson has shown how a social indicator approach can be employed to measure the extent to which some goal of general interest has been achieved. However, the nature of the available data forced Wilson to assume that the quality of life was homogeneous throughout a particular state, even though in reality, conditions would vary greatly within it. Similar generalizations would be forced however even if working on a regional or city level and hence these generalizations can be viewed as both liberating and inhibiting factors

of quantification.

The factors constituting the quality of life in this study were limited by the nature of the initial goals, for as Wilson said;

> "We do not intend to suggest that these goals represent the ultimate set of normative variables by which to assess the existing quality of life, but they do represent the latest consensus of any type on a definitive set of goals for the nation as a whole."[1]

It is significant to note that these goals were being developed by the President's Commission at a time (actually the late 1950's) just prior to the growing concern for the state of the human/non-human environment relationship[2]. Hence improvement of this relationship was not seen by the Commission as a goal of national importance, and consequently is not reflected in Wilson's study.

To aid in the formulation of goals and objectives, the indicators developed by Wilson would have to explain the causal relationship existing between an indicator and specific public policy programs. This however is

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[1] Ibid., p. 6.

[2] Supra., Chapter IV.

a formidable problem which has not yet been solved since the techniques applied in studies such as this have no underlying theory of causal relationships, nor is there the existence of a generally accepted weighting system. This is in contrast to economic indicators which, for better or for worse, at least have the Keynesian model and market-determined prices as underlying ingredients in both their formulation and causality analysis. Economic indicators also have a single basis, money, for comparability. Other social sciences engaged in the development of social indicators have no such single basis.

Indicators and the Non-Human Environment.

In any attempt to apply indicators to the inclusive environment there is a need to measure not only the human environment, but also the non-human environment. However, the complex manner in which the non-human environment reacts to human intervention, makes the development of indicators for this environment a difficult task.[1] Furthermore, the atmosphere, hydrosphere and lithosphere are expected by society to

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[1] Supra., pp. 24-39.

yield a variety of human uses and satisfactions. Water in a lake for example, may be used for navigation, for industrial purposes and as well for recreation. Each of these uses requires different standards and hence it is not possible to judge water (or air and land) quality without reference to a specific human use. There are in addition, regional and temporal variations in the non-human environment which mitigate against the development of general indicators, even for the same human use. As J.L. Fisher states in regard to the use of indicators in the non-human environment:

> ".....indicators with respect to the quality of the natural environment are difficult to conceive and more difficult to work with. Surprisingly little of a rigorous and analytical character has been done."[1]

Indicators and the Inclusive Environment

While indicators have been developed for assessing the condition of the human environment, the "state of the art" is still in its nascent stages. This is even more so with regard to the use of indicators in the assessment of the non-human environment. Further-

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[1] J. L. Fisher, "The Natural Environment", in B.M. Gross (editor), Social Intelligence for America's Future, (Boston: Allyn and Bacon Inc., 1969) p. 460.

more, techniques for employing indicators in the formulation of goals and objectives, within the framework of the inclusive environment, is a subject hardly yet broached. While the thesis has hopefully made clear the need for such techniques, their further development and application lie beyond the bounds of the present thesis.

In view however, of the continuing nature of this subject, it would be misleading to conclude in the traditional manner of summing up the major points made in the thesis. To do so would give an unwarranted finiteness to the work. Instead, we will conclude with a brief description of one attempt to apply indicators within the framework of the inclusive environment, an endeavor with which the author has had limited personal experience.

Habitability in the Boreal Zone of Canada

The United Nations has identified as a priority area for research, the development of,

> "environmental socio-economic indicators to measure the condition of human settlements and to identify, over time, trends in their development...."[1]

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[1] United Nations Conference on the Human Environment, Planning and Management of Human Settlements for Environmental Quality", Document A/CONF. 48/6, p. 30.

At the Department of City Planning, University of Manitoba, Dr. J. E. Page, S.J., (now of the Faculty of Environmental Studies, York University, Toronto) and Professor M. Carvalho, are currently working on a research project entitled "Habitability in the Boreal Zone of Canada." This project is being carried out under the auspices of the Canada Council and the Center for Settlement Studies at the University of Manitoba.

