1996

Household Responses To The Environmental Problem

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HOUSEHOLD RESPONSES TO THE ENVIRONMENTAL PROBLEM

by

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Submitted in partial fulfilment
of the requirements for the degree of
Doctor of Philosophy

Faculty of Graduate Studies
The University of Western Ontario
London, Ontario
August 1996

ISBN 0-612-15050-X

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classical distance decay effects of spatial and temporal scale or distance on knowledge and response were not found.

Most household environmental information was from mass media, but those who made greater private efforts had more knowledge. Household formal education was the most identifiable explanatory factor; other socio-economic factors had little impact. Income correlated up to an "upper middle" level, but then lessened. Members of environmental groups, especially GAP, stood out from non-members. There was a strong correlation with sound exological, but not with endological, values.

Findings provide empirical evidence of time-space compression in the post-industrial era. Consciousness of the coincidence of human goals and environmental viability is emerging in the adoption of a Human-Environment Sustainability Paradigm (HESP). Concern for and willingness to change to protect the earth are widespread in society. The environment matters!

Keywords: Attitude, Behavior, Distance decay, Environmental Orientation Index, The Environmental Problem, Household, Human-Environment, Information, Paradigm, Neighborhood, Sustainability

ACKNOWLEDGMENTS

I wish first to thank my supervisor, Dr Elaine Bjorklund. She interested me in Geography, she guided me through my graduate study, and she has provided stimulating and encouraging example. Without her many kinds of support and assistance, and her advocacy of my cause in hours of need, this study would certainly not exist.

My advisory committee, Dr Michael Troughton and Dr Graham Smith, provided timely criticisms, encouragement, and support.

This study was supported by a graduate research assistantship, and certainly could not have been carried out without it.

I also want to give a special thanks to Dr Allen Philbrick who believed in me faithfully, and gave strongly worded encouragement when it was needed most.

My family, in China, started me with the values of study, and have carried me through with their imperishable confidence.

Finally and always, I must remember the sweet patience and enthusiasm of my daughter, Janet. I treasure the intellectual challenge, kind generosity, and beautiful love of my husband, Dr Robert Gordon.

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CHAPTER 1

Introduction

1.1 Research Problem

The environment matters to humanity. Yet how informed, how adaptable are human communities to changing their ways of dealing with the environment to sustain its viability?

Human activities increasingly penetrate all environmental regions in one way or another. Human needs and greeds collectively make demands on all regions which contribute to progressive destabilization of some parts of the planet and renders unlivable other parts[1].

The human population of the earth is moving from 5.7 billion in the mid part of the last decade of the twentieth century to doubling itself by 2050 according to The World Bank in 1995. Continuation of prevailing attitudes and behaviors of people, individually and collectively, raises serious questions about global survival and thus human survival.

Increasingly, scientific evidence shows that many human life-supporting ecosystems of the earth and its atmospheric environment are deteriorating at an accelerating rate. If global warming, stratospheric ozone depletion, air pollution, acid rain, exhausted ground water, deforestation, soil erosion, water contamination, and loss of living species continue, the survival of the only known habitable planet is jeopardized. Continued human existence, especially when the numbers will double in the next fifty years, faces mortal threat, if not globally, more likely on local and

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[1] Chernobyl, Love Canal, and Bhopal are examples of human-induced environmental disasters.

regional levels. Grossly diminished environmental capacities in many places are a certainty.

It may be argued that the earth's environment is only undergoing natural cycles and non-catastrophic changes. Humankind may have incomplete and imperfect knowledge of the complexities of the global environment, including our own roles and impacts. There is growing evidence that human treatment of the environment and escalating demands made upon it do contribute to its degradation. Accelerated demands for water, fuels, minerals, food, fibre, places to put wastes, especially toxic kinds, along with many other demands on earth's eco-systems do impact upon atmospherical, bio-litho-hydrospheres. The transactive effects of human and environmental processes are now widely recognized[2].

Whether or not one adopts a catastrophic view of the global future, curbing environmental degradat on to ensure sustainable development[3] is an issue confronting people everywhere in the world. Behavior change at all levels is required to reduce and reverse the current environmental trend. Societies in varying circumstances need to identify and address different tasks, difficulties, and opportunities.

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[2] Even within the scientific community, there exists a considerable consensus that the global environment is in crisis and that the crisis is complex with interrelated elements. However, controversial interpretations remain over the magnitude, causes and solutions of the changes in the global environment. Support for a variety of different positions can be found in the scientific debates.

[3] Sustainable development is the theme of The World Commission on Environment and Development, *Our Common Future* (Oxford: Oxford University Press, 1987). The book is better known as "the Brundtland Report", because Mrs. Gro Harlem Brundtland chaired the commission appointed by the United Nations. The report promotes the concept of ensuring that present economic growth not jeopardize the opportunities for the prosperity of future generations. This, of course, is not an entirely new concept, but certain aspects are presented in a new form. The term "sustainable development" has been given diverse definitions and interpretations; nevertheless, the general concept has been warmly embraced around the world.

The consumer lifestyle is incompatible with environmental sustainability. Developed countries with insatiable demands on resources are major contributors to environmental degradation[4]. Every community, household, and individual are witting and unwitting participants.

Awareness of the scope and magnitude of the environmental problems both current and potentially in the future has been the subject of many scientific reports, national debates, media accounts and educational programs. As the public is exposed to the widespread extraordinary levels of resources waste and destructive environmental practices, some attention is being directed at changing behavior to accommodate new realities in North America. Some change in behavior and lifestyles is detectable[5]. These are, however, minute in relation to the scope of change needed. Profound questions are raised by the issue of environmental concerns. Among the questions are:

1) *What information do people have about environmental matters on which to base their behavior?*

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[4] Based on data by World Resources Institute (1994), North Americans produce fifty per cent of the world's garbage with just eight per cent of the world's population. Daily per capita production of household garbage is 1.9 kg in the United States and 1.8 kg in Canada. In Tunisia, India, and Philippines, however, the figure is only about 0.5 kg. In terms of contribution to global warming, as indicated by energy consumption, the gap becomes more astonishing. Each year, an average Canadian uses 281 times (281 million BTUs) the amount of energy of an Ethiopian (1 million BTUs) and about 47 times that of an Afghanistan (6 million BTUs).

[5] According to the study by The Roper Organization, *Environmental Behavior, North America: Canada, Mexico, United States* (New York: Roper, 1992), there was observable increase of public adoption of more environmentally responsible lifestyles in the 1980s and early 1990s. Canadians, in particular, were found to be the "greenest" North Americans. A special example of Canadian success was the "Blue Box Program" launched by the Ontario Multi-Materials Recycling Initiative (OMMRI) in 1981. The comprehensive curbside recycling program covered 78% of the Ontario province and reached 2.9 million households in 1992. The volume of material recycled through it grew from about 50,000 tons in 1987 to 450,000 tons in 1991.

2) *What are the prevailing attitudes about environmental problems that are seemingly widely known?*

3) *Are actual behaviors of people consistent with the knowledge they have and their attitudes toward it?*

4) *What are the urban spatial patterns of environmental information, attitudes and behavior, especially in an urban center in Canada?*

5) *How can the patterns be explained toward understanding human-environment relationships?*

These are the basic questions being addressed in this study. The study takes place in London, Ontario, using a sample of 300 households from representative neighborhoods to discover prevailing spatial patterns pertaining to environmental information, attitudes toward environmental problems and revealed behavior. The household is taken to be the unit of investigation using responses from an adult member to represent its membership. Households' environmental positions are identified at three levels: 1) information, 2) attitude, and 3) behavior, using a selected range of environmental issues and problems. The research identifies and describes some important factors and processes that lead to actions that both change environment and our ways of interacting with it. Well-established theories and methods are used to implement the enquiry and provide explanation, as will be discussed in later sections.

Successful and effective promotion of behavioral change regarding the environment on a broad scale is difficult to achieve and equally difficult to bring about in a timely manner. Some theoretic framework has to be brought forward and some general sense of the actual objectives to be achieved formulated. Recent studies have shown that change

of prevailing attitudes and behaviors is necessary. Many industrial countries, including Canada, are undertaking certain educational programs to inform and interest people in the environmental problem generally and to inform people about specific issues locally. Evidence of this can be found in Catton and Dunlap (1978, 1980), Capra (1983), and Henderson (1991) on identifying the newly emerging ecological paradigm in the post-modern society; in Drengson (1980), Rifkin (1980), Porritt (1984), Bookchin (1990), Durning (1992), Suzuki (1994), and Dobson (1995) on advocating ecological ideology and green lifestyles; in WCED (1987), Milbrath (1989), Tolba, et al. (1992), and Elgin (1993) on initiating and envisioning sustainable development and societies; and in Daly (1990), Macdonald (1991), Nelson, et al. (1993), and Smith (1993) on promoting and implementing specific aspects for environmental sustainability. These sources consistently point out that change is a practical process involving personal lifestyle alteration and social-political-economic change at national and international levels. Not addressed in these important discussions are the behavioral changes at household and community levels. This study will offer a contribution at the local level.

Geographical concepts, perspectives, and techniques can make crucial contributions to understanding peoples' response to environmental problems. The problem itself, the condition of the environment as the home of humankind and support systems of life, is fundamentally time-spatial.

Perceiving, learning, and applying information about place is a time-spatial process. Comprehending problems from within the ways things are customarily done, appreciating alternative ways of doing them, and adopting different behaviors that may affect accustomed lifestyles, are not

easy to disseminate; nor are they necessarily easy to accommodate in people's lives. Also there are social, cultural, economic, and technological constraints and contexts that have their own geographies. Investigations into the impact(s) and role(s) played by individuals and groups of all sorts have time-spatial dimensions. These geographic views underpin the enquiry to be presented in the following chapters.

Making changes in our lives to achieve necessary transformations of our habitat and ourselves is a continuing human-environment transaction[6]. This has been a persistent process throughout all of human history. Individually and collectively, change involves information acquisition and its utilization toward attitude formation, values developed, and ultimately actions taken, here referred to as behavior. Rising public awareness, growing concern and active participation in some circles to regulate negative and unnecessarily destructive impacts of human activities on the environment constitute examples.

Many human and environmental forces contextualize and constrain the information we have at our disposal, its use, and the choices made. Among them are the prevailing political, social and cultural circumstances as well as technological, economic, and spatial-temporal forces. Even

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[6] The transactional view focuses on the changing relationships of aspects and entities in the transactional whole. Psychological and environmental aspects are understood as holistic entities, not separate elements. The inseparable factors not only simultaneously and conjointly define the whole, but also their very definitions and meanings are dependent upon one another. Change is intrinsic and ongoing, resulting from the interactions of the intertwined entities. For further discussions of the transactional view, see Irwin Altman and Barbara Rogoff, "World Views in Psychology: Trait, Interactional, Organistic, and Transactional Perspectives", in Daniel Stokols and Irwin Altman (eds), *Handbook of Environmental Psychology* (New York: John Wiley and Sons, 1987), 7-40; Stuart C. Aitken and Elaine M. Bjorklund, "Transactional and Transformational Theories in Behavioral Geography", *The Professional Geographer* 40(1), 1988: 54-64.

if all these large-scale forces were to be removed, people would still differ in their particular information selection, attitude formation, and behavior based on their past experience, their present predispositions, objectives and aspirations, and their sense of the future.

Given the impossibility of anyone having complete information of total reality, choices are made and actions are taken that fit with habitual behavior patterns, rather than with any new information and altered behavior which might be investigated (Bjorklund, 1983). Customary practices are those which, on the whole, are likely to be similar to priorities broadly used by other people in one's society. Conformity is the easiest and most likely path to follow.

Conventional patterns of behavior and belief are hallmarks of the societies we belong to, the groups we associate with, and the nation we are part of. Of course, there are marked variations that occur in all these human organizations. Some people are totally anchored to familiar ways and resist all change. Others will be receptive to new information and gradually incorporate it in their lives to make changes in their ways of doing things. A much smaller set will raise questions, and actively seek out new information toward addressing a problem.

Making changes in behavior is a difficult and complex task, especially on matters that are long-term, large-scale, and with uncertain outcomes. Effort must be made to address questions such as:

What are the factors that make people change their ways of doing things?

How do individuals and groups structure information toward arriving at alternatives?

How can selection of desirable options be effected?

These and other questions are at the heart of this behavioral geographic enquiry into human behavior regarding environmental problems.

1.2 Conceptualizations

Before probing more deeply into the questions raised and the procedures followed to investigate them, it is appropriate to present the conceptualizations employed in this study.

They will be discussed in three sub-sections called: 1) The Environmental Problem, 2) Behavioral concepts, and 3) Household and environment.

1.2.1 The Environmental Problem (TEP)

The Environmental Problem referred to throughout this study as TEP stands for the complex set of natural and human forces and processes that threaten irreversible destruction, degradation, contamination of earth-sustaining conditions. The term is used in a generic sense to represent any or all of the environmental conditions that concern human beings at whatever scale, in whatever form(s) that exceed natural recovery capacities. Significantly, human beings are taken to be part of the environment and as distinctive environmental participants.

As integral parts of nature, people compete with each other and other species for occupancy of the earth. Human beings are critical forces and agents of environmental change. While changing themselves individually and collectively, people learn about, adapt to, modify, create and recreate nature for their purposes. Therefore, TEP includes the aggregate of all the ways people occupy the earth and use its material resources that jeopardize the

functioning or relative stability of local, regional, and global environmental processes and conditions. TEP is a conceptualization that encompasses a multitude of specific physical and human problems such as chemical spills and population explosion.

World-wide ecological change is widely observed from satellite images and from documented accounts of lost species, weakened ecosystems on land and in water, and whole regions which have lost the ability to sustain human communities. Scientific evidence accumulates rapidly that crucial natural systems are in jeopardy. The observed thinning of the ozone layer, global temperature increase, and many profound changes in soil fertility, vegetative cover, and diminished aquifers show evidence that critical thresholds are being crossed. Survival of life on the only habitable planet in the known universe is threatened. Humanity may be confronted with the real possibility of imminent extinction if environmental destruction continues.

The magnitude and speed of environmental degradation has no precedent in human history. Whether or not such dire consequences are unavoidable outcomes of natural and human forces is arguable; but there is irrefutable evidence that the earth cannot sustain ever-escalating levels of use and abuse. Scientists do not fully understand global environmental changes nor do they have adequate knowledge of actual human impacts on environmental processes.

Available information strongly suggests, however, that observed disturbing changes in the quality of the global environment are unlikely to be exclusively attributable to natural causes or even simply to cyclical shifts. However naturally turbulent the earth is, it seems reasonable to assert that the acceleration of planetary changes is

augmented by human activities. The human species imposes stresses on the environment through the magnitude, severity, and irreversible transformations of the earth to undermine its sustainability.

The term "TEP" is used for this conceptualization of the state(s) of human-environment interaction (especially with the dynamics of the human domain in mind) for two reasons. Firstly, "the environmental problem" is a phrase in general and widespread use among the public, and even the scientific community. This suggests that, in a very general sense, the term does have some broad, intuitive base of shared meaning. Secondly, and following from this, for purposes of this research, it serves as a convenient umbrella term which can be used as such, and at the same time narrowed to focus on more specific particular environmental issues and conditions where warranted.

In Figure 1.1, the model of human environment transactions used in this study is presented to assist in the description and understanding of TEP.

As shown in the model, there are two poles: the human one called Human Impact on Environment (HIE) and the environmental one called State of the Environment (SOE). These are seen as fields of transaction between Lifestyle Dynamics and Ecological Dynamics. SOE refers to the particular circumstances prevailing at any given time and place. These may be well known or fully understood, or they may be partially known, or mostly unknown to human occupants.

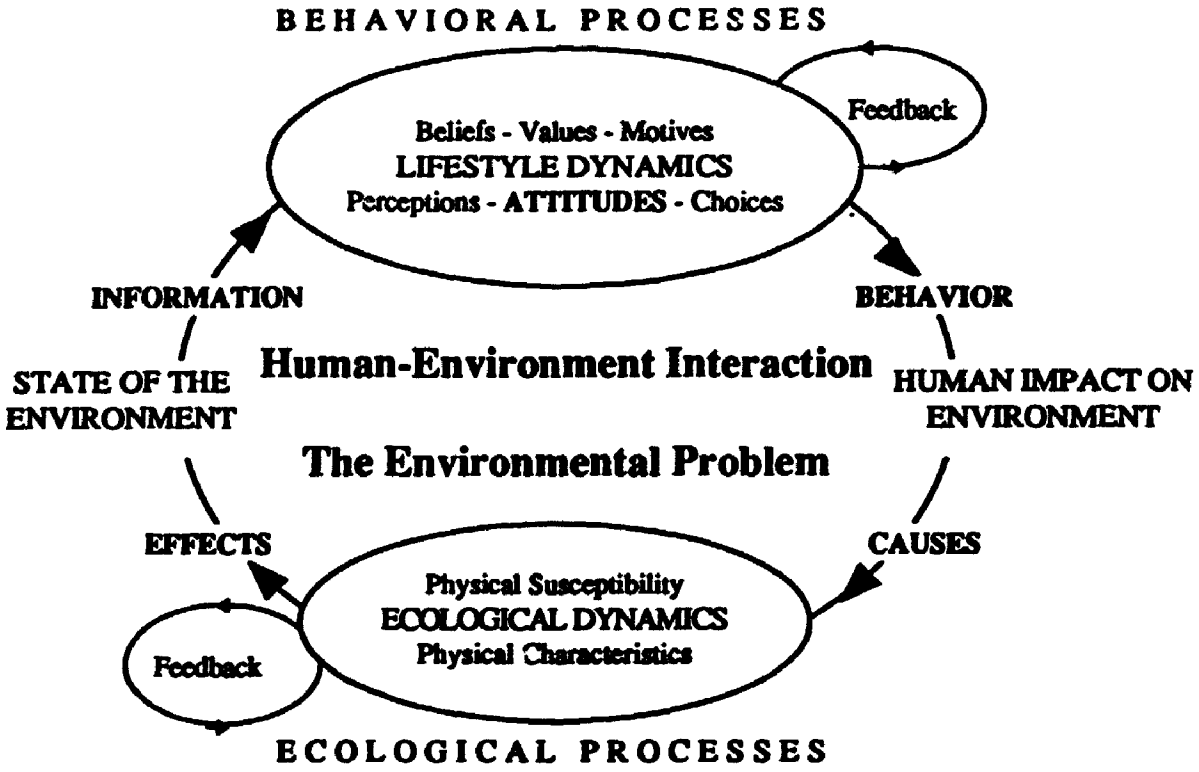

Figure 1.1 The Environmental Problem

To the extent that SOE is comprehended, it has objective and subjective characteristics. These exist externally to ourselves, yet are knowable from experience, including repeated observations, tested and verified according to the mental constructions used by the individual or group. SOE undergoes changes resulting from HIE that contribute to changes in Ecological Dynamics. SOE contains evidence that can be used as information by people in the formation of their beliefs, attitudes, values, motives characterized as Lifestyle Dynamics.

Lifestyle Dynamics are the processes by which information derived from and about SOE shapes beliefs and attitudes and values. These in turn form behaviors which have impacts on environment. Ecological Dynamics are the transactive processes in which communities, and associations

of living things including human communities, bring about changes in one another to produce different susceptibilities and altered characteristics. All these form networks of feedbacks and transactional relations to each other. This is a general formulation of TEP developed to identify and describe key parts from the perspective of this study to reveal its characteristics.

A wide range of environmental characterizations has been conceptualized by scholars in different disciplines, by international and national organizations, and by public and private interest groups. A selected set of these deserve mention at this stage.

In their overview of environmental outlooks, Catton and Dunlap (1980) as well as Dunlap and Van Liere (1978, 1984) present two contrasting paradigms that coexist: the Dominant Social Paradigm (DSP), and the New Ecological Paradigm (NEP) in our present era[7]. The central thrust of the DSP is 1) the assumption of the environment itself having little value other than providing endless resources for human use; 2) the assumption of unlimited growth and important values placed upon material consumption and wealth accumulation; and 3) the assumption of the efficiency of science and technology to solve all problems. This worldview characterizes the prevailing position in the 20th century.

Following from research into many aspects of the global environment aided by new technologies, another viewpoint is emerging in the last part of this century which Catton and

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[7] The conceptual paradigms were also empirically tested and confirmed by Riley E. Dunlap and Kent D. Van Liere as reported in their publications of 1978 and 1984. They used survey data from about 1,500 people in a Washington state sample to verify the concrete definitions of the two paradigms for which they constructed scales. The statistical findings through the use of the factor analysis techniques enabled them to demonstrate the different dimensions in the DSP and the NEP.

Dunlap and Van Liere believe will evolve into the basic paradigm of the twenty-first century.

The emerging NEP assumes 1) the importance of maintaining ecological balance; 2) the reality of limits to growth, including population, industrialization, as well as consumption; and 3) the responsibility for reducing anthropogenic environmental degradation. This emerging paradigm has grown from within industrial societies. There is increasing belief and evidence that suggest the public has already adopted many elements i· the NEP belief systems while rejecting core features of DSP (Milbrath, 1989; Edgell and Nowell, 1989; Olsen et al., 1992).

Other scholars have articulated their views on the environmental problem somewhat differently. Cotgrove (1982) suggests that contrasting prevailing viewpoints can be characterized as "cornucopian" and "catastrophic". He sees that projecting about human and environmental futures involves believing in the optimistic or pessimistic scenario. Dobson (1995) argues for "light green" and "dark green" approaches to describe environmentalist and ecologist positions. O'Riordan (1981) first offered a simple polarized classification system concerning the ideological themes of environmentalism: "ecocentrism" and "technocentrism". The former emphasizes the elimination of technological interference from environmental integrity. The latter affirms technological control over environmental problems. More recently, O'Riordan (1991) describes the differences as the dynamics of "greenness", within a range of activities supporting environmental concerns, from dry to shallow to deep green phases.

While these conceptualizations are useful, there is only limited research effort to apply them systematically at

local, regional, or national levels to determine the actual levels of support or refutation these models have. Milbrath (1984:23) has found that, at least in three advanced industrialized countries (USA, Germany, England), the majority of individuals may be categorized into two general groups. The "vanguard group" are people who advocate fundamental social change as the answer to TEP while the "rearguard group" are those who believe technological innovation will solve the problem. Acquisition of data on people's information, opinions, and practices regarding environmental matters is difficult to obtain, especially on a community-wide basis. The absence of coordinated research effort or program effort with, between and among these levels is lacking, as reported by Hines et al. (1986) and Morrison and Dunlap (1986).

The majority of the studies have been done in the United States. Canada has its own environmental and social problems and issues to be understood. This research addresses these issues in the broad Canadian context.

Canada's physical geography is also unique. Given the size of Canada, the importance of its natural resources as an economic base, and its prevailing patterns of environmental use and abuse there are legitimate reasons for undertaking comprehensive research on human-environmental problems in this specific context. As Boardman (1992:xiii) has pointed out, "the varied character of the environmental movement itself... [allows for] a considerable amount of diversity". There is a broad base of environmentally concerned organizations and institutions, e.g., Canadian Geographical Society, Nature Conservancy, Wilderness Society, Pollution Probe, Greenpeace, and various government agencies at federal, provincial, and municipal levels. Because of these many interests and approaches, there is no

unified understanding of environmental issues by the public. This study attempts to develop a general model and a cohesive approach to public understanding of and orientation toward the issues.

On the global scale at least a few efforts can be cited: the reports of the Brundtland commission, of the World Bank, and of World Watch. The Brundtland Commission pointed out that important decisions and massive actions are necessary to ensure the common future of the world's peoples. Coordinated international effort will be required. Peoples and governments everywhere need to make environmentally sustainable choices for their economic development. It is less easy to implement sustainable development than it is to agree on its necessity as discussed by both Redclift (1987) and Caldwell (1990).

The real challenge is to document human responses within their changing and different cultural and ecological contexts and build new habits, alternative ways of doing things, and better understandings of short-term and long-term impacts of prevailing behaviors. The fundamental question then becomes, not just what policies, strategies, and programs are needed to manage environments, but what means will be effective in providing information, affecting attitudes, and changing behaviors.

Heightened awareness of environmental matters apparently is taking root in Canada. The study by Angus Reid Group (1991), *Canadians and the Environment,* found that 67 percent of Canadians believed their lifestyles were harmful to the environment, while 83 percent felt declining environmental conditions were health hazards. There is also evidence that lifestyle modification has begun. For instance, in the *Household Environment Survey* conducted by

Statistics Canada in 1991, almost 50 percent of the households had access to a variety of recycling facilities. Of those with access, the rate of actual use was around 86 percent. This suggests that the Canadian public is, by and large, supportive of such programs.

Massive public response to one issue of environmental problems, however, does not mean either real understanding of the problem, or unanimous support for changing the customary ways of life (Greer-Wootten, 1989:20). Not counting the variations of support among supporters of environmental initiatives, there are many forms of opposition to action in relation to environmental problems. They range from indifference, to silent rejection, to active resistance, to hostile confrontation, to violent animosity, even to sabotage. Among them are those (e.g., Simon and Kahn, 1984; Singer, 1992; Easterbrook, 1995) who believe that environmental problems are non-existent, or simply due to natural occurrences, or at least over-stated. Others (e.g., Grayson and Shepard, 1973; Gee, 1994; Wildavsky, 1995) intensely criticize environmental-protection programs and in some cases actively oppose related actions.

In the final analysis, TEP becomes how people choose to orient themselves in living within the mechanisms that keep a balance among the components of complex ecosystems. TEP is dynamic in its actual manifestations. However, the underlying forces and the processes involved are always part of human changing knowledge and awareness, attitudes and beliefs, and behaviors and actions.

Collectively, the accounts cited, and many others, have contributed to the author's understanding of TEP, and are embedded directly or indirectly in the General Model of TEP presented earlier in this section. Important for this

research, however, are conceptualizations pertaining to human interaction with the environment from a geographer's point of view.

1.2.2 Behavioral Concepts

Human interaction with the environment is conceived in this study as based in three inter-connected behavioral factors: information, attitude, and behavior. Together they compose each household's environmental orientation - how the household will interact with the environment.

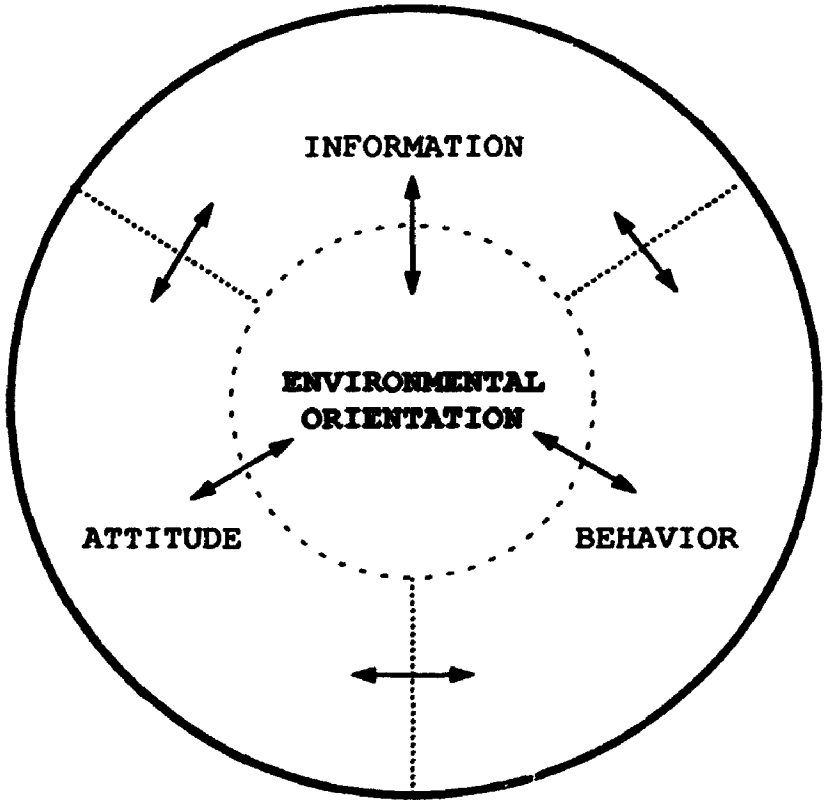

Figure 1.2 Environmental Orientation Circle

In Figure 1.2, is presented a model of the interaction and contribution of the three factors in environmental orientation. Environmental orientation is the measure developed in this study as an assessment of each household. Its central importance is reflected in its place in the center of the diagram. All three components make their

contributions, within a feedback system indicated by the arrows, both to the overall orientation and to each other. Change in any one factor will result in change in the other factors and in the total orientation.

Perceptions can be enhanced and changed; images and ideas can be formed and reformed; attitudes can be shaped and reshaped. Information becomes the building block in all aspects of human behavior and the relationships that are developed with the environment. Acquisition and assimilation of information provides the basis for the development of cognition of the environments.

Information is essential to the formation of attitudes and the undertaking of action. Unless people know something is happening, they can have no attitude toward it. Unless they have an idea of how it works, it is difficult to conceive ways of addressing it with action. Much of the effort in contemporary environmentalism is devoted to providing and spreading information to raise awareness and to elicit commitment and action.

Households have access to information about the environment, and may utilize it as knowledge towards developing attitudes that can be expressed as behavior. Attitudes act as filters to information and motivate behaviors. Behaviors include those actions which reinforce attitudes and shape information gathering.

Knowing any environment is essentially dependent upon an information gathering process by trial and error over a lifetime of coping with environmental conditions which undergo change. This information gathering process is not a random one but is self-regulated by feedback from within oneself and outside in the social/cultural contexts of one's community. As Bjorklund (1983) has shown in her model of

behavior as a "search process", information is gained and lost over a lifetime as aging, role changes, changes in interests, goals, and orientations occur in different environmental contexts. Habitual behaviors are developed which fit common social/cultural patterns. Information used by individuals is always susceptible to change according to necessity, interest, or accident. It is readily expanded and enhanced by learning, use of many media, and by experience with other people[8].

Cumulated and selected information from past experience combined with acquisition of new information from whatever source(s) define and redefine environments. Without information environments are very weakly comprehended by people. The weaker an individuals' information base about environments, the less intelligible the environments are likely to be. Perhaps environment is little more than a blur of features, or a surface on which things happen. Similarly, the stronger and more diversified the information base, the more meaningful the environments are expected to be for individuals. For the most part, however, people's needs, curiosities, and experiences of external events prompt them to seek out information about their surroundings that seem pertinent to their interests. To effect changes in people's knowledge and information fields requires that any new information be introduced in acceptable formats, demonstrate repeatedly its efficacy and utility, and provide opportunities for its use by them. Repeated communication of

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[8] David Lowenthal, "Geography, Experience, and Imagination: Towards a Geographical Epistemology" in *Annals of the Association of American Geographers* 51, 1961), 241-60, distinguishes two modes of environmental knowledge: individual and consensual. G.T. Moore and R.G. Golledge, in "Environmental Knowing: Concepts and Theories" in G. T. Moore and R. G. Golledge (eds), *Environmental Knowing* (Stroudsberg, PA: Dowden, Hutchinson and Ross, 1976), 3-24, using two categories, indicate that most knowledge is derived from consensual sources (especially mass media) rather than from personal experience.

information is important both to reinforce existing patterns of behavior and to effectively introduce new information (Gould and White, 1974; Moore and Golledge, 1976; Estes, 1978).

Attitude is a disposition producing consistency in behavior as well as a general evaluation of an object or a situation. It is understood as having three components: cognitive, affective, and behavioral. There is an obvious correspondence between the terms used by Allport (1935) and the key terms in the present study[9]. However, the three components are theoretically and empirically distinctive measurements (Breckler, 1984). Fishbein and Ajzen (1975)[10] argue that attitude should be understood only as the affective dimension. The present study conforms more closely to this position, though it is impossible to completely isolate the components from each other.

Attitude determines how people will respond to what they know about - to the information they have received. Attitudes can be scaled on a continuum and characterized into three general classes: (1) affirmative or supportive, (2) neutral or indifferent, and (3) negative or objectional (Bjorklund and Philbrick, 1975). Before action to protect the environment is possible, people must both believe that

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[9] "Attitude" has been widely defined, though the general approach has followed Gordon W. Allport, one of the founders of American social psychology. In 1935 Allport listed a set of differing influential conceptual definitions and characterizations of attitude and provided his comprehensive definition. The terminological correspondences are: cognitive:information, affective:attitude, and behavioral:behavior.

[10] M. Fishbein and I. Ajzen, *Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research* (Reading, MA: Addison-Wesley, 1975), 6, defined attitude as "a learned predisposition to respond in a consistently favorable manner with respect to a given object". They pointed out that the three components were separate entities and not always related. For a more detailed analysis and illustration of views on attitude components, see Stuart Oskamp, *Attitudes and Opinions* (Englewood Cliffs, NJ: Prentice-Hall, 1991), 8-14, where the analysis is referred to Plato.

they have the capacity to deal with TEP, and adopt as a value that environmental sustainability matters. Thus, various strategies are undertaken by environmentalists to create attitudes in the public that will lead to the kind of actions desired.

Attitudes, perception and values are culturally formed. Bjorklund (1983:96) describes this screening and limiting effect as "*cultural control*". Not only experience, but even the opportunity for experience, is bounded by "reference conditions prevailing in ... the group" and preserved by tradition. These forces are so powerful in the human mind that they can even lead "people [to] see things that do not exist" (Tuan, 1974:246). Attitudes are largely shaped, instilled, or extinguished through enduring formal social institutions, i.e., education and community or informal mass communication, traditional culture, and modern popular culture. Obviously, given these mechanisms of their development, changing attitudes does not happen quickly.

Information and attitude are steps toward adopting a particular behavior, but behavior certainly may exist without conscious awareness of those two factors. One can be unable to explain or feel indifferent toward an action, yet display behaviors that are simply related to those underlying factors. Observable behavior that affects the course of environmental degradation, recovery, or sustainability is understood as any action or inaction taken in relation to the environment. This can be behavior which contributes to environmental degradation or any that is intended to prevent it. Behavior may also include the state of ignorance and indifference.

Behavior is a function of behavioral intention, which in turn is directly influenced by attitude toward a

behavior. As discussed by Fishbein (1967), Ajzen and Fishbein (1977, 1980), intention to act is an independent phenomenon and is a most immediate precedent of overt behavior. It is true that not all behavior intentions lead to acted out behavior or behavior may have different bases, not necessarily reflecting the underlying attitudes. There is a strong link between cognition and action. Expressed beliefs, stated values, and revealed behavioral intentions are guides to dispositions to act. The present study did not attempt to obtain data about behavior by direct observation. Behavior as examined is households' reported behavior.

Behavior can be initiated and carried out on different scales (local to global) and by different kinds of agents (householders to industries); it can take place as the result of initiatives of individuals, households, neighborhoods, corporations, or even nations. In general, behavior is viewed as implementation of decisions, as reasoned or planned action (Fishbein and Ajzen, 1975; Ajzen and Fishbein, 1980; Ajzen, 1991).

Behavioral change usually occurs through at least one, if not more than one, of the following: 1) initiatives from leadership, 2) controls imposed on individuals through legislation, or 3) individuals' attitudinal shifts resulting from changing experience and perception.

Behavioral change occurs as information grows, knowledge expands, and attitudes alter. However, it is possible, even common, for information and attitude to change without change of behavior. The main reason is that it is customary to act according to habitual patterns. Inconsistent behavior is not unusual. Sometimes a behavior change takes place before information and attitude are to be changed. Once people alter their behavior and get used to

doing things in a different way, the associated attitudes, beliefs and values will change only with effort and over considerable time.