In this study, "Habitability" is taken to mean "To be able to be inhabited continuously by humans with relative ease." Habitability then, is a continuim, made up of a combination of human and non-human components. Stated in the terminiology employed in this thesis, the governing hypothesis of the Carvalho/Page study is that habitability is a combination of elements in the non-human environment, the human abiotic environment and the human biotic environment, in space-time dimensions. The more favourable the non-human environment, the less the <u>continuous</u> input needed from the human environment in order to make a settlement habitable. The type and amount of human abiotic environment (or technology) required depends on the quality of the non-human environment. As well it is dependent on the culture of the population group (an element of the human biotic environment) attempting to establish an habitable settlement.

In summary the relationships can be expressed in the following manner;

$$E_h = (E_d \cdot E_n + E_d \cdot E_t)$$

where

E_h = a habitable environment

E_d = the demographic characteristics of the population group living in the settlement under consideration (that is, one element of the human biotic environment).

E_n = the natural environment (that is, the non-human environment).

E_t = the man-made or technological environment (that is, the human abiotic environment).

Although the habitability study is more concerned with the "fit" between the human and non-human environments than with the development of "community" as such, it is nevertheless realized that without this "fit", the "community" will suffer because opportunities for human enrichment will have been significantly lessened.

In the Carvalho/Page study, the measurement of habitability is limited to those settlements established in the Boreal Zone by Non-Native Peoples. The basic study unit employed was a human settlement with 50 or more people at the centre of an area described by a 1.5 mile radius; a settlement of 500 or more was termed "urban". Originally, all settlements of 50

people or more in the Boreal Zone were to be included in the initial testing. However, difficulties in data acquisition have resulted in the initial testing of the hypothesis in an area at the edge of the Boreal Zone in south eastern Manitoba, an area for which data (as well as the settlements themselves) are more accessible.

In order that the study be as objective as possible, only those data suseptible to real measurement were used; in short the application of a social indicator approach. Similarly to Wilson's study[1] a number of variables were employed to obtain a single variate which would serve as a measure of one aspect of the environment. In all, 39 variates were used; 9 dealt with the non-human environment; 16 related to the human abiotic environment and 14 were concerned with the human biotic environment. Experts in each field were consulted to ascertain whether or not the measures developed actually did give a reliable indication of the variate's contribution to habitability. A computer program was then selected to calculate the principal components for all three sets of variates and for each of the sets.

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[1]Supra., p. 83.

The next phase of the research will involve determining the meaning of the principal components calculated in the first phase of the research. This will be accomplished by examining each settlement in the light of these principal components. The results from this work will then have to be applied to two more test areas before any tentative generalizations can be attempted. If the results are favourable, it is hoped that with these generalizations it will be possible to set out predictive statements about the level of habitability that can be achieved in a particular settlement given a deliberately assigned amount of each sub-environment input into the settlement. At this stage then, use of the habitability modelmay make possible, policy formulation on a more holistic basis than has heretofore been accomplished.

In the final analysis then, this continuing work on habitability is part of a growing effort to gain a deeper insight into the complexity of the inclusive environment, particularly into the relation between its human and non-human components. Hopefully this research as well as a great deal of other work not reviewed here, will move society towards "the adoption of a comprehensive

environmental development approach to policy-making and implementation in the field of human settlements;".[1]