Environmental information, attitude, and behavior are social products. Each is a part to be understood in the context and in relation to each other. Individually and collectively, these behavioral components of environmental orientation are affected by other facilitating and impeding factors. When examined at the aggregate level, patterns of each factor as well as relationships among them can be identified, described, and explained.

1.2.3 Household and Environment

Inquiries into environmental interest and participation may be conducted at many levels, from the individual to the whole human race. This research is based on investigation of the household.

The household is chosen as the unit of study, because it is regarded as a fundamental gecgraphic unit of environmental experience. It is a unit at which basic working knowledge of human spatial behavior may be gained. Every household is a location situated in an environment. It is comprised of one or more biologically or socially related individuals who share a residential place and significant parts of life experience together. Focusing on the household, rather than on the individual person, enables the study to examine a geographically specific unit as it relates to environmental information, attitudes, and behaviors.

Both the relevance and the importance of studying the household can be better understood through a discussion of the function and the status of this entity in TEP. The household operates as a multi-functional unit in many

spheres of life, such as procreation, education, social intercourse and economic activity. Arguments are presented to show important roles households play in environmental matters, as a source of problems, and as a focus for remedies.

The household is regarded by this study as the basic geographic unit, in that it has actual physical location, namely, the residential occupancy of a place by a person or a collection of persons. The residential dwelling may be a house, an apartment, or an institutional setting for a special group of persons such as residential school, hospital, etc. This research examines the single-family unit in detached dwellings only.

The household, by its relation to a specific location in space, is an elementary observable entity in all cultures. This makes the household a universally identifiable research unit of analysis.

The geographical dimension of the household has direct environmental bearing and intrinsic spatial meanings. Almost everyone derives environmental experience in the life-world radiating from the home. From birth to death, most people live in a household, the base for conducting daily tasks of living.

Close association between household activities and national and global environmental conditions is commonly recognized. However, urban households are not equal in how they contribute[11] to the problems nor in how they experience

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[11] Anne H. Ehrlich and Paul R. Ehrlich, *Healing the Planet: Strategies for Resolving the Environmental Crisis* (Reading, MA: Addison-Wesley, 1991), 7, proposed the "PAT" formula: I=P x A x T, which means the Impact of any nation on the environment is a product of the size of the Population, the level of its per capita Affluence, and the Technologies used to support that affluence. Walter H. Corson, in "Measuring Sustainability: Indicators, Trends, and Performance" in Dennis C. Pirages (ed), *Building Sustainable Societies* (Armonk, NY:

their effects. According to the ecological classification by Durning (1992), those belonging to the consumer class in North America, West Europe, Japan, and Australia produce more detrimental impacts on the environment. Those of the poor class in Africa, India, and South Asia overall have less environmental demands and are minor contributors to environmental degradation.

For example, in economically advanced countries, such as Canada with large demands and allocations of resources, levels of resource use and abuse are high, waste generation has reached gross proportions. According to Johnson (1990: 66), of the total Canadian waste stream, one-third to one-half has a residential origin, while the rest is from manufacturing and industrial processes. However, even the latter portion has strong connections to individuals and households.

In a market-oriented society, with consumer-driven industries and commerce, individual households' buying power and consumption patterns determine what is, or is not, produced. Under existing ideological economic conditions, excessive use of machines, wasteful consumption of hydrocarbon fuels and petroleum derivatives, and dependency on the convenience of unnecessary processing and packaging have created the chain of over-supply, over-consumption, and a throw-away society.

Another example of the interaction of the household with the earth can be seen in increasing world-wide urbanization, identified as having precipitated the ecological crisis, producing the most obvious and immediate

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M. E. Sharpe, 1996), 325-52, takes a different approach to formalizing this differential: I=PRT, which means Impact at global, regional, or local level is a product of the size of the Population, the Resource use per person, and the Technologies employed in resource use.

environmental damage (Douglas, 1983; Brown and Jacobson, 1987; Cadman and Payne, 1990). When people move from the countryside to the city, they adopt urban lifestyles. An escalating quantity and variety of environmentally harmful activities and products, can be found throughout the urban landscape. The profligate use of an enormous range of resources, such as food, water, fuel, shelter, land sites, to sustain the urban way of life, has contributed to air pollution, water contamination and waste, and the runaway "waste generation".

Spatial inequality of environmental costs and benefits at different scales has been noted in many studies (e.g., Brown, 1991; Lutzenhiser and Hackett, 1993; Redclift and Benton, 1994; Schnaiberg and Gould, 1994). There are "environmental refugees", who are forced to leave their homes because of environmental disasters. Equipment and products often end up in the homes of those, who can least assess or handle the environmental harms. The economically disadvantaged households are more likely closer to environmental hazards, sometimes being directly on top of environmental disasters, or adjacent to toxic or hazardous sites. Those that are economically established enjoy the wealth and privilege enabling them to distance themselves from pollution, toxic wastes, and other environmental dangers. Suburban expansion has been an option of economy.

The location of each household is an observable fact. The significance of the location, however, is more complex. It seems reasonable to assume that household location is a function of relative socio-economic status. The local state of the environment is one of the principal factors determining the value of locations, especially where degradation is evident. Insofar as there are preferred locations within and across areas, those with more resources

to do so will obtain locations of greater value. Therefore, household location is considered an indicator both of human consequences of and human responses to environmental change.

The household is recognized by this study as a basic socio-economic unit, consisting of a single person or a number of persons who cooperate to perform culturally defined tasks as a group. This group may or may not be related by blood or marriage, and can include housemates or live-in helpers. Despite the variations of size and composition, the household operates as society's "smallest grouping with the maximum corporate function" (Hammel, 1980:251).

Mutual care is provided among members in the household. This care includes not only material necessities such as money, food, and clothing, but also attention to emotional and social well-being. As discussed by Netting, et al., (1984), this is accomplished through a set of strategies and activities. In varying ways and degrees, household members are engaged in production, consumption, and socialization, etc. The desired goal is to increase collective success of the household. The members are one unit, in relation to the rest of the society.

Decision making is shared, based upon an assumed common belief and value foundation of the household. Decisions may be made by either an individual on behalf of the household, or by consensus with the members of the household. Each of the persons in the household, to varying degrees according to age, gender, and level of responsibility, influences the overall behavior of the household. At least optimally, the interests of the whole household prevail over those of any single individual within it. Responsible adults, however, are the significant decision-makers.

In matters pertaining to TEP, the household is commonly assumed to function in the same way. In comparison to larger groupings of population attitudes, a relatively high degree of homogeneity of environmental attributes is expected among the members in the household. Those attributes can be ascribed to the fact that they are fundamentally social products of the household. They are outcomes of the interaction of the individuals within the household, constrained by complex forces in their shared lives.

Some examples may help to illustrate the point.

Individuals' tastes and requirements will determine what the household will buy, as exemplified by the quantity of meat in the diet, use of bleaches in the washer, or the vehicle use of the family. However, as a social unit, the choices are the outcome of aggregate factors within the dynamics of the whole household.

The financial command of the household acts as a constraint on household's environmental preferences and behavior patterns. There is commonly a primary purchasing decision maker who selects the appliances, products, foods, and other consumables used by the entire household. The decision maker may or may not be supportive of "green" products, or environmentally safe practices.

Similar to occupational and religious practices, one or some of the household members may decide what environmental information the household is exposed to. Some members of the household, due to age, profession, or association with certain institutions, may have greater influence on the household than other members. There may be a head of the household who can mandate the household jobs and amount of income spent on behalf of the household. Such individuals

may virtually define the environmental characteristics of all household members.

The household is also where information is acquired, shared, assimilated, used in the formation of attitudes and behaviors. Within the household, opinions are expressed and transformed, and courses of action are established, and revealed to the rest of the society in other different social and geographic settings.

Recognition of extensive sharing and mutual influences within the household make it an appropriate research unit from which this study elicited environmental interests and concerns to determine the relationships among a) information about environmental matters, b) attitudes towards TEP, and c) behaviors that have environmental impacts. These are the three components believed to be major dimensions comprising the environmental orientation of the household. They will be analyzed in relation to each other, and in association with other variables.

The household is an important unit to initiate change, to be supportive of change, and to be a conduit of change. It also can be a unit resistant or indifferent to change in household patterns. If there is to be improved environmental awareness, as well as different attitudes and behaviors, for the purpose of sustaining environmental quality, the household will be one of the basic entities to undergo change. It will be a key to influencing the larger units of the social and cultural body. These ideas form the cornerstone of this dissertation, and lie behind the choice of the household as a good place to begin documenting emerging patterns of environmental behavioral factors and relationships. It is believed this is a most revealing level of explanation, and a logical focus for remedial effort.

The household is considered as a transactional environmental unit and a system of dynamic functions within human-environmental transactions. The household both affects and is affected by environmental conditions and processes, such as water, climate patterns, atmospheric conditions, acid rain, pollution, soil contamination. The reported behaviors and attitudes of each household are regarded as the net result of the household's internal capacity to absorb and act on information based on interpersonal relationships and the information sources from which they operate. The household provides a meaningful framework for analysis of TEP. It brings into one focus the real-life interaction of the individual, the societal, and the environmental forces. Recognition of this functional embedding facilitates study of environmental orientations at the household level.

The connections of the household to TEP will be described using a framework derived from Ludwig von Bertalanffy's (1956, 1962) general systems theory. The household is seen as a unit within larger complexes with three distinguishable but interrelated domains: bio-physical, social-cultural, and behavioral. These cut across different functions of the household, as shown in Figure 1.3 Household Functional Transactions. The complex provides a set of widening contexts of the household. Within this complex, the household develops and exhibits environmental experience of its occupants as a geographic unit and socio-economic unit.

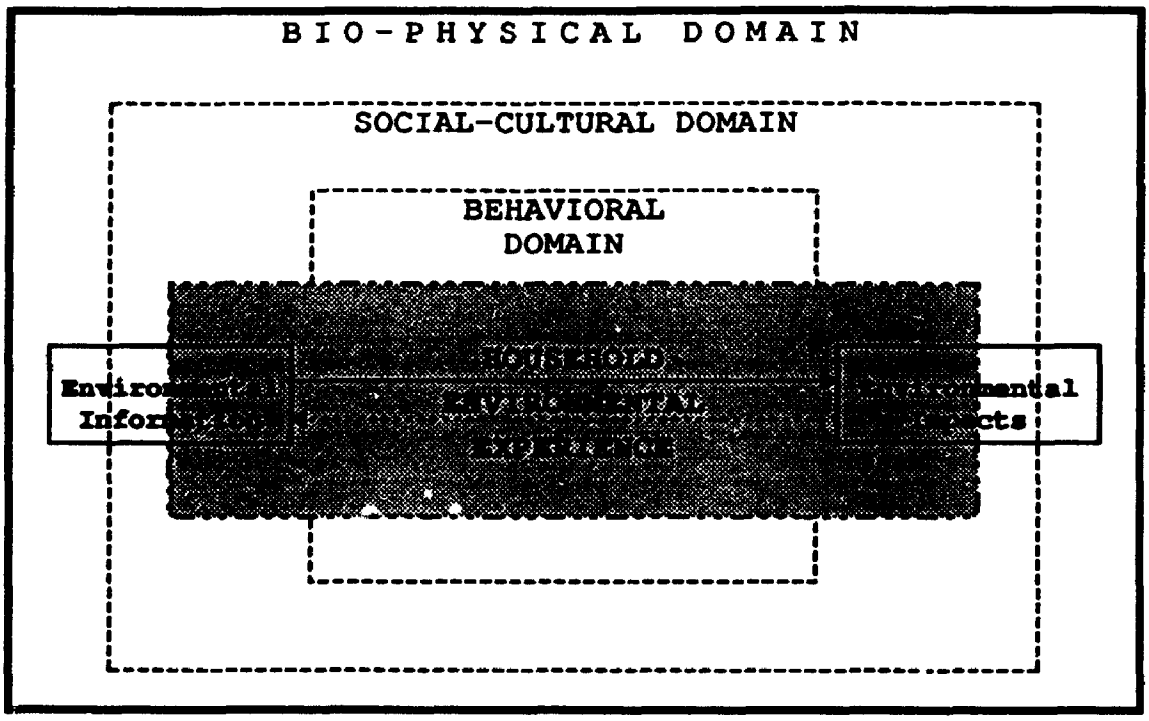

Figure 1.3 Household Functional Transactions

As illustrated in Figure 1.3, the intricacies of household environmental experience take place across all three domains. While the behavioral and social-cultural domains have permeable boundaries, the bio-physical domain represents the totality of the household context. The different boundaries also symbolize another concept behind this study. The broken lines suggest the limitless human opportunities for solutions to problems within the limited (solid line) natural world. The environmental conditions of the bio-physical domain are perceived through values acquired from the social-cultural domain and organized by existing psychological capacities in the behavioral domain.

According to the systems approach, each of the three domains may be viewed as an open system, composed of a set of entities, among which a set of relations can be specified as depicted by the dashed lines closing the domains. Deductions from some relations to others, or from the

relations among the entities to behavior or the history of the system, are then possible. Within a system, there are subsystems, defined by grouping certain entities. No component in a system is static. All are capable of entering into change: as contributors to change or as affected by change. The input/output function of a set of components generates a continuum of feedback routes, both within the system itself and between components, rather than a unidirectional linear production. Alteration of any component will affect other components and their relationships, because of the complexity associated with their high level of interdependence.

Relating the model of this Figure 1.3 to the model of Figure 1.1 The Environmental Problem, and the accompanying discussions, the environmental experience of the household may be construed as a particular case of human-environment interaction. The household level is but one of many levels of the dynamic human and environment interactions involving the three domains. Others include individual, national, and continental levels.

The main interest of this study is to bring investigation to a sharper focus on the position of the household and its relationships among environmental information, attitudes, and behaviors. In terms of the two models of The Environmental Problem and Household Functional Transactions, these can be seen either as an examination of the boundary conditions for the household where it crosses domains (Figure 1.3) or as an analysis of the dynamics mediating the state of the environment and human impacts on it (Figure 1.1).

As illustrated in Figure 1.3, environmental information represents the socially and culturally conditioned

understanding of the state of the environment. Household behavior takes place within the socio-cultural domain. Behavior is taken in a sense to include values, beliefs, attitudes, preferences, motivations, expressed opinions, and overt actions. It is in this inclusive sense that behavior and practice combine forces to produce environmental impacts. In turn, these impacts affect the state of the environment, and the changed conditions which become the source of feedback information for future decisions.

In the terminology of the systems approach, environmental information provides inputs to the formation of household behavior and societal practice. Impacts of household behavior and societal practice create outputs resulting in changes in the environment. The feedback effects represent the dynamic continuum of change.

Household behavior is more than just a part of societal practice. Aggregated household activities constitute the range of societal practices. There is a synergistic amplification of the effects of many households expressed as societal practice which, in turn, makes social differences. So the output forces of societal practice have effects beyond either any individual household or the mere sum of these. Behavior may be imposed on the public by authorities through legislation or regulation. Of course, individual households can go against the current of societal practice. It is best to conceive the different forces of household behavior and societal practice as a continuum of human impacts on the environment.

A more detailed conceptual model, inspired by that of Bjorklund (1983:93), is presented in Figure 1.4 to represent the system of household behavioral phenomena involved in environmental transformation. The general conceptual schema

shows an open system of human behavior in relation to environmental information. "Human behavior" is defined here as patterns of attitude and practice vis-à-vis environmental issues, both at the individual household level and at the aggregate level of society. "Environmental information" refers to signals and reports of environmental conditions detected and interpreted by people. This schema recognizes that there is no single beginning or finishing point; anywhere can be the start; any one of the several parts may initiate change. In the following discussion, relations depicted on the outside of the diagram will be treated first, moving toward the center as the exposition progresses.

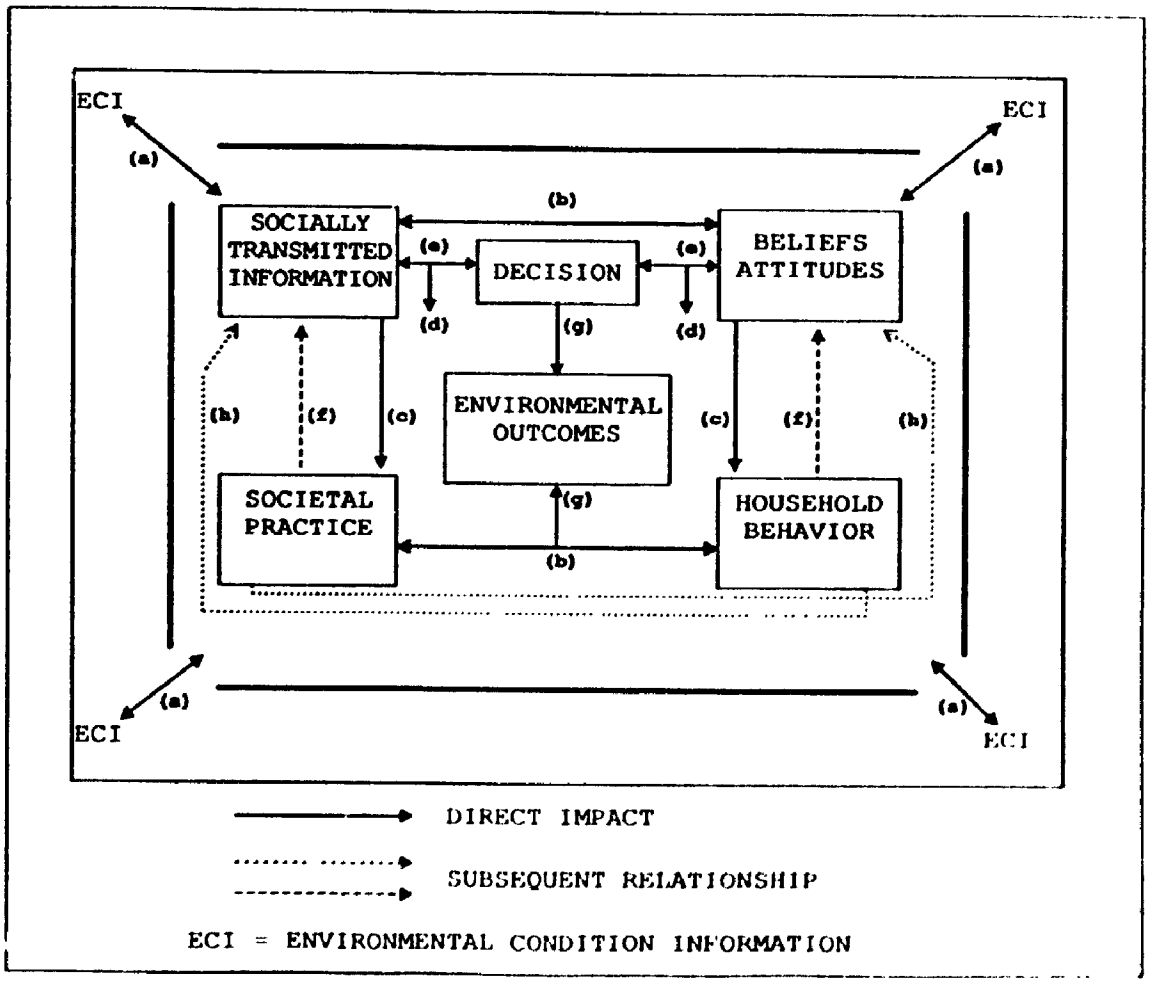

Figure 1.4 A System of Household Behavior

Households perform activities in an open system of interactive bio-physical, social-cultural, and behavioral environments. These activities and their effects can be conceptually located in Figure 1.4, by matching the letters (enclosed within parentheses) in the illustration to those in the following paragraph.

Bio-physical, social-cultural, and behavioral environments form an open system of information generation and loss as shown by the two-directional arrows called **(a)**. Interaction and mutual influence take place between environmental information perceived by individual households and institutions formed by that society. Intermittent exchange **(b)** is present between what the individual householder thinks should be done and what socially transmitted information directs people to do; and, again, between what the individual household does and what the society as a whole practices. At the household level, and at the aggregate level of the society, decisions **(c)** sometimes are translated into observable outcomes expressed as individual household behavior or societal practice respectively. At other times, decisions **(d)** get lost either because individual households are noncommittal by weak dedication, or because these are collectively rejected as ineffective. On the other hand, if decisions are carried out, implementation may be incomplete or only partially successful. Whatever happens, decisions **(e)** made at each and every level affect others. When actions are brought to successful completion, not only do societal practices and household behaviors influence each other, but also, each **(f)** at its separate level, produces subsequent feedback to earlier decisions, to information stores, to policy formulation, to perception, and to the formation of attitudes. Decisions and actions **(g)** of all kinds contribute

to environmental outcomes, which in turn affect the entire cycle of information, beliefs, attitude, and behavior of individual households and society. Furthermore, societal practice **(h)** may eventually modify individual household perception and attitudes; and, in turn, the feedback effect from individual household behavior may change public information and policies. In summary, no factor in this system is static; all the components are dynamic entities competing and complementing each other. Change is present at every stage, occurring at different paces, in different forms, simultaneously. In practice, this means that human-environment interactive system can shift from being relatively unified to one of varying degrees of conflict between and among parts.

The "Blue Box"[12] as a recycling practice is a concrete example of a household response system. In the urban environment, waste generation from over-production and over-consumption has become a major environmental concern. Concerned individuals and groups instigate recycling programs in communities to reduce waste. Policies are established to disseminate information and instructions. This information is intended to affect attitudes and beliefs of those who receive it. They are encouraged and even assisted to participate in waste reduction programs. Increasing number of households and institutions become involved. The collective effort becomes societal practice that ultimately reduces the pressure of waste on the environment. Subsequent altered environmental states will provide bases for future change of policy and practice. As

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[12] The Blue Box is a program adopted in London, ON, and in other places across North America, providing householders a special container for separation of recyclables from general waste for collection. All households of the type surveyed were included in the municipally mandated version of this program.

information changes, there will be changes of the other components involved in households behavior.

The discussions above show clearly that the household is both a major contributing source of TEP and a necessary part of its solution. The members of a household draw materials from the environment, make demands on the environment, and contribute to the transformation of the environment. Households are producers, consumers, decision-makers, and environmental participants in daily life. As such, households exhibit attitudes and behaviors that reflect environmental concern or environmental ignorance, environmental ambivalence or even environmental hostility in society.

1.3 Organization of Dissertation

The dissertation is organized into six chapters. In this introductory chapter the general direction and purpose of the dissertation have been outlined. The chapter also provided conceptual discussions and some theoretical underpinning of the research problem, referred to as The Environmental Problem (TEP), and of the unit of the research, the household. TEP is shown to be complex, involving many dynamic forces. Key concepts, especially the central one of environmental orientation, were reviewed within the framework of the investigation at hand. The adoption of a transactive behavioral geographical perspective provides final guidelines for integration of these concepts and methods. Social scientific understanding of human environmental orientation is much needed in order to promote and sustain beliefs and practices that help to reduce negative human impacts in the bio-physical sphere. Investigation at the household level, using the human geographical knowledge and methods, is among the many

fruitful of ways to learn about the important factors and processes that determine environmental orientations.

Chapter 2 is devoted to delineating the contexts of the study. The study joins the increasing interdisciplinary effort to understand the complex and dynamic human role in changing the biophysical conditions of the earth. Three areas of academic activity in particular have influenced this research: (1) studies in human behavior, (2) studies in environmental awareness, both of which provided useful perspectives and methodologies, and (3) the geographic and spatial approach, which gave shape and direction to the study. Current public concern for environmental quality, and emerging social scientific interest in understanding the phenomenon of massive lifestyle transition are discussed, against both the historical background and the contemporary setting. Shifts in general positions regarding human-environment interaction unfold as an integral part of the evolution of human civilization. Changing patterns of environmental perspectives and practices are not mere deterministic consequences of technological advances. Active human agency plays a key role. Human involvement in and with the environment shapes both social and ecological reality. A combination of the action of individual persons and the operation of social structures defines the ways in which humanity changes its mode, position, and role in interacting with the environment.

In Chapter 3, some of the methodological problems that confront this kind of research are discussed first, followed by an exposition of the specific steps taken by the research. These steps include statements of research assumptions and hypotheses, sampling procedures, questionnaire development and administration, measurement

construction, as well as statistical methods employed for data analysis.

Chapters 4 and 5 present the findings of the London households survey of environmental information, attitudes, and behaviors. Chapter 4 describes the overall shape of the data set and major characteristics of the sampled households. In Chapter 5, a series of hypotheses tested are discussed. The significant test results are described to give an empirical picture of the shades of green of the London households. Different typologies of households revealed by the data are also presented.

Discussions in Chapter 6 compare results from this research with the findings of other studies. Interpretations of both the similarities and differences suggest a complex picture. Of particular difficulty is lack of consistent powerful explanatory variables. It seems that social and behavioral studies of human environmental orientations are at the infantile stage. The final sections present conclusions, offer some critical evaluations of the study, and discuss the continuing dilemma of changing the environment and ourselves.

CHAPTER 2

Environmental Perspectives as Study Contexts

This chapter provides both historical background and intellectual context for this research. Changes in human attitude toward the environment have been accompanied by changes in understanding environmental focuses and practices and the evaluations of environmental interaction.

The long-wave shifts along the continuum of possible attitudes toward human-environment interaction have led to several quite different perspectives on the development of human occupancy of the earth. These intellectual and moral paradigms range from the mystical to the pragmatic, the holistic to the specific. Each of them commands the respect and loyalty of significant numbers of the public, and contribute to approaches and methods of many researchers.

In the past few decades, advances in science have permitted us to understand our relationship to the environment in ways that have inspired both awe and terror. Technologies, many of which have been created for exploitation of earth resources, also reveal the potentially disastrous effects of that unmitigated exploitation. When different perspectives are brought to bear on these insights, different responses are suggested. While few contest the fact that something must be done to alter our current mode of interaction with the environment, there is much disagreement as to how. It is not possible to be indifferent to or neutral about the environment. Everyone lives within it, and all are confronted by it.

Therefore, the transformation of ideas, integration and divergence of ideas, and basic conflicts are described here insofar as they contribute in various ways to clarifying the

intent and directions of this research. The first section offers an overview of key ideas and perspectives about human-environment relationships that have developed from human societies over time and place. The second section addresses some of the main themes in current thinking and practice.

2.1 Developmental Perspectives

Contemporary understandings of human-environment interaction are relatively new, but not the reality. Since the birth of humankind, people have struggled for survival and security in the environments in which they have found themselves. Generally speaking, the persistent efforts of human societies to cope with dynamic environments have been by trial and error, gradually acquiring the information to sustain themselves, or losing the battle against extinction. Slowly, patterns of experience have developed, as information is acquired, used, evaluated, transmitted to others, repeated with some level of success, and modified to fit different circumstances.

2.1.1 An Overview

Human life on earth is part of an intricate network of interactive systems, or more accurately a dynamic process. E. A. Gutkind (1956:1) describes this process as the perennial revolution involving two dynamic forces.

> Man and nature are the twin agents of the perennial revolution which shapes and reshapes the face of the earth and the character of man's activities. This struggle, at times violent and sporadic, at others gentle and consistent, but forever demanding a new response to a new challenge, activates the potential energies of man and nature, molding them into a grand pattern of advance or retreat, of creative interaction or disastrous antagonism, and of promise or failure.

Equilibrium and harmony among the operating systems of the earth are no more than a theoretical circumstance. This applies in both natural and human realms. In *Biology as Ideology,* R. C. Lewontin (1991:92-3) explicitly emphasizes that living organisms have been constantly changing the environment since the beginning of the earth. For example, the atmospheric air was not on earth before living organisms. Sixty thousand years ago, Canada was completely under ice that extended to the middle of the United States. The earth's environments change and evolve irrespective of the presence or absence of human intervention. It is impossible and illogical to preserve environments, as if they existed as static entities.

The central problem of the human species is to find ways to secure and sustain human life on earth that do not irreparably harm earth's self-support system. Humans can plan for change, postpone change, or divert the direction of change to minimize degrading the biophysical world beyond its capacity to recover.

Two basic approaches can be adopted in human environmental activities: 1) one *adaptive* to prevailing conditions, by selective use of materials without adversely affecting the environment permanently, and 2) one *manipulative,* powerfully transforming environments to achieve particular resource-based outcomes and even to sustain these.

Review of human history over the surface of the earth reveals several outcomes: 1) early societies and a few examples of existing groups operated following the adaptive path, 2) some societies have pursued the second option, the manipulative, often with increased effort and achievement, and 3) more commonly groups have combined features of both

adaptive and manipulative strategies on which their survival and development have been based.

Out of these different and varied choices human societies have undergone three identifiable shifts I profile, depicted in the boxes of Figure 2.1, bottom to top, as pre-industrial, industrial, and post-industrial. These correspond to general tendencies observable globally over course of human occupancy of the earth.

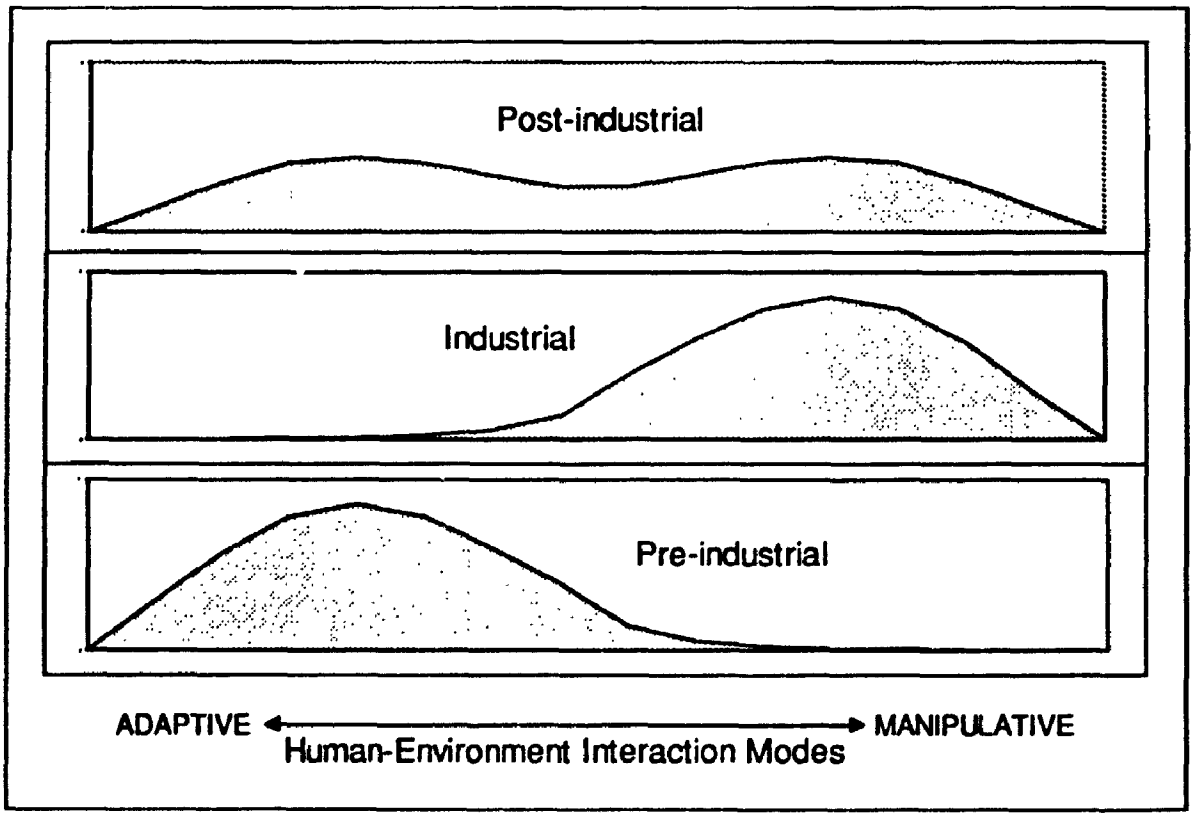

Figure 2.1 Variations and Shifts of Environmental Positions

In all three boxes of Figure 2.1, the horizontal represents a continuum of possible positions ranging from (left) highly adaptive strategies to (right) highly manipulative. The vertical axis in each box represents the strength at each possible position in that profile shift.

Early in human occupancy of the earth, the adaptive mode was probably most widespread as societies sought to

find ways of maintaining subsistence patterns of life within a world of which they had limited perspectives. Societies using adaptive strategies gained strength.

However, as successes occurred, commercialization and industrialization took shape, bringing opportunities for dominating or manipulative strategies. Industrial ascendancy is usually marked by weakening of adaptive practices and increase in manipulative ones, which suggests that the struggle between societies with divergent orientations present produces conflicts over environmental uses.

As post-industrial interests emerge, a bimodal pattern takes shape to indicate the dual thrusts of economically-driven and ecologically-driven pursuits that are followed. Still in the process of formation, this bimodal pattern is challenged as not being sustainable in the light of virtually insatiable consumptive demands.

Although it would be easy to suggest that globally, nationally, regionally or locally there is a sequential progression through each of these stages, nothing could be further from the truth. It must be recognized that on the global scale, national, regional and local levels, each of these three modes coexists concurrently. In practice no single environmental position, adaptive or manipulative, has uniform strength or is omni-present.

Generally speaking, however, pre-industrial societies have tended to operate with more adaptive strategies primarily out of self-interest unless external forces override. As industrialization occurs there are tendencies for those peoples undergoing such change to devise more manipulative strategies. Even so it is possible for more adaptive orientations to co-exist, at least in pockets and peripheries.

Whether the current situation will evolve into a renewed adaptive position or lurch back into a manipulative mode is the basis for the current environmental debates which contextualize this research and suggest a new mode. This would be represented by a central position on the continuum as a transactional approach that can capture the values of both.

To understand how humans negotiate or transact their relationships to the environment, it is essential to remember that their roles are not merely bio-physical. Humans are both biophysical beings and culture creators as stated by Frederick H. Buttel (1986:338-43). In the former part, the human species is like all other species whose life is dependent on taking resources from the earth and is subject to natural laws. In the latter part, the human species is uniquely different from any other species in its ability to alter the natural conditions through unbounded innovation and artifice. The two parts form competing forces, always challenging humanity with the need to find balancing solutions.

Human beings live and act in their own cognized environments. People develop mental models about what the biophysical world is, what natural environmental limits are, and what human relationships with it should be. Individually, the models may differ in various degrees. At the collective level, however, shared place, culture, and experience produce commonalities resulting in general social paradigms within their time-spatial contexts. Among those social paradigms, the ones that are held or adopted by dominant groups in the majority of the societies become influential environmental positions in the evolution of humankind.

People orient and reorient their behaviors in relation to the biophysical environment through the process of gaining ability to modify, and acquire knowledge about, both the natural and the cultural worlds. As experience and knowledge relative to various physical and cultural contexts change, human environmental perspectives and behaviors undergo transformation. Distinctive patterns of interactions with the natural environment emerge over time.

The shifts of environmental positions shown in Figure 2.1 are outcomes of the human pursuit of desired life on earth as different realities are created and different objectives are set.

Goudie (1986), Simmons (1989), and Miller (1992), among others, provide details of the historical development of relations between humankind and the biophysical world. Clarence J. Glacken (1967) traces the history of Western environmental understandings from classical times to the end of the 18th century. He identifies three main themes: the designed earth, environmental influence on human activities, and humans as active agents of environmental affairs. The following outline touches upon only those features of the development relevant to the present writing.

2.1.2 Holist

Interaction with the environment has always been an issue in human civilization, but has not always occupied a prominent place in the public attention. People at all times suffer environmental calamities. Deforestation and erosion are two processes that have accompanied human progress in all major civilizations. People of necessity have always sought for effective ways to interact with the environment. Reluctantly and periodically humanity develops environmental awareness and concern.