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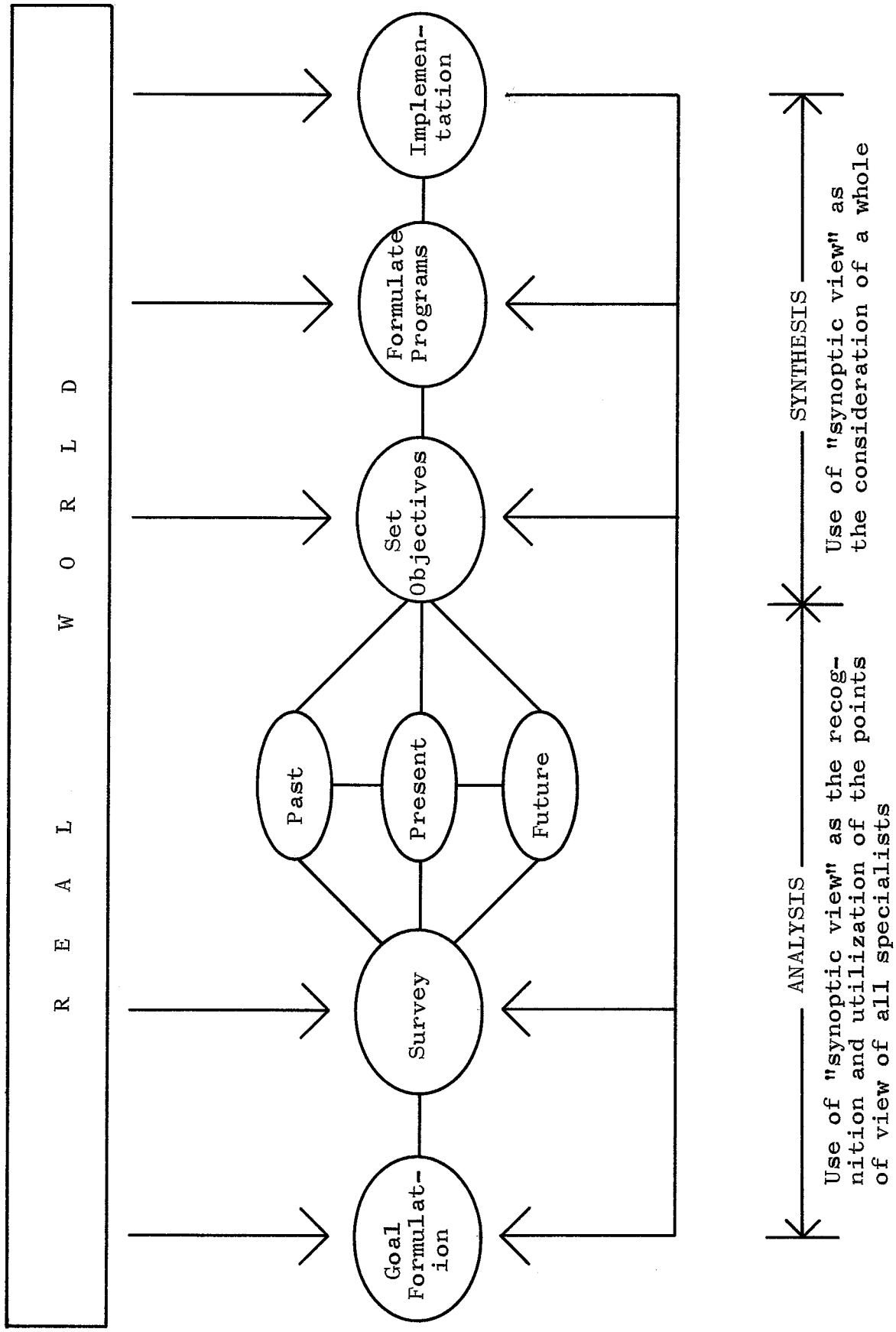
[1]United Nations Conference on the Human Environment, Planning and Management of Human Settlements for Environmental Quality", Document A/CONF. 48/6, p. 27.

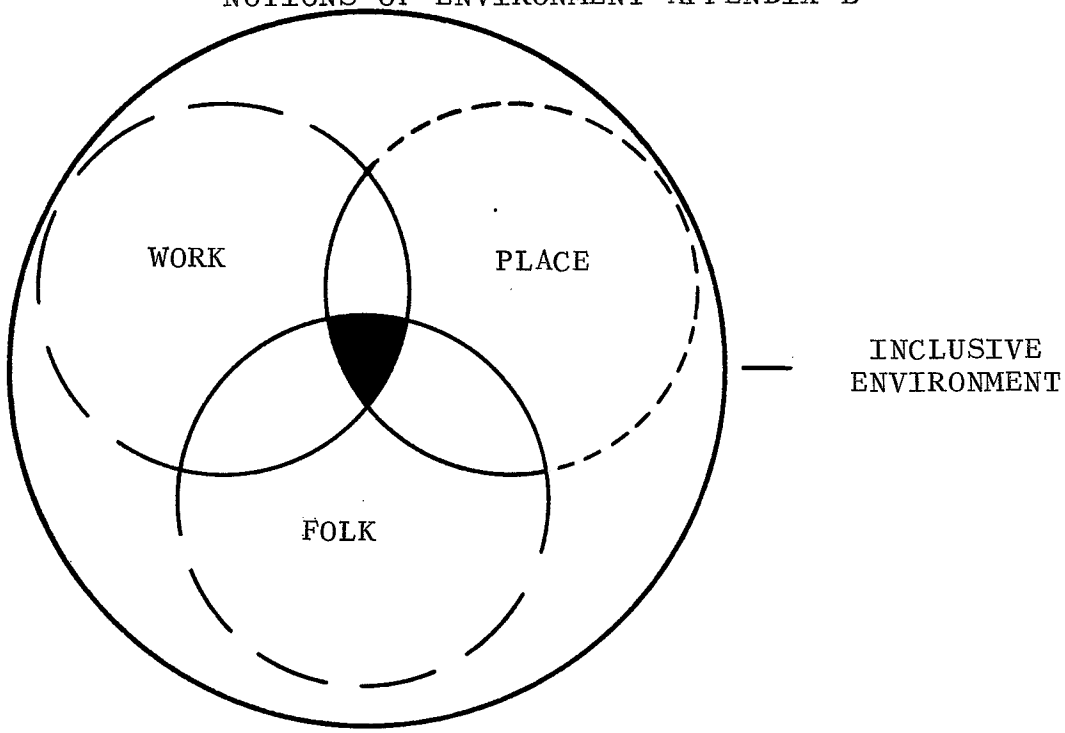
A P P E N D I C E S

THE PLANNING PROCESS APPENDIX A



NOTIONS OF ENVIRONMENT APPENDIX B

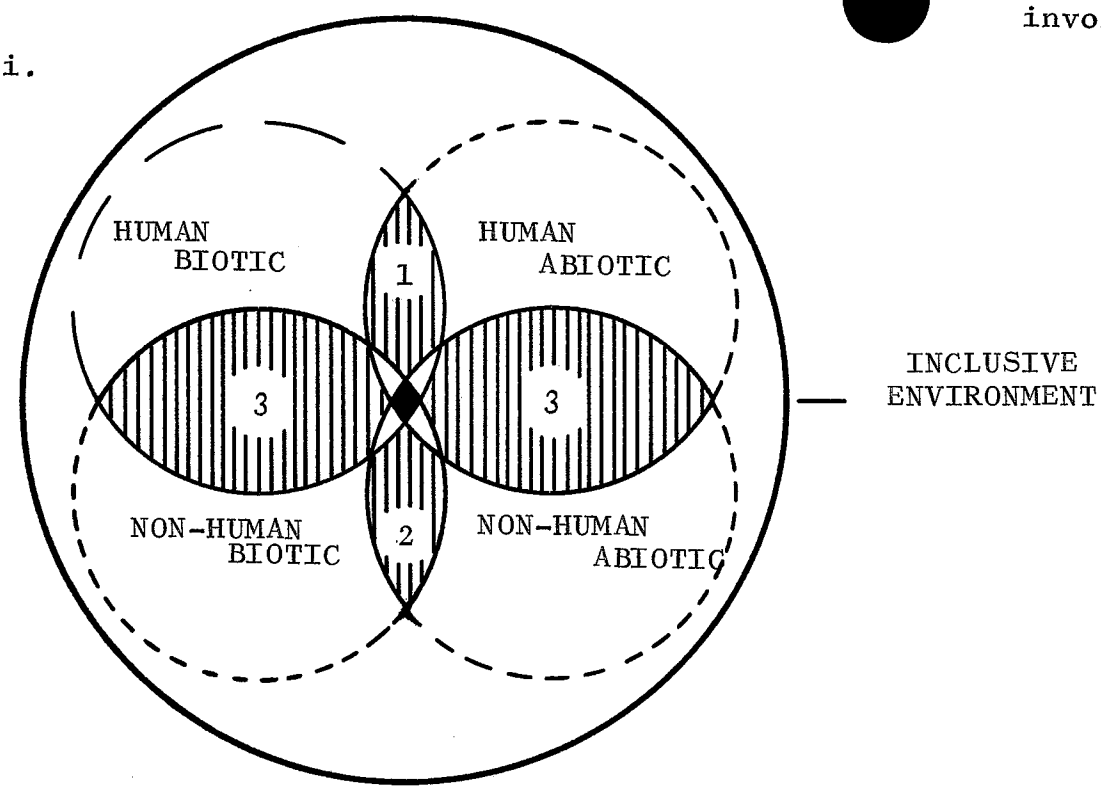
i.



major inter-relationships

area of planning involvement

ii.



APPENDIX C

ENVIRONMENTAL POLICIES OF THE AMERICAN INSTITUTE OF PLANNERS (ADOPTED MARCH 1971)

From: Journal of the American Institute of Planners, XXXVII (July 1971)

The assurance of a high quality environment is a valid national goal. AIP affirms the following as essential elements of an approach to environmental quality control:

Conservation and Management of Resources Conservation and management of basic environmental resources (air, water, land, open space, nature, quiet, safety and beauty) should include the following principles: minimization of the consumption of non-replaceable resources; replenishment or recyclying of replaceable resources; and absolute protection of unique or critically endangered resources. Federal and state governments should initiate research aimed at identifying critical environmental resources, their rates of consumption under the impact of urbanization, and strategies for their protection and conservation.