An ancient and recently promoted perspective, that values living in harmony with nature, reveres the natural world and accepts humans as integral parts of nature. People carry out conscious actions to modify natural conditions, and make necessary demands on the environment. The natural world is conceived as a fluidly changing but unchallengable totality, beyond human manipulation.

One major holistic interpretation emerged in China. According to the *Tao Teh Ching* (Wu, 1989:59), "The world is a sacred vessel, which must not be tampered with or grabbed after". Out of respect for the world of spirit forces, human probing into the earth is conducted, wherever possible, while avoiding disturbance of the *feng-shui* (flow of cosmic powers) by geomantic calculation. People are motivated to search for ways to harmonize human activities and constructions compatible with nature. This is a position taken by Chinese[13] and other East Asian cultures who have integrated Daoist ideas in their styles of living (Tuan, 1974; Anderson, 1996).

There are various holistic systems and beliefs among North American natives. E.A. Anderson (1996) gives accounts of the traditional ways of life of the Haida, Tlingit, and Tsimshian peoples of coastal and northern British Columbia

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[13] The Daoist ideas advocated by Lao Zi and Kong Zi (Confucius) gained predominance in traditional Chinese culture. Nevertheless, three main styles of thought may be identified: (1) Lao Zi and Kong Zi [*circa* 5th C. B.C.] "harmony with nature"; (2) Zhuang Zi [*circa* 4th C. B.C.] "leaving nature alone"; and (3) Xun Zi [*circa* 3rd C. B.C.] "reforming nature". For further details and references, see, Xia Weisheng, *Ren Lei Sheng Tai Xue Chu Tan* (China: Gansu Renmin Chubanshe, 1988), 15-16. Actually, like all peoples in the world, the Chinese have had, and continue to have, different perspectives on the human-environment relationship. The attitudes of Xun Zi were official in China since the Liberation of 1949, especially during the Cultural Revolution (1966-1976), and the recent decision about use of the Three Gorges on the Yangtze River as a hydro-electric project with vast negative impact on the environment seems to indicate that the approach dominates in the current "economic reform".

and southern Alaska, and the Mexican Mayan people. Beliefs in "the Land Otter", "the Lords of the Forest", and "the Lords of the Animals" are explained for their value and efficacy in solving environmental problems. Ecologically-sound practices are related to strategies of psychology and religion which are used in managing natural resources and in creating a specific human bond with nature. On a global scale, most early peoples viewed human activities as being no different from other material and supernatural forces of ecosystems.

Another early approach, found globally among many subsistence peoples, is based on the idea that parts of environments are "profane" and others are "sacred". As Yi-Fu Tuan (1974) has discussed, these basic distinctions are based on constructs formed, and interpretations made, relative to the values groups assign to particular environments. The "sacred" is whatever is revered and is thereby nurtured or protected. The profane are places, conditions, materials which are taken for granted, common, or otherwise not protected. Mountains, water sources and courses, rocks, trees and other special plants, specific animals, atmospheric events, floods and many other phenomena have been deified or assigned supernatural powers. While few cultures today adopt this perspective exclusively, most cultures still have such distinctions imbedded in their ways of life to protect, support, control access to selected parts of environments.

Lovelock's (1979, 1990) Gaia theory is a contemporary version of the holistic approach, based in modern science. It takes a planetary perspective, in which no individual species, including the human species, matters. The theory emphasizes the living and dynamic earth, incorporating humans as a part among parts of nature. The planetary system

has a living ability to regulate itself to stay healthy. If human behavior is incompatible with the holistic earth systems, humans will perish.

Many deep ecologists (Elgin, 1981; Russell, 1982; Devall, 1988; Naess, 1989) advocate holistic living. They stress the necessity and significance of recognizing human evolution as a part of the global development of the earth. The concern with the wide range of environmental issues and problems, such as protection of endangered species, alternative technology, voluntary simplicity, and energy and resource conservation, is orientated toward living more in tune with the planet.

Whether or not the earth has a mind and life of its own is a matter of controversy. The extent to which humans should obey or defy the power of nature remains debatable. The holistic perspective encourages the embedding of human life within the totality of nature.

2.1.3 Materialist

The invention of agriculture gave rise to the development of radically different methods for food procurement and new ways of life. Wherever and whenever agricultural, or other materials-based (minerals, forests, marine) technologies were adopted, this innovation vastly increased human population, ultimately creating greater demands on ecosystems within the physical world. As new methods increased human wealth, it also expanded human ability to tame nature for human needs, and inspired people with a new confidence, giving rise to the notion and hope that ever more could be learned to subdue nature and make it serve human purposes. Reliance on the adaptive mode declined, as the manipulative mode gained strength.

Eventually, of course, this led to practices that overstressed the capacities of natural systems. Ecological collapse destroyed many civilizations, for instance, Mesopotamia, Western Roman Empire, and Lower Mayan States. But the total human population on earth began relatively small, and its growth took many centuries. During these millennia, environmental degradation occurred on locally or regionally limited, and, from the global point of view, generally reparable scales. Some groups of people who suffered total or near ecological collapse could start afresh in new places. Sometimes they managed to stay in place by retreating to more rudimentary styles of living, or by anchoring on a totally different resources complex, as in the case of shifts from hunter-gatherer systems to agricultural ones.

Industrialization enabled humankind to move beyond coping with the natural world. Various techniques were developed for using earth's materials to meet accelerated needs and wants of explosive human populations.

Although the industrial way of life has been experienced unevenly, human activities have been expanding and intensifying across the surface of the earth, generating unprecedented changes in the worldwide ecological systems in the last 300 years, particularly in the last few decades (Turner, et al., 1990). The growing human ability to fundamentally transform the biosphere, natural systems, and their interactions is beyond question. Intentional or unintentional exploitation of nature has affected every continent, country, and household. The trend is likely to continue at an accelerating rate as so called "Third World" countries generate their own industrial systems to form new locales of resource-based economies. For the most part, industrializing groups have perceived techno-power as

beneficial, rating economic growth more important than environmental protection (Caldwell, 1990; Lowenthal, 1990). The desire to mold nature to human wishes has progressively gained predominance as industrialization advances globally.

The majority of environmental problems can be traced to practices in dealing with the environment that are profoundly influenced by Western philosophy and science, and glorify anthropocentric exploitation of nature (Dunlap and Van Liere, 1984; Milbrath, 1984). Some studies indicate that these are components of the traditional Judaeo-Christian[14] values, beliefs, and ideologies of the Western society that are at the root of TEP (White, 1967; Blackstone, 1980; Catton and Dunlap, 1980; Hanson, 1986; Helfand, 1986; Taylor, 1986; Stone, 1988; Dower, 1989). These traditional perspectives are seen as treating nature as mere matter, to feed mankind's insatiable appetite for material well-being and material progress.

The materialist approach is founded on anthropocentric assumptions about human-environment interaction. Belief in human superiority and dominance over nature is built into the Dominant Social Paradigm (DSP), a concept identified, documented, and used by Pirages (1977:6). DSP assumes humans are a unique species separate from other biotic communities, and denies the possibility of physical and biological limits

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[14] Judaeo-Christian teachings can be interpreted as fostering such beliefs. The biblical image of the human relationship to the planet reduces the natural world to the status of an object to be conquered, a wilderness to be exploited for human use, with whatever means are provided by growing technological capability. However, research in the correlation of religious beliefs with environmental attitudes does not support a link; see Willett Kempton, et al., *Environmental Values in American Culture* (Cambridge, MA: MIT Press, 1995), 115; and Charles L. Harper, *Environment and Society: Human Perspectives on Environmental Issues* (Upper Saddle River, NJ: Prentice-Hall, 1996), 42.

constraining economic growth, social progress, and other societal phenomena.

This exploitative mentality toward the environment ultimately inflicts serious damage on nature. Revision of the DSP toward a more ecologically sustainable world-view has become necessary (Catton and Dunlap, 1978; Dunlap, 1980b; Schnaiberg, 1980). The combined forces of human values and economic interests produce increasing pressure for a social paradigm shift.

2.1.4 Preservationist

As early as the 19th century, environmental concerns were expressed and ecological insights offered.[15] Extensive pressures on wild lands, agricultural lands, and certain natural environments, raised awareness of environmental risks, and prompted strong and widespread reactions against them. Especially in the economically advantaged societies, particularly in North America, a documentable conservation movement developed and matured in the 1930s and 1940s. John Muir, Gifford Pinchot, and Aldo Leopold were among the best known figures who campaigned against human intrusion and domination of nature. Even though their emphasis was preservation of land and wilderness, they laid the intellectual and ideological foundations for the contemporary environmental movement.

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[15] The importance, appreciation, and preservation of nature was articulated by people such as Henry David Thoreau (1817-62) and John Muir (1838-1914) who were concerned about the negative effects of human economic activities on the environment. The American early environmentalist George Perkins Marsh (1801-82) and the German biologist and philosopher Ernst von Haeckel (1834-1919) were commonly credited for planting the roots of modern ecological thinking. Detailed discussions of their works and contributions may be found in Roderick Frazier Nash, *The Rights of Nature: A History of Environmental Ethics* (Madison: University of Wisconsin Press, 1989); and Peter J. Bowler, *The Fontana History of the Environmental Sciences* (London: Harper Collins Publishers, 1992).

From the 1950s onwards, pollution and toxic chemicals started to cause the concern about people's health and well-being. Strong public awareness was raised by Rachel Carson's (1962) important book, *Silent Spring*. More than conservation of forests and wilderness far from the population center, protection of environmental quality for human and other life beings got the focus. Then the long-term implication of the human exponential population growth and even slowed growth became issues. Gradually other ecologically-informed interests joined in. Concerns over food security, nuclear radiation, shrinking bio-diversity, deforestation, urban sprawl and congestion, natural resource depletion, particularly energy resources are among the problems addressed.

On Christmas eve 1968, the astronauts of the Apollo VIII revealed the first photographs of the earth as seen from outer space. The startling satellite image of the fragile planet sparked an essential consciousness of the "spaceship earth" for the first time.[16]

Global environmental reality encouraged further conviction that ecologically all human beings and other living things are inhabitants of an elaborate set of interacting life-support systems. Proliferating human demands produced potential danger on the ecosystems. With unmatched capacity of environmental alteration and self-alteration, humankind as a species is both the primary driving force of the planetary deterioration and the principal care taker of the earth.

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[16] This metaphor portraying vulnerable human life on the craft-like planet was used first by R. Buckminster Fuller, in *Operating Manual for Spaceship Earth* (Carbondale, IL: Southern Illinois University Press, 1969). According to this metaphor, the earth is not an assemblage of vaguely related parts. It is an integrated system (spacecraft) in which all parts, living or non-living, interact and contribute to the harmonious working of the whole.

On April 22, 1970, the first Earth Day declared that human environmental impact must be comprehended in planetary terms. The newly gained ecological perspective considered survival of the planet earth as a whole and all life on it.

2.1.5 Transactionalist

The prevailing modern industrial consumer lifestyles have been increasingly challenged for being environmentally unsustainable. There is growing consciousness that the earth's systems and natural processes cannot absorb the impact of expanding and accelerating human activities. Extensive human modifications of the earth carried out in unhealthy ways are believed to have reached the level of posing imminent threats to earth's capacity to sustain life.

Human over-use and abuse of nature seriously degrading environments alarms increasingly more people. From care for the wilderness on the peripheries of human activities to anxiety over environmental conditions involving the mainstream of human life, and finally to fear of the sustainability of the earth, environmental concerns expanded in magnitude to pull together various strands of thought.

To give more active support, people increasingly joined environmental organizations that formed environmental lobbying forces. For example, old organizations blossomed, as in the cases of both the Sierra Club founded in 1892 and the Audubon Society founded in 1905. New organizations mushroomed as in the establishment of groups, such as Friends of the Earth in 1969, Pollution Probe in 1969, and Greenpeace in 1970.

By the early 1970s there was acceptance on the international agenda that humanity should respond to the

urgency of many environmental problems.[17] It was no longer the voice of a small number of individuals and groups that called for a more caring and holistic approach to the environment and its resources. The so called "environmental movement", launched in Europe and North America, became a strong social and political force of change in industrial countries and expanded to take root world-wide. The human dimension in the ecological deterioration was recognized. Economic development and environment could not be separated (Sandbach 1980; Lowe and Goyder 1983).

The general public became aware of the existence of the issues and some of positions which had earlier been staked out. Wide distribution of a number of seminal writings, such as Rachel Carson's *Silent Spring* (1962), Paul Ehrlich's *Population Bomb* (1968), Garrett Hardin's *Tragedy of the Commons* (1968), Club of Rome's *Limits to Growth* by Meadows, et al. (1972), and UN's *Only One Earth* by Ward and Dubos (1972) helped to promote ecological awareness and environmental consciousness. Continuous media coverage of environmental problems and issues also provided great assistance in the mass mobilization for environmental protection. Many technical terms for aspects of environmental troubles became household words. Ordinary citizens came to use terms such as "toxic waste", "acid rain", "ozone depletion", and "global warming", with or without understanding them.

Over the last twenty-five years, much has been learned about the environmental systems and the human dimensions. Curbing environmental degradation to safeguard the common life-enhancing base has assumed a higher worldwide priority.

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[17] In 1971, UNESCO launched the program of Man and the Biosphere (MAB). In 1972, the United Nations Conference on the Human Environment was held in Stockholm, Sweden.

The United Nations has urged the international community to preserve and protect the planet earth for sustainable development. The urgency and importance of so doing have been consistently stressed. The need for action became so imminent that Worldwatch Institute in its 1989 *State of the World* warned that the great environmental battles would be won or lost in the last decade of this century. The notion of sustainable development has become a permanent part of political policy and public life (Pepper 1984; Harman 1988; Milbrath 1989; Daly 1990; Caldwell 1990). The "blue box" program, "green" products, and the recycling industry are recent success stories, because of the environmental movement. A lifestyle of voluntary simplicity has been practiced in many countries (Durning, 1992:139).

In general, the persistent effort of a wide variety of persons and groups succeeded in pushing the environmental issue into the center of modern human life.[18] As a result of the cumulative effort from various sources, globalization of environmental concern can be observed and is supported by public opinion data.[19]

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[18] Detailed documentation and discussions of contributions of private effort, growth of environmental organizations, and the media effects in diffusing environmental sympathy and support can be found in J. McCormick, *The Global Environmental Movement* (London: Belhaven, 1989); Clive Ponting, *A Green History of the World* (London: Sinclair-Stevenson, 1991); R. E. Dunlap and A. G. Mertig (eds.), *American Environmentalism: The U.S. Environmental Movement, 1970-1990* (Philadelphia: Francis Taylor, 1992); and Kirkpatrick Sale, *The Green Revolution: The American Environmental Movement, 1962-1992* (New York: Hill & Wang, 1993). In them there are concrete statistics. For example, the number, membership, and operating budget of American environmental organizations are particularly illustrative. Sierra Club and Audubon Society experienced membership increase of over 90 per cent from 1960 to 1990. In 1990, more than 3 million people in U.S belonged to national environmental organizations alone compared with about 123,000 in 1960. The combined budget for the environmental organizations in 1990 was approximately 217.3 million US dollars.

[19] Remarkable uniformity of environmental concern was revealed in large majorities in each of the twenty-four countries according to the findings of Gallup's "Health of the Planet" survey. A summary report is provided in Riley E. Dunlap, George H. Gallup, Jr., and Alec M.

The world community is prepared to work out solutions in reducing or reversing the degradation of our environment. The Earth Summit (formally known as the United Nations Conference on Environment and Development or UNCED for short) held in Rio de Janeiro, Brazil in June 1992 provided another indicator. The attendants at the summit represented international, national, and other levels of official organizations, as well as all types and levels of non-governmental organizations (NGOs) of virtually every country in the world.[20] They exhibited the maturing human world in understanding global ecological problems.

The most recent patterns of human-environment interaction involve simultaneous operations of both the adaptive and the manipulative modes. The actions and counter-actions can be readily observed at international, national, community, household, and individual levels. Exactly what the final shape will be like is too early to tell, as humanity is currently undergoing another process of profound transition. However, simplistic conflict models are being abandoned in favor of more nuanced models of interaction between human communities and the natural world. The present research presupposes a transactional model of this kind - appreciative of both the fragile power of the bio-physical environment and the culturally-mediated creativity in human society.

Gallup, "Of Global Concern: Results of the Health of the Planet Survey", *Environment* Vol.35, No.9, 1993:7-15, 33-39.

[20] Specific accounts of the attendants, the issues, and problems addressed may be found in Peter M. Haas, Marc A. Levy, and Edward A. Parson, "Appraising the Earth Summit: How Should We Judge UNCED's Success?", *Environment* 34, 8 (October 1992): 7-11, 26-32. The point to be made here is that despite the frustrations and difficulties, the conference bears witness to the joint effort in creating global environmental networks and setting broad guidelines for environmental action into the twenty-first century.

2.2 Contemporary Perspectives

Desirable change in the cultural norms for interaction with the environment can only come when human minds are changed. To this end, information about the environment must be disseminated. There is no lack of information or would-be disseminators. But they all have special positions, and the information comes to the public colored by the myriad of perspectives.

So far, the many voices have made a symphony rather than a cacophony. Each group espouses diverse concerns or goals; yet the cumulative effect of all such public espousals advances the environmental cause. As the debate matures, however, and various "sides" attract credible and authoritative supporters, uncertainties about the reliability of the message are appearing. The potential for resistance from interest-group politics must be recognized.

Avoidance of extreme polarization is necessary. More sophisticated human forces must now intertwine to find a balance between ecological integrity and cultural dignity. A synthetic position, at once holistic and technologically aware, is available in the transactional alternative of TEP as presented in Chapter 1. Nevertheless, communication of this message, as of any other information, depends on correctly understanding both the intended recipient and the nature of the communicative task.

In this section, the present research is placed in the context of the cognitive dimensions (differing perceptions, interests, and positions) that have emerged. The order of the discussion begins with the most concrete (material technology) conceptualization of the environment, then relates this to the more subtle (social and cultural) side of the issues, and shows how the cognitive approach provides

the most relevant synthesis for action. The nature of conflicts among positions is examined. The task of communication is then addressed, and a contribution to the problem from within the special competence of behavioral geography is discussed.