Planning and Plan Implementation Planning, including plan implementation, can and should be used to abate and prevent pollution of all kinds, to assure balances between land use and density of development and the capacity of supporting systems, to provide and promote suitable

development standards for planning in relation to existing and desired environmental quality, and to minimize the impact of unavoidable pollution on populations through the appropriate arrangement of land uses.

Environmental Design High quality for the built environment should be promoted through land use planning, urban design, and the systematic application of multidisciplinary planning and development techniques.

Social Responsiveness Environmental protection, control, and restoration of quality should seek equity in the distribution of unavoidable adverse surmounted effects, in the availability of access to amenities and the provision of suitable institutional mechanisms for the representation of all citizen interest.

APPENDIX D

SELECTED IMPACTS OF THE AUTOMOBILE

From: Martin V. Jones, A Technology Assessment Methodology. Reprinted in The Futurist, VI (February 1972), p.26.

Values

- Georgraphic mobility.
- Expansion of personal freedom.
- Prestige and material status derived from automobile ownership.
- Overevaluation of automobile as an extension of the self - an identity machine.
- Privacy - insulates from both environment and human contact.
- Consideration of automobile ownership as an essential part of normal living (household goods).
- Development of automobile cultists (group identification symbolized by type of automobile owned).

Environment

- Noise pollution.
- Automobile junkyards.
- Roadside litter.
- Land usage for highways - takes away from recreation, housing, etc.
- Land erosion from highway construction.
- Water pollution (oil in streams from road run-off).
- Unsightly billboards.
- Air pollution - lead, asbestoes, hydrogen chloride, carbon monoxide, oxides of nitrogen, oxides of sulfer.

Economic

- Mainstay and prime mover of American economy in 20th century.
- Large number of the jobs directly related to automobile industry (one out of every six.)
- Automobile industry the lifeblood of many other major industries.
- Rise of small businesses such as service stations and tourist accommodations.
- Suburban real estate boom.
- Drastic decline of horse, carriage, and wagon businesses.
- Depletion of fuel reserves.
- Stimulus to exploration for and drilling of new oil fields and development of new refining techniques, resulting in cheaper and more sophisticated methods.
- Increased expenditures for road expansion and improvement.
- Increased Federal, state, and local revenues through automobile and gasoline sales taxes.
- Decline of railroads (both passengers and freight).

Social

- Changes in patterns of courtship, socialization and training of children, work habits, use of leisure time, and family patterns.
- Created broad American middle class and reduced class differences.
- Created new class of semiskilled industrial workers.
- Substitution of automobile for mass transit.
- Ready conversion of the heavy industrial capability of automobile factories during World War 11 to make weapons.

- Many impacts on crime.
- Increased tourism.
- Changes in education through bussing (consolidated school versus "one room country schoolhouse").
- Medical care and other emergency services more rapidly available.
- Traffic congestion.
- Annual loss of life from automobile accidents about 60,000.
- Increased incidence of respiratory ailments, heart disease, and cancer.
- Older poorer neighborhood displacement through urban freeway construction.

Demography

- Population movement to suburbs.
- Shifts in geographic sites of principal U.S. manufacturers.
- Displacement of agricultural workers from rural to urban areas.
- Movement of business and industry to suburbs.
- Increased geographic mobility.

Institutional

- Automotive labor union acitivity set many precedents.
- Decentralized, multidivisional structure of the modern industrial corporation evident throughout the auto industry.
- Modern management techniques.
- Consumer installment credit.

- Unparalleled standard of living.
- Emergence of U.S. as foremost commercial and military power in world.
- Expansion of field of insurance.
- Rise of entrepreneurship.
- Basis for an oligopolistic model for other sectors of the economy.
- Federal regulation of interstate highways and commerce as a pattern for other fields.
- Highway lobby - its powerful influence.