2.2.1 Technological

Care for the environment and human relationship with it is the most natural and necessary thing imaginable. The unprecedented level of public environmental concern in the modern environmental movement is attributable to complex and diverse forces. It is impossible to give credit to every approach in the limited space here. Nor is it appropriate to go beyond the scope of the present study to make judgments about whether the approaches address major causes or mere symptoms, or to establish where they are positioned on the ideological scale. The central task is to show that purposeful action is being carried out to engage the public in a conscious lifestyle shift toward a healthy environment.

Biological, geological, atmospheric, ecological, and geographic sciences all have distinctive theories, perspectives, methodologies of study the environment. Stemming from advances in all of the particular branches, comes a broadened awareness on the part of many scientists of the over-lapping interactive and integrative aspects of biological, geological, atmospheric and human systems.

From the point of view of the human dimension in TEP, material technology, social arrangement, and cognitive schema are three general mechanisms by which humans have impact on the environment. Material technology is an exploitation of nature, but it is also bound up with nature itself. Through material technology human activities make their most direct impact on the biophysical world, in

contrast to the ways in which social and cognitive systems more indirectly operate.

Material technology includes the various uses of formulas and tools to convert earth's resources to provide food, shelter, and clothing. The more advanced the technology, the more matter can be transformed for human use, and the more changes are introduced to ecological conditions. Higher standards of living, better health, and longer life expectancy obviously come with environmental price tags. There are many disputes and conflicts concerning uses of technology.

Some argue that technology lies at the heart of environmental degradation. According to this approach, technological changes should be the solution to environmental problems. Barry Commoner is a key proponent of technological improvements.

Barry Commoner (1971) shows how technological changes (especially where caused by large, technology intensive and resource dependent, corporations) are directly linked to commonly identified environmental problems. He points to natural resource decline, garbage accumulation, population increase, and rise of consumption. His argument is made particularly plausible by his finding that the increase in manufacturing capacity, due to changes in productive technology, was dramatic, in comparison with less rapid demographic and economic growth in the USA.

Kenneth Boulding (1966) criticizes technological development for enabling the reckless environmental exploitation in the name of economic progress. He explains that nature does not have endless resources with boundless capacity to absorb waste. Costs of intended or unintended environmental problems exceed benefits achieved. Therefore,

the practice of "cowboy" economy needs to be replaced with that of the "spaceship" economy.

At the end of the pre-industrial period, Malthus drew attention to the alarming consequences of the relatively "natural" course of human history. Technological development brings about economic and population pressures on the environment. The earth's long-term ability to support people cannot be taken for granted (Ehrlich and Ehrlich, 1970, 1987). The *Limits to Growth* thesis (Meadows et al., 1972) projected this as amplified by industrial technology.

Most environmental groups share these ideas, reflect them in their missions, and promulgate them to the public. Government agencies and social institutions incorporate what the public desires in developing programs and policies that give further support to the approach.

Others oppose the pessimistic projections. They criticize the eco-pessimists' arguments on the high costs and questionable benefits of environmental protection. The obvious advancements science and technology have brought about is usually presented, while the negative aspects are ignored. Short-term economic prosperity and human well-being are stressed so that the interest of protecting and sustaining the environment is shown as being unreasonable and unacceptable (Simon, 1983, 1994; Simon and Kahn, 1984; and Gee, 1994). Corporations and the business community favor this approach, by and large. Increase in investment and production costs, and reduction of profits are feared. They sponsor political lobbyists and public campaigns to refute the claims of eco-pessimist environmentalists. They give financial support to organizations that weaken the base and power of environmental groups. A variety of forms

employed in coordinating the counter-movement is discussed by Sale(1993:102-4).

Still others try to convince the public not to take either of the two extreme views. They stress the fact that technology has done wonders in solving many problems and can be used to combat environmental deterioration. The capability to control the impacts of technology has not kept pace with the power to alter the natural world. Technological innovation to deal with the side effects of improvement and development in human life is inadequate. Even though its primary intended function has not been to help the environment, it holds promise in becoming more useful. In fact, evidence is not too difficult to find to prove the point. Bramwell (1994) and Easterbrook (1995) are among the most recent proponents. They say that, given the good job that eco-pessimists have done in highlighting the real harms of technology to the environment, there is now an opportunity to seek and find technological solutions that will be helpful and more harmless, with controlled side-effects.

Material technology accounts can barely pass beyond description of the state of things. Even when the human interests in technology are postulated, no understanding of how or why such technologies are used and approved can be achieved. But technologies exist and have their functions within societies and cultures. While the direct effects of material technology on the environment can readily be imagined, it is arguable that the apparently less direct effects of the arrangement of our social systems provide the truly relevant explanation. This human dimension of TEP is the subject of the next section.

2.2.2 Sociocultural

The sociocultural view focuses on the ways people structure human relationships in society, which lead to environmental changes. Bookchin (1990) invokes Marx's conceptions of social organization and class conflict to the environmental crisis. According to Schnaiberg and Gould (1994), social arrangements affect the environment far more comprehensively than any individual element, because they constitute the structure through which all aspiration and action must occur. They refer to the "treadmill" of modern society within which all citizens and institutions are constrained to work out their efforts.

The so-called "consumer" lifestyle itself is a value system dangerous to the environment according to Durning (1992). Consumption levels, usually seen as an index of increasing human well-being, are equally indicators of the amount of harm being done to the environment. The climbing spiral of energy- and resource-hungry manufacturing feeding unsatisfiable appetites for ever more consumer "goods" creates an intractable vacuum that scours the earth of every natural thing.

Also following this general approach, but taking a more focused look at particularly dysfunctional aspects of social organization, others (Hargrove, 1986; Blaikie and Brookfield, 1987; Mohai, 1992; Pepper, 1993; Redclift and Benton, 1994) find the key cause of environmental degradation in the various social inequalities of power, gender, status and wealth among people. Although their particular causes may be only tangentially connected to the core issues of environmentalism, their efforts appeal to significant constituencies. They are able, therefore, to

bring to bear greater resources for communication and motivation than more sober advocates can.

Ecofeminists (Plant, 1989; Shiva, 1989; Seager, 1993) identify male dominance of social institutions as the cause of environmental problems. It is asserted that males are naturally dominant and aggressive, with little sympathy or understanding for the delicacy and intricacies of nature. Seager draws examples from popular media of communication (advertisements and popular culture) to show how women's role is minimized and marginalized. Since, therefore, the institutional and social structures place decision making primarily in the hands of males, it is inevitable that the need for reasonable, long-term thinking will be neglected in favor of short-term power and profit-oriented action.

Inequalities of wealth are thought to be a useful entry to public sympathy for and involvement on behalf of the environment. It would appear obvious that those most vulnerable to degradation would be most motivated to take action against it. "[W]orking-class persons are drawn into grass-roots environmentalism because environmental hazards are more likely to be located in communities with substantial... blue-collar populations" (Harper, 1996:303). While the wealthy are able to deal with these hazards privately (for example, purchase of specialized home air-purification systems) or simply by moving away, the poor cannot. It is assumed that they must join groups that have an aggregate power to deal with issues globally.

Sociocultural accounts are plainly deeper than material technology accounts, because they address sociocultural contributions in human-environment interaction. However, they stop short of treating individuals whose habits and choices make up a society. That step, to the cognitive basis

of aggregate public awareness, values, and behavior, is the subject of the next section.

2.2.3 Cognitive

Attention has recently been focused on the contribution that mental activities make to human-environmental behavior. Cognitive activity may be the most indirect in terms of material causation, but it is plainly the most crucial source from which humans derive the ability to change the environment. The cognitive perspectives include integration of values, beliefs, attitudes, and ideologies that motivate and legitimate economic, social, and technological practices, particularly with reference to the environment.

Macro-level innovation in technology and institutions, may not be found in time to divert the dangers we face. Even though there is world-wide indication that governments are accepting some responsibility to restore and protect the environment, there is limited evidence of real action to guarantee substantial changes. In any case, social change seldom occurs as the result of grandiose planning. Even large-scale ecological catastrophes, no matter how difficult to endure, rarely produce immediate changes in behavior; when the disaster is over, people return freely and quickly to their earlier pattern of life. Only changes of attitude and perception will be effective. This is not because it is the easiest; on the contrary, a shift in the values paradigm is perhaps the most painful and difficult of all.

Human action is not deterministic. Humans are independent, autonomous beings, who make decisions and choices. Their actions are dependent on the information they have, their understanding of it, and the application they pursue with it. Furthermore, how they use that information is dependent upon the attitudes and commitments they have

embraced. Environmental action must be seen as "a question of responsibility" (Tolba, et al., 1992:600-1).

Perhaps the ultimate cognitive approach to eliciting environmental action is deep ecology or "ecosophy". This involves a quasi-religious commitment to the environment, starting from an intellectual understanding of insights, with the conviction that "the right form of practising helps us to cultivate our ecological self... [f]inding our center and integrating from our center into the larger 'body' of the world" (Devall, 1988:2). But this approach is deliberately contemplative, rather than active.

Technology needs people, and people need technology. The use of technology of some sort is strictly inevitable. Even the *Earth First!* slogan "Back to the Pleistocene!" implies some technology. Technological and social functions have produced environmental problems because people have failed to properly understand and appreciate the interconnectedness of human material requirements and the life support system, our earth. Like all inhabitants of the earth, human beings naturally exploit nature. The problem is to find technologies that can make wise use of the earth.

That problem can be addressed by paying more attention to the potential of behavioral technologies. Cone and Hayes (1984:5) identify the imbalance of physical and behavioral technology most prominent in TEP. According to them, behavioral technology can help put physical technology to appropriate use. Also, behavioral technology is helpful in solving or reducing environmental problems for which helpful physical technology is either not available or effective.

The answer to the problems of obtaining an appropriate trade-off between human advancement and a continuation of natural systems lies in placing a just value on the

environment, and creating an ethics that will guide action (Barbour, 1973, 1980; Murdy, 1975; Attfield, 1983; Hanson, 1986; Stone, 1988; Dower, 1989; Seligman, 1989). Human beings can reason and have moral control. Being unique in the natural world defines human centrality not necessarily human domination nor passive participation.

It has been plausibly argued by Fukuyama (1992) that political systems around the world are inexorably converging on forms of social democracy. Porritt (1984) argued that any successful approach to dealing with environmental problems must take into account that fundamental social change can only be effected democratically. Governments and agencies cannot force actual change; they can only implement it by encouraging individuals to change their attitudes and behaviors through legislation. Individuals must be won over cognitively to accept the concepts and values of environmentalism.

People need to discard the modern industrial value systems and learn to comprehend the human-environment relationship in new ways, as discussed by Brechin and Kempton (1994), Stern and Dietz (1994), Stern, et al. (1995), and Milbrath (1996). Private aspirations, motivations, personal attitudes, values, and behavior form the aggregate substance of social practice. They drive the necessary changes in society. Individual human decisions hold the key to achieving the necessary attitudinal and behavioral changes.

There is increasing media coverage of the topic, growing emphasis on decision making, and expanding involvement of the general public to make the hard choice. The "lazy slumbers" are ending in what can be truly called a "global awakening" to making individual commitments to

actual change in expectations, attitudes, and behaviors. Emergence of this awareness has provided a new dimension to the search for solutions.

Environmental problems and issues can not be resolved by simple or single solutions. It is important to recognize that the three seemingly diverse mechanisms are really interrelated rather than separated. William James Metcalf (1977) explains that working with general models is more helpful. To foster effective action for environmental sustainability, the complex and dynamic relationships among technology, lifestyle, and ethics in relation to the environment must be addressed within a system framework. Vandana Shiva (1987:262) also stresses that the diverse forces should be considered as components of one process, "the philosophical, technological and economic components of the same process".

Environmental activism cannot speak to societies, or to cultures, or even, strictly speaking, to "the public". It must address individuals in their actual life situations. However, as adumbrated in this chapter, any effort to effect change toward the environment must take into account both the long-wave shifts in the cultural position, and the contemporary effects of discordant and competing conceptualizations which are likewise multi-dimensional. The next section deals with the problem of understanding these conflicts and factors in communication.

2.2.4 Conflict and Communication

It is probably true that no sane person anywhere would argue literally against sustaining the environment and human civilization. The various views and claims discussed in previous sections share the underlying belief that human activities play an important role in the changing

environment. Controversies and debates involve how exactly to put the grand idea of sustainability into practice. Despite the fact that all of the approaches contribute to raising environmental awareness and affecting environmentally-related attitudes and behaviors on a massive scale, they are understood as manifestations of naturally occurring conflicting behavior.

People live in diverse physical, political, and social environments. They have diverse styles of living and operate with various moral and ethical codes. Inconsistent information, along with conflicting values, produces diverse attitudes and behaviors towards the biophysical world and shape the ways in which people perceive, understand, and address TEP.

Even with a basic commitment to the environment, differences lead to incompatible priorities in selecting aspects of the problem to address and to act on immediately. Given the absence of scientific or non-scientific certainty about complex forces and processes concerning environmental change, there is no comprehensive approach. It is inevitable that there will be a wide array of approaches. One group concentrates on agricultural technology, another addresses family planning, yet another focuses on consumerism, and so on, as discussed above.

Inevitable and natural as this diversity may be, it is also a problem for the comprehensive goal of environment[illegible] - sustainability. Much energy is lost in useless col[illegible]ions and meaningless arguments. It is a problem that must be overcome.

The solution, however, is not in reducing the number of initiatives. A diversity of approaches is potentially and very likely better than one grand plan. In fact, the best

approach is probably not so much reduction of projects as it is multiplication of participants.

Whatever the most cogent analysis of problem generation, the solution lies somewhere at the household level. No special interest group as such, no government decree or mega-project will reverse global environmental degradation. That can happen only with a change of opinion, conviction, and habit on the part of the households which make up the human community of the earth.

To achieve this kind of cultural change is no small matter. It depends on the diffusion of an entire cultural model of environmental orientation, including each component of sound information, constructive attitude, and effective behaviors.

The process in changing cultural expectations is a problem of diffusion, in this case, gradual widespread adoption of a new lifestyle. Change takes time and energy. According to the old Chinese saying, "a thousand-*li* journey begins with the first step". In the journey towards altering our present environmentally destructive patterns of socially and culturally entrenched behavior, the first step is an alteration in the behavior of people.

Coleman et al. (1957) and Rogers (1962), using an ecological model, understand diffusion as a "two-step-flow" process. Their description applies to both spreading information and changing behavior. First, a few leaders in different places get the information. Then they pass it on to others (followers) in their respective places. Other processes relevant to the diffusion phenomenon, include expansion and contagious diffusion.

As with any diffusion, there are barriers to overcome. Inertia factors, literacy barriers, misunderstandings,

reluctance to change, and dissonance may be the major ones. Dissonance and opposing forces may make the adoption of new lifestyles difficult. However, besides such primary conflict, there may be secondary disagreements about approaches and methods. Such multiplicity and divergence must be accounted by addressing the issue of conflict at the outset.

On a first cut, there is conflict between those who have an active concern for the environment (Responsive) and those who do not (Non-Responsive). After that, among the environmentally responsive, four different conceptions of response can be distinguished. Based on the discussions and classifications by Milbrath (1984) and O'Riordan (1989), The four conceptions may be grouped into two types: Gaianism and Communalism under "Ecocentric", and Accommodation and Intervention under "Technocentric".

But even these distinctions leave room for confusion and conflict, mainly due to misunderstanding. There are two potentially opposed positions respecting which side of the human versus environment imbalance should be the focus of adjustment. In the Dominant Social Paradigm (DSP) it is assumed that change should be achieved by manipulation of the non-human world. In the New Environmental Paradigm (NEP) the contrary assumption is that the desired change will be best addressed by changes in human social and individual behavior.

The "Non-Responsive" are positioned in the Human Exemptionalism Paradigm (HEP), either denying the existence of TEP, or considering it a trivial matter undeserving of serious attention or action. Table 2.1 lays out those positions with their conflict potential.

		Focus of Action	
RESPONSIVE		**N E P**	**D S P**
Eco-	Gaianism	Extreme	Reject
Centric	Communalism	Major	Minor
Techno-	Accommodation	Minor	Major
Centric	Intervention	Reject	Total
NON-		**N E P**	**H E P**
RESPONSIVE			
Exemption-	Trivialization	Reject	Extreme
alism	Denial	Reject	Extreme

Table 2.1 Positions With Conflict Potential

Boulding (1962) offers a model and terminology to understand "conflict parties" involved in the "concrete behavior space". Various "positions" within this two-dimensional space compete with one another for self-maximization under constraints of total area for any solution.

Using his model to examine the course of conflict, four general scenarios may be distinguished: 1) indifferent, when both the "Responsive" and "Non-responsive" positions are weak; 2) opposed, when both positions are strong; 3) obstructive, when "Responsive" positions are weak while "Non-responsive" positions are strong; and 4) supportive, when "Responsive" positions are strong while "Non-responsive" positions are weak. It may be noted that the terms chosen here to refer to the categories of patterns of attitude and behavior reflect the values and assumptions of the "Responsive" party.

Bjorklund and Philbrick (1975) and Bjorklund (1980) provide the active/passive and positive/negative continua chart to analyze the attitudinal and behavioral attributes of the parties. Their dynamic interaction matrix illustrates twenty different attitudes and behavior positions representing possible interactional shifts. If existing

patterns of environmental attitudes and behavior become known, it will be possible to identify what changes are most likely to occur.

Human-environmental conflict, therefore, is not something to passively observe. The existence of conflict makes the task of communicating and promoting behavioral change a challenging one. The challenge of communicating a coherent message in the midst of the interference of conflicting perceptions, interests, and expressions is addressed next by discussing the underlying principles of Information Theory.

Information Theory, initiated and developed by Shannon and Weaver (1949), lays out the mathematical laws governing systems designed to communicate or manipulate information. At the core of the theory are mathematical techniques for measuring information, and the capacities of various systems to transmit, store, and otherwise process information. Information is there strictly defined as a physical property without intrinsic meaning. Extensions of the theory, however, consider that signals may be transmitted with purpose, under which circumstances the information communicated may be interpreted as meaningful. Therefore, in this broad sense, information includes the messages occurring in any of the standard communications media.

The important concepts in information dissemination and reception are flows and filters of information. According to Dretske (1981), the flow of information can be understood from an interaction standpoint. Changes at one stage in the communication process may result in modification in other workings of the communication system. A filter is a feature of the context of communication that modifies the information as it passes from source to receiver(s).

Whether conceived as physical quantities or meaningful messages, the amount of information generated at source largely determines the amount of information transmitted to the destination. Even where a filter produces some loss of information during the transmission process, the proportion of the received to the transmitted will remain the same. Up to a point, of course, the greater amount of information is received, when more is emitted from the source. Amplitude is a primary determinant of effectiveness in communication. It is reasonable to believe that when people have a greater amount of information about TEP, greater attentiveness to environmental matters, and greater demand for information will follow.

In considering the effect of information, it is important to observe that received information not only adds content, it also affects structures. This is clearly so when the recipient is a person.

A cognitive structure is a model or a mapping of attitudes and beliefs. Structural change is achieved by introducing new information into the recipient's old cognitive structure, or by bringing to light internal contradictions and implications, which the recipient will process by changing the attitude held (Gould and White, 1974; and Estes, 1978).

The kind and amount of available information concerning the environment can be expected to have direct influence on people's attitudes and behavior. That, in turn, will have an environmental impact.

Knowledge of what factors interfere with the environmental information flow will help to organize programs to ensure maximum information reception. Opportunities may be created for more voluntary

participation in growing exposure to lifestyle changes individually as well as collectively, as an environmentally-sound culture is being developed.

2.2.5 Geography and Environment

The discipline of geography has long addressed itself to the interaction between humankind and nature, and has persistently addressed environmental matters. Different, sometimes opposing viewpoints have evolved attempting to understand and explain human-environment relationships (e.g., Environmental Determinism, Possibilism, Regionalism). The shifts of focus and scope reflect re-conceptualizations and rethinking of the issues involved. Particularly in contemporary human geography, the interest is further specified to examine the complex relationships between human actions and environmental changes (Thomas, 1956; Glacken, 1967; Goudie, 1986; Simmons, 1989; Johnston, 1993).

Harlan H. Barrows was one of the first to define geography as human ecology. His examination of human adjustment to natural environment recognized humankind as a part of human ecology, to be studied differently from the previous environmental approaches to investigate environmental influences. Barrows (1923:3) suggested that the task of geography should be to determine "the relationships existing between natural environments and the distribution and activities of man". Carl O. Sauer (1941, 1956) reinforced Barrows's ideas by incorporating an explicit historical context within which human-environment adjustments evolve.

Edward Ackerman (1963:435) extended their ideas, placing ecological analysis into a systems framework. He argued that geography was "nothing less than an understanding of the vast, interacting system comprising all

humanity and its natural environment on the surface of the earth". Humankind forms part of a complex ecological system, and geography is to be devoted to the study of the intricate human-environment relationships through evaluation of the human impact on the physical environment and the environment's influence on humankind.

Stoddard (1965) discussed the connection between the man-land tradition of geography and the ecological approach. He states that humankind is part of the ecosystem, characterized as a functional and dynamic relation between biotic and physical components. The ecosystem is holistic and synergistic, implying that the whole gives rise to emergent qualities, not predictable from knowledge of the constituent parts.

Stoddard's view is compatible with the behavioral perspective in geography, which asserts the existence of dynamic relationships: people act in response to the perceived environment and adjust to change. The behavioral approach, process-oriented and seeking comprehensive explanations of the complex nature-society relations, stresses that people are active agents functioning in a variety of roles within complexly constructed physical, social, and perceived environments. As a further strength, the approach does not ignore the reciprocal effects of various environmental processes on human actions.

The collective evaluation of human-environment relations, in the paradigm of geography as human ecology, poses the central questions on "location, spatial structure, and spatial process" (Abler, Adams, and Gould, 1971:61). Particularly since late 1960s when concern over environmental crisis emerged, ecological analysis in

geography has gained growing popularity and recognition (Mitchell, 1989).

From the studies of flood-plain and natural hazards by White (1945) and Burton and Kates (1963) down to recent discourse on human use of the environment, the behavioral approach in addressing resource and environmental matters has proven the applicability of geography to environmental understanding and problem solving. This is exemplified in discussions of sustainable development (Smith, 1993; Adams, 1995); assessments of the social impacts of technology (Kasperson, et al., 1980; Kates, et al. 1985); and analyses of specific resource management problems (Soussan and O'Keefe, 1985; Blaikie and Brookfield, 1987). It has contributed to a realization of the importance of perceptions, attitudes, and values in motivating behavior (e.g., Kates 1962; Brookfield 1964; Saarinen, 1966, 1976; Kromm and White, 1984; Ku. . 1992; Greer-Wootten, 1976, 1989, 1990).

As awareness of the crucial role that human behavior plays in shaping the environment develops, spatial relationships and distribution patterns of behavior are now part of the broad discipline of geography. There is increasing effort to use geographical knowledge and techniques to understand the changing physical and human worlds. It has potential for contributing to understanding and facilitating human responses to TEP.

In this chapter, the historical and academic contexts of the present research have been introduced and described. Having outlined the range of ideas in their synergies and conflicts, the challenge of communicating any improved paradigm was discussed from the point of view of the cognitive perspective and geographic discipline.

The next chapter, explains how the research itself was carried out, to discover the concrete reality of environmental orientation in London, Ontario.

CHAPTER 3

Research Methodology

This chapter discusses the procedures employed in the study in eight sections. A preliminary theoretical discussion is followed by a treatment of five methodological issues, descriptions of techniques in survey development and administration, and a presentation of data analysis methods.

First, before describing actual procedures, there is a consideration of some of the difficulties and challenges that this kind of research faces. Two issues are addressed specifically. The methods of the present work are related to the scientific method in general. The method of using questionnaires surveys in particular is addressed. Criticisms of each of these methods are possible. However, an explicit acknowledgment of strengths and weaknesses provides rationale for its use and defines constraints on interpretation.

The purpose of the study is to explore, describe, and explain the behavioral processes of household environmental orientation using the empirical evidence obtained from a survey of 300 households in London, Ontario. This research is designed to document the identifiable relationships among information, attitude, and behavior relevant to TEP at the urban community household level. Data required for the research problem did not exist in secondary or tertiary sources. Most of the necessary variables under investigation were not visible features and difficult to observe directly. It was decided that a questionnaire survey was a suitable research format to elicit information from households regarding their information, attitude, and behavior in relation to TEP.

The design itself is not unique. The survey method is commonly used in social and behavioral studies. Use of a structured questionnaire is among many scientific ways to gather data for analysis. The importance of this study lies in (a) the selection of the household as the unit of investigation, (b) adoption of micro-scale spatial samples (blocks of neighborhoods), and (c) careful selection and development of variables, which have yielded measurable expressions of the important conceptual elements.

Descriptions of the research methods, and explanations of some of the important decisions that lay behind them, are developed in relation to the five main methodological problems addressed by the study. They are stated below in the order of discussion in the chapter:

1) formulation of hypotheses to state detectable and testable relationships pertinent to the central questions posed in the study;

2) design of a sampling procedure to select households able to produce a manageable data set and reveal patterns predictive across the city;

3) development of a questionnaire to elicit responses from households that adequately reflect their environmental information, attitude, and behavior;

4) creation of a measurement procedure that enables assessment of levels of environmental information, attitude, and behavior, relationships between and among the different variables, and variations of overall environmental orientation among households; and

5) selection of analytical techniques to test statistical significances and to generalize the characteristics, correlations, and variations of the data.

In addition to these five sections, two other topics are presented, describing how the questionnaire was tested and how the data were collected. They will appear after discussions of the first three major methodological problems, but before the last two.

3.1 Problems in Studying Human Behavior

Studying human behavior in the real world is not an easy task. Both the human being and the environment are complex and changing constantly. The simultaneous interactive effects of human action in the dynamics of the two large systems adds further difficulty. As discussed in Chapter 2, despite the continuing effort and advancement in understanding of human-environment interaction, the behavior of the physical world is far better known than the behavior of human beings. As the capacity of humankind to create change in the environment increases, and as concern over life on earth intensifies, the importance of coming to terms with TEP can scarcely be overstated. To ensure environmentally sustainable human action, it is crucial to gain appropriate knowledge and skills.

The behavioral approach in human geography is one of the many ways to learn about how people choose to alter their lifestyles in order to achieve environmental balance. This approach views the constant interaction of humans and environment as ongoing transactions and transformations of each other (Aitken and Bjorklund, 1988). It seeks to understand the spatial display of the people-environment interaction through empirical findings of the various psychological processes involved and how these processes affect the behavior of people (Walmsley and Lewis, 1993: 6-7).

The behavioral approach uses the scientific method to discover general tendencies and patterns and to seek explanation for empirical findings. These are expected to contribute to our understanding of environmental assessment and of taking environmental action (Golledge and Stimson, 1987: 3-9).

Human behavior is believed to be non-random because reasons, intentions, motives, and dispositions have been found, at least statistically, to follow rules. Rules are essentially social conventions which increase the predictability of the behaviors of individual. People have both individual and common experiences. According to Philbrick and Bjorklund (n.d.: 7-8) the fragment of total experience which is common is basic to group behavior. Common cognitive experience is recognized by societies as important, and is culturally fostered through purposive communicative behavior.

According to Carl G. Hempel's (1966) lucid discussion, the scientific method is the best known means by which reliable explanatory generalizations can logically be made. The "nomological" method provides explanations of events by reference to laws (deductive) or statistical regularities (inductive) through making and testing hypotheses. Despite differences between the physical sciences (which Hempel mainly discussed) and the social sciences, this method is widely used in social science. Therefore, proper collection of data, and discovery of its general characteristics can provide evidence to support or refute carefully constructed hypotheses.

By adopting this approach, the study tries to resolve the problems of generalization faced by social and human scientific inquiries. The reality is far more complex than

can be revealed by the use of the "scientific model". Unlike the subjects of study in the natural sciences, people make individual choices, as well as act in learned ways that fit the culture they belong to. Unique human intelligence produces language, values, desires, beliefs, and other phenomena, that make it hard to establish universal laws governing human behavior. Compared to the study of the physical world, human behavioral research encounters many practical difficulties in establishing the empirical truth of the propositions based on collected observations or other data.

Many scholars have written profound arguments on the topic of the applicability of the Hempelian "nomological" method to social and human issues, and represent a spectrum of dis/agreement(See Weber, 1949; Durkheim, 1951; Winch, 1958; and Kuhn, 1962). Rudner (1966), Phillips (1987), Rosenberg (1988), and Little (1991) have provided thought-provoking discussions of the controversial views. In the discipline of human geography such debates have been carried out and reflected in works such as those of Hartshorne (1939, 1959), Schaefer (1953), Harvey (1969), Buttimer (1976), Desbarats (1983), Pickles (1988), Gould (1988), and Gregory (1978, 1994). Central to the dispute lie some thorny issues, such as "human nature", "free will", "the mind-body problem", and "the role and force of society". These problems are seen as the dualisms of the scientific and humanistic world views (Sayer, 1991).

It is beyond the scope of this chapter to elaborate upon these complicated philosophical issues. Whether it is possible to capture the essence of humanity is still an open question, unlikely to be resolved in the foreseeable future (Couclelis, 1986:95). The point to be made here involves the residual agreement in this debate. There may be limitations

and constraints in applying the assumptions and method of natural science to human phenomena. Nevertheless, given an absence of any comparably powerful alternative, the scientific method remains the principal means by which general knowledge of human behavior is developed.

Among the central methodological problems in scientific study of human behavior are identification of initial actions and causes of actions (Rosenberg, 1988:33). Values, beliefs, and socio-economic variables are confounding factors difficult to account for. Rosenberg's (1988: 27-49) exposition concludes that the logical-connection argument used in explaining the regularity of actions of non-sentient matter cannot be vigorously held, because human affairs have too great a variability. Rational behavior at all times and under all endeavours is not a human characteristic. Desires and beliefs themselves are actions; behavior may be understood as a guide to desires and beliefs. Further, certain desires, beliefs, and actions are associated with other desires, beliefs, and actions undetermined by causal factors. Particularly in real life, with some social phenomena being mental constructs (Berger and Luckmann, 1967), it is hard to have control over the subjects and the variables. Cognitive factors influencing human behavior are non-observable, but real, socially and culturally determined facts, subject to scientific analysis. They must be systematically accounted for to achieve a satisfactorily increased level of knowledge of human behavior (Couclelis and Golledge, 1983).

Recognition of the pragmatic difficulties in research should not be interpreted to mean that people are so unique, their behavior so complex, and their motivations so indecipherable that no generalizations can be made. Social scientific studies of human behavior do not have to take

extreme positions. Refined, instead of rigid, applications of the scientific method are fruitful ways to see the forest for the trees in the process of improving the link between research findings and actual behaviors (Johnson, 1991; Bird, 1993). The mind and the environment are in constant dynamic interaction. According to the principles of transactional methodology (Aitken and Bjorklund, 1988), both the rules governing decision making and the contexts of and constraints on behavior must be considered. In this way, knowledge gained at a micro-level provides the basis for aggregation in search of commonalities, thus leading to improved general understanding (Golledge, 1988; Golledge et al., 1988:155).

The questionnaire-based method (surveys, polls, census, etc.) is an extremely common approach to the description and analysis of human behavior. It is widely used by social scientists, market researchers, and public opinion pollsters. It is a relatively inexpensive way to collect information from a large number of people (Bailey, 1987:105-6; Jackson, 1988:5). The structured format yields standardized data and enables statistical analysis to reveal general characteristics, including otherwise intangible features of reality. In addition to providing a snapshot with respect to certain trends of a set of people at any given point in time and place, the method can also extend scientific horizons back in time and forward into the future, to explore new terrain and expand the data pool (Agnew and Pyke, 1987:98). It is used in a wide variety of situations - from examination of voting preferences to measures of stereotypes and prejudices, from investigation of market behavior to assessment of attitudes or perceptions.

There are problems associated with using this method to create data that research such as the present must take into account. It is impossible to ask completely exhaustive questions in any investigation. Research has to be very selective in the questions included in the questionnaire. This necessarily excludes other questions from being asked, therefore, limiting the findings of the research. Other variables that may affect people remain unknown because of such sacrifice. The selection of questions may not be optimal in their capacity to represent all possibilities.

One criterion for question selection is the need to control the range of diversity of answers to given questions. Such diversity hampers generalization. Therefore, the close-ended questions are used to force responses into certain categories provided. Variations in answers among respondents are eliminated artificially. Lack of flexibility due to the structured format means some valuable information becomes lost. Difficulties also arise in interpreting omissions, because the researcher has no opportunity to ask for explanations. Furtnermore, all answers must be accepted as given, even if they may not reflect the reality they are intended to capture: for example, random answers, guess answers, or clerical-error answers produced while checking-off given categories (Lounsbury and Aldrich, 1986:87-8; Agnew and Pyke, 1987: 97-8; and Bailey, 1987:118-9).

Dependency on the written language to elicit information makes the selection of indicators to represent conceptual definitions an extreme challenge (Eiser and van de Pligt, 1988:1-19). The researcher may try the very best in the first place to define the measures as precisely as possible. Measurement of variables may not always give exact results, because irrelevant meanings are embodied in the language. No matter how hard the researcher tries to refine

its accuracy, a gap may exist between the measurement and the reality. Besides, people have different levels of understanding of a given statement or question. Even if the questions or statements are designed to minimize differences in levels of understanding, responses may be identical, while the underlying interpretation embedded in those responses remains unknown. The single-meaning assumption is simply accepted. The researcher simply has to live with such limitations of the measurement system.

Finally, answers to questionnaires may be more or less disingenuous. The responses may not indicate the subjects' real opinions, attitudes, and behaviors, but rather an assumption about what the researcher expects, or concerns the respondents have about revealing their actual position. The behaviors people report themselves as doing, or not doing, may not be real actions. Yet given the financial and time constraints, researchers sometimes must rely on the reported behavior. Therefore, however useful behavioral information may be in aiding explanation, the problem of discrepancies and external validity has to be recognized.

3.2 Research Hypotheses

Household environmental orientation can be studied by examining specified measurable factors in simple and complex associations. The principal assumptions and propositions underlying the study discussed in Chapter 1 led to collection of empirical data using the questionnaire survey. In order to draw valid conclusions with any scientific rigor, a process of testing propositions must be followed. Assumptions must be made. Specific hypotheses to be tested need to be formulated. This section states the assumptions and hypotheses.

This research makes the following assumptions:

1) **Environmental information is available to all.** In the last decade or so, there is a wide acceptance that a serious environmental crisis of global dimensions threatens. Numerous means exist to communicate the nature and implications of environmental dangers and what people can do to help. Environmental information has penetrated all aspects of daily life, evenly distributed and is readily available to all members of society.

2) **Household environmental orientation varies primarily through complex interactive factors at the micro level.** As much as human behavior does not occur in vacuum, residents in London, Ontario, are subject to the same social, political, and economic forces. They have equal opportunities to choose to participate or not to participate when it comes to addressing TEP. The difference in voluntary lifestyle modification, to various degrees, is due to private factors such as experience, perception, attitude, belief, and value. Each or all of them may act to facilitate or inhibit environmental efforts.

3) **Unanimity is reflected in the household responses to the survey.** Whoever answers the questionnaire they are not giving merely personal statements. Rather the responses represent the shared opinions and decisions of all members of the household. The respondent has either consulted other members or has complete knowledge of the household.

The remaining paragraphs of this section contain statements of the research hypotheses. Research hypotheses are created to be confirmed. Tests for rejection of the hypotheses were conducted, following scientific convention, against null hypotheses. The latter were formulated as the reverse of the positive hypothetical statements. To make

both the reading and the writing simpler, the null hypotheses will not be stated.

As in any scientific investigation, a wide range of relationships may be envisaged in the data set. There are always different ways of examining the data to uncover new associations among variables. For this study, the central focus was on spatial distribution and spatial association of variables.

The study attempted to detect and measure the presence and degree of three factors thought to determine a household orientation index. These factors were, as stated, information, attitude, and behavior. The hypotheses primarily address the antecedently possible and empirically testable patterns of relationship which households have, or might have, with the other characteristics of the neighborhoods within which they exist.

Major hypotheses were formulated to explore the relationships among the three factors and their association with other variables. Under each major hypothesis, more specific ones were formulated. They are stated below in order of decreasing breadth.

1) **Patterns of household environmental orientation are expressed as spatial configurations with reference to residential geographical locations.** It is widely believed that people spatially sort themselves out into various urban neighborhoods according to their life-cycle, life-style circumstances. Based on different combinations of variables, such as age composition of family members, number of years of formal education, range of occupational type, income level, and shared preference of physical and social features of residential locale, households in a neighborhood are assumed to be more or less a homogeneous

group. They are expected to have similar environmental orientation but significantly different from those of dissimilar neighborhoods.

1.1) There is an uneven spatial distribution of information.

1.2) There is distinguishable locale of strong and weak awareness.

1.3) Residential location defines problems and responses.

2) Spatial and temporal proximity is a powerful information restriction. Traditional theories and empirical evidence have shown that local or immediate events are more likely to receive attention and generate actions. As spatial distance or temporal distance increases, people become less interested and less willing or able to relate to them. In post-industrial society, telecommunication and mass media have significantly weakened spatial and temporal barriers. Yet, effects of distance still exist. Therefore, three scales are delineated to test for the linear effect. The hypotheses follow.

2.1) The greatest amount of information, concern, and action is linked to the local scale; progressive decrease will be observed as the scale changes to regional, then global.

2.2) The farther away from the present time an event occurred, the less the knowledge about it; greater information is more likely when the time-distance is medium and near.

3) Information is the most important factor in fostering modern environmental ethics and shaping public attitudes toward environmental problems and issues. Perception and

comprehension of the nature and complexity of TEP depend upon information acquisition of a vast array of sources. They include both private and public, direct and indirect sources. The actual range and amount of information can be quantitatively assessed and compared. Relating them to the overall index of household environmental orientation will demonstrate the vital role information plays. Specifically, it is hypothesized that

3.1) There is a direct correlation between reception of information and level of awareness.

3.2) Behavior is a function of level of information and awareness.

3.3) The more information concerning the environment a household has, the more responsive the household is to the environmental problems, and the greater the likelihood it will be actively involved.

4) There are identifiable general patterns of household environmental orientation. It is understood that environmental choice is not universal. At the individual household level, one may see only distinctiveness. But shared characteristics exist and can be observed at an aggregated level to make it possible for description and broad classification. For overall orientation as well as underlying dimensions, it is feasible to have both spatial and aspatial types of the following:

4.1) They fall into categories of antagonistic, indifferent, interested, and supportive clusters.

4.2) They form a spectrum ranging from the deepest to the shallowest commitment.

5) **Awareness of TEP and participation in environmental activities bears a close relationship with certain social, economic and demographic factors.** Increasing social scientific evidence has shown that social, economic, and demographic characteristics influence many kinds of human activities at different levels. Household stages in life are expected to determine environmental orientation (information acquisition, attitude development, behavior adoption). Specific hypotheses of such variations are related to the following:

5.1) Household community involvement is related to awareness and participation;

5.2) Age range of household members is related to awareness and participation;

5.3) Level of education of household members is related to awareness and participation;

5.4) Occupational type of household members is related to awareress and participation; and

5.5) Household income is related to awareness and participation.

These hypotheses set the direction for the research. They required appropriately drawn samples from which to collect data for their testing. How the requirements were met is the topic of the next section.

3.3 Neighborhood Samples Database

The research focused on a single city as the geographical setting of the behavioral exploration of households' environmental orientation. A city is typically a relatively self-contained territory. Population density is proportionally higher within the spatial boundary than

outside it. Statistical information from the census and other sources is available to contribute to the analysis.

On the one hand, an urban area was chosen because it constitutes an organized system of human life and activity. A city contains a wide range of domestic environments, and types of households from which samples can be drawn. A particular city is a social-environmental unit exposed to common local, as well as regional and national influences. Its occupants share a common environment, living in the same set of infrastructures with similar information base.

On the other hand, only one city was studied, in order to achieve a certain homogeneity among households, or rather to minimize differences due to extraneous large-context factors that might influence a household's environmental orientation. By explicitly not putting different urban areas and countries into one analysis, the research concentrates on unmasking behavioral variations instead of accounting for the different ideological, social, and political biases.

The rationale for selecting London, Ontario, as the locus of the study may be summarized as follows.

London is one of the Canadian urban centers regarded as sharing most features of other urban municipalities. There are both old and new city cores. Homogeneous and mixed neighborhoods can be located in central and peripheral areas. Land use is diverse with industrial, agricultural, institutional, residential, and recreational designations. The economic base is diverse and reflected in the wide range of occupations.

At the time of survey distribution, in 1992, London had a population of about 308,000 in an area of 37,000

hectares.[21] It ranks eleventh in size among Canadian cities. Rapid growth has created a range of environmental problems, such as waste disposal and water quality. Therefore, London is confronted by similar environmental challenges experienced by many other urban centers qualifying it as a representative city.

London has been identified as a typical Canadian city serving as a test market for many commercial products and a variety of new projects (see Kotler and Turner, 1985:347). Examples are introduction of the first K-mart store, the first Holiday Inn, the first Global Action Plan for the Earth. Widely known as a quiet, average city, London is not predisposed to seek out change or be especially receptive to new things. The common belief is that, if the test is successful with Londoners, there is a likelihood of similar results with people in other cities.

It is the researcher's residence; so, it is a convenient and cost-efficient place for such research.

Three general steps were taken to select the sample households from the five geographically and demographically stratified random neighborhoods. First, the cluster technique was used to obtain representative sample localities across the city of London. Five major types of residential neighborhood were identified in London, based initially on Statistic Canada's 1986 census data and data from the Planning Department of the City of London. The neighborhoods were verified and updated, when 1991 census data became available. Next, further random clusters were drawn within each type of neighborhood. Those clusters were compared by consulting the city planning documents and

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[21] In a January 1993 annexation of surrounding communities, the city has gained approximately 8,000 persons and enlarged its land mass to about 42,300 hectares.

authorities and by personal field observation. Finally, the city blocks were stratified to produce the five sample areas. Systematic random sampling determined the 300 households to whom the survey questionnaire was delivered.

Cluster analysis was chosen as the most suitable method to identify homogeneous groups of London neighborhoods. This was to avoid pre-determining group membership of households, or the number of groups of neighborhoods. Enumeration areas were used as geographical references to determine similarities of neighborhood clusters.

Based on the discussions of Anderburg (1973) and Romesburg (1984), four criteria were selected as input variables to form hierarchical groups of the census tracts. These were: household income, real estate values, ratio of single-detached dwellings to the total private dwellings, and the ratio of the population in the two residential types. The value of each variable was standardized and one distance measure was calculated for each census tract to form a separate single member cluster in the grouping process. The most similar two census tracts with the smallest distance in value were grouped together. The proximities between these two and each of the others were calculated. The next two groups were combined in the same way. The process continued until every census tract was considered and there was one big group for the whole city of London. Examination of the value increase of the coefficients in the agglomeration schedule combined with visual inspection of the icicle plot and the dendrogram provided the bases for classifying London into five groups of neighborhoods.

To ensure an equal degree of representation of sub-areas of the city, three census tracts were randomly drawn

from within each of the five groups. This was done by numbering all the census tracts in that group first. Then a simple random procedure using a Table of Random Numbers determined which three were chosen. To produce a more even spatial average without sacrificing important local elements of the overall pattern of household characteristics, one census tract was selected from each of the three tracts for the five groups. These five census tracts represented not only the five neighborhood types, but also five geographical sections of London. During this process, detailed comparison and contrast were made among the neighborhoods within each. Data and maps from the City of London *Planning District Profile* were analyzed and authoritative opinions were consulted.[22] Personal field observations were conducted for all the neighborhoods to confirm visually the statistical and authoritative definitions of the residential localities best meeting the sample requirements for the research.

Finally, city blocks were identified by numbering them within each of the five census tracts. Then a number was randomly picked to select a starting point. The first 200 single-family dwellings (houses) without intervening multi-occupancy apartment buildings formed the sample area. It was decided that 60 households in each of the sample areas should be given the questionnaire. Those were the households determined by the systematic random selection of dwellings. Figure 3.1 shows the locations of the five sample neighborhood areas.

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[22] John M. Fleming and Chris Howell, planners, City of London Planning Division, provided detailed documents of the twenty-one planning districts of London and reviewed the characteristics of the fifteen neighborhoods initially identified by this author, Monday, July 13, 1992; Tuesday, July 21, 1992. Brenda Fieldhouse, Counsellor, Information London, discussed the general distinctive features of different city areas, Wednesday, July 22, 1992. These interviews helped the final decision of the study samples.

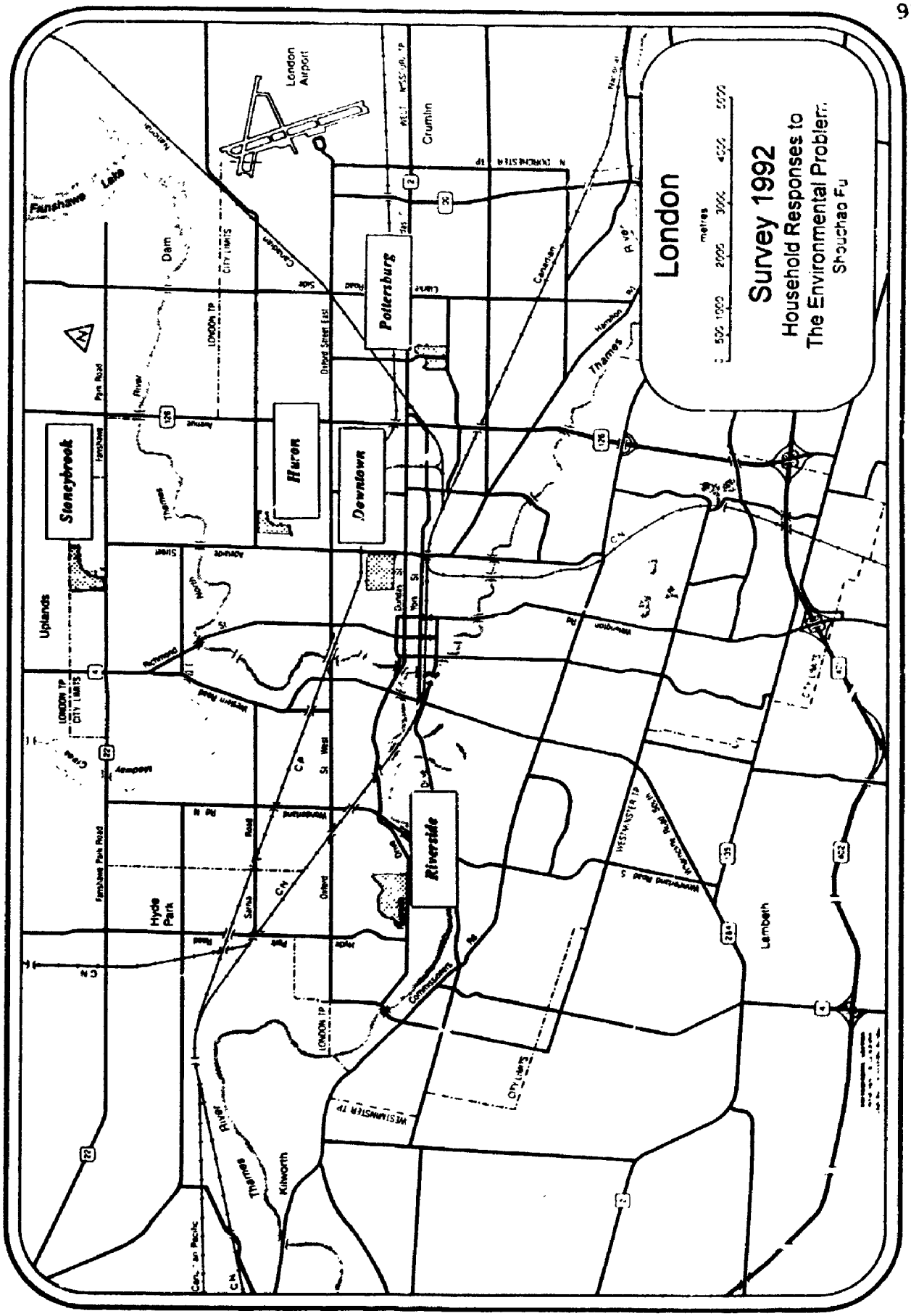

Figure 3.1 Locations of Sample Areas

All the households sampled were served by the city weekly curb-side garbage and blue-box collection. Below are some brief descriptions of the characteristics of the households in the five sample areas. Each area is first identified by naming the neighborhood.[23] Next, the blocks of streets defining the area are listed. Socio-economic characteristics, based on Statistics Canada 1991 Census data, were specified before the distinguishing physical settings and special features are discussed.

1) **Huron Area** This neighborhood was defined by Huron Street, Taylor Street, Cheapside Street, and Leroy Avenue. This was one of the single-family residential neighborhoods sharing some of "East of Adelaide" features.[24] The neighborhood is not the poorest in the city, but did have low socio-economic status. Mean household income was about $37,000. Average real estate value was around $115,000. Residents were mostly working class people with a large number of new immigrants. They occupied plain houses situated on small lots with some high-rise buildings nearby. Service and commercial facilities were poor. There was limited public open space other than heavy-traffic roads.

2) **Pottersburg Area** This neighborhood contained blocks of houses surrounded by Spruce Street, Whitney Street,

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[23] The neighborhood name is the primary identifier in descriptions of the areas and in discussion of the data. The name is often used to stand for the households in an area or for the residents of the households supplying data when the data have been aggregated by area.

[24] Adelaide is a north-south street in the city of London, ON, here under study. It is locally common knowledge that all the wealthiest neighborhoods are to the West of it, though on the northern edge of the city a few better off neighborhoods are to the East. Where the central east-west street crosses Adelaide is the district most associated with substance abuse, assaults, violence in schools, crime, urban decay, and poverty.

Winnipeg Boulevard, and Wavell Street. Judged by its socio-economic condition and general appearance, this neighborhood was similar to Huron Area. Mean household income was $44,000, slightly higher than that of the Huron area. Mean residential real estate value was virtually identical to Huron's at $120,000. In the surrounding areas, however, the ratio of single detached houses to other types of private dwellings was higher compared with that of Huron Area (58% vs. 35%). What made this area particularly interesting to the research was its location close to industrial and environmental hazards. A few years before, chemical pollution in nearby Pottersburg Creek (a few blocks south) had made local residents publicly express environmental concerns and show organized action (see Martin, 1984).

3) **Downtown Area** This neighborhood included clusters of residential dwellings framed by Colborne Street, Central Avenue, Adelaide Street, and Dufferin Avenue. Financial wealth overall was not impressive due to the range of top and bottom figures in the area; but household income and real estate values on average still put the neighborhood in the London middle rank ($43,000 in the former, $165,000 in the latter). This neighborhood was rich with cultural heritage, beautiful trees, and variety of corner stores. Also it had the lowest ratio of number of persons to private dwellings in the five types of areas (1.6 compared to the average of 2.6). This neighborhood was chosen specially for the mixed single-family, multi-family residential units and close proximity to commercial center and old city core.

4) **Riverside Area** This neighborhood consisted of those families residing within the boundaries of Everglade Crescent, Plantation Road, Hibiscus Avenue, Pinetree Drive, and Riverside Drive. Average household income was calculated at upper-middle level ($77,000) while mean real estate value was $195,000. This was one of the older post-war, well-established neighborhoods in the city. Neat single-family detached houses were observed on large well-maintained lots. With Thames River and Springbank Park in the background, this neighborhood had the more green space than any other sample areas. It appeared quiet and orderly with a pleasant natural setting.

5) **Stoneybrook Area** This neighborhood was north of Fanshawe Park Road to the city limit and bound by Phillbrook Drive and Repton Avenue on the West and Stoneybrook Crescent and Bybrook Court on the East. Here were some of the London's high income families ($130,000 per average household) enjoying spacious new houses in a landscaped setting (real estate average $300,000). Two-car or three-car garages on the property were the norm. A high concentration of the city's young professionals was known to live here. This neighborhood was usually referred to as the "New Stoneybrook" area to give emphasis to the modern level of affluence of this enclave. Monster homes is a phrase often used to describe the prominent architectural features of this neighborhood.

These representative areas reflected general residential population characteristics that coincided with other geographical clusters for London noted in other

studies addressing different matters.[25] Identifying these groups as spatial units expedited the identification of spatial patterns of shared characteristics within each unit. This enabled the question to be addressed: *Do areas that share the same general locations show similar instances of shared attitudes and behaviors pertaining to TEP?*

This kind of multi-stage cluster sampling design was regarded suitable for this kind of research. A 0.5% sample drawn appropriately reflected general characteristics of the 58,350 London households in single-family detached dwellings (about 50% of all dwelling types according to the census data). It reduced the cost of sampling by intensively focusing on the small city-blocks. Although this method is often employed in large scale sampling, its association with higher probability for sampling error is a common concern (Golledge and Stimson, 1987:25-6). For the present study, this was not a serious issue, because the author had direct access to the population and advice from qualified local experts.

Members of Global Action Plan for The Earth (GAP), a local environmental organization, were chosen as the control group, to compare sample households with, for this study. GAP London was part of a world-wide