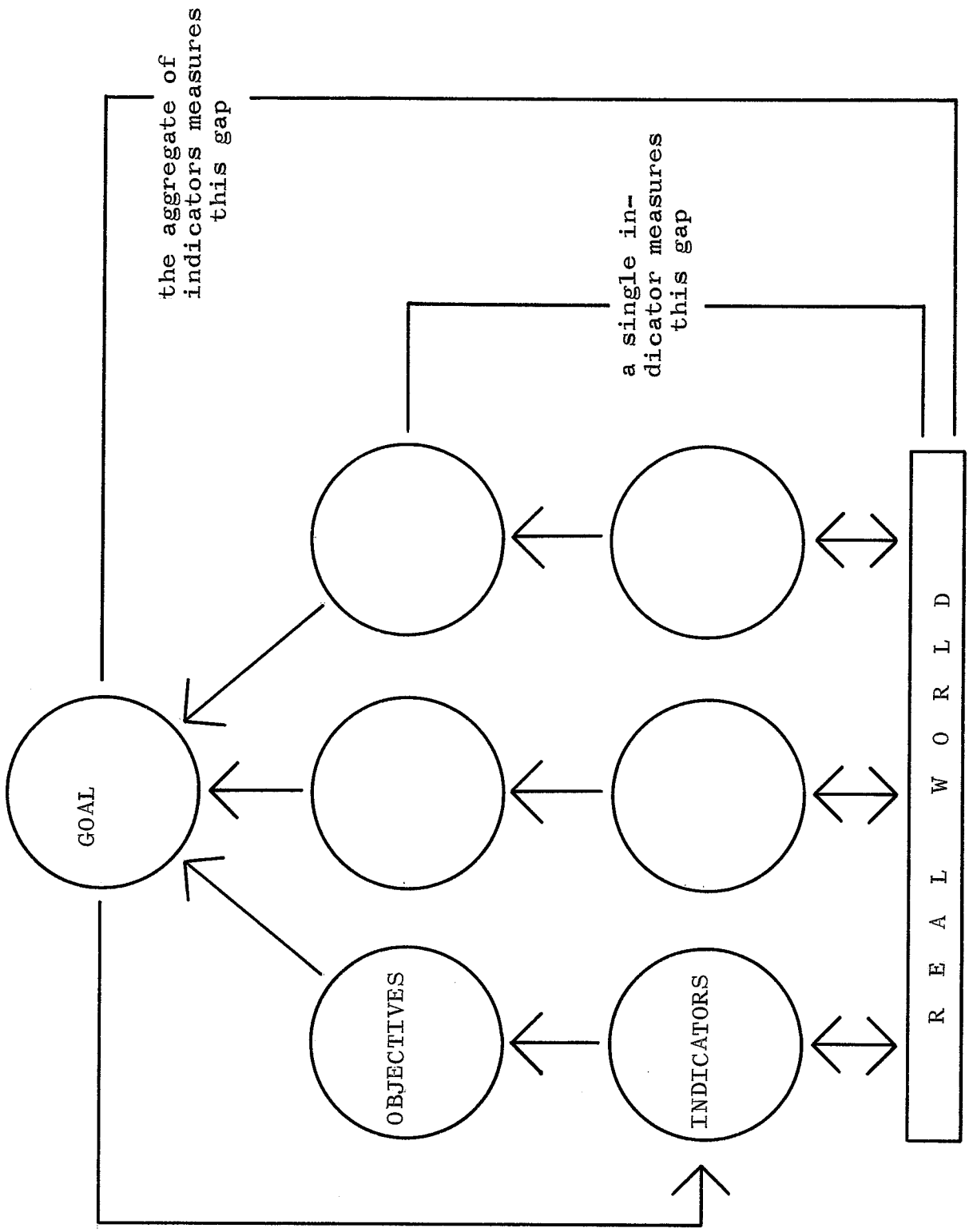
APPENDIX E.

SOME PRE-1960 CONSERVATION GROUPS

From: L.K. Caldwell, Environment: A Challenge to Modern Society, (Garden City: Natural History Press, 1970), p. 49.

1870	American Fisheries Society
1875	American Forestery Association
1876	Appalachian Mountain Club
1892	Sierra Club
1900	Society of American Foresters
1905	National Audobon Society
1911	North American Wildlife Foundation
1915	Ecological Society of America
1919	National Parks Association
1922	Izaak Walton League
1925	Defenders of Wildlife
1932	National Reclamation Association
1935	The Wilderness Society
1936	The Wildlife Society
1936	The National Wildlife Federation
1941	The Soil Conservation Society of America
1946	Wildlife Management Institute
1947	Conservation Education Association
1948	Conservation Foundation
1958	American Conservation Association

GOALS, OBJECTIVES, INDICATORS AND THE REAL WORLD
APPENIX F



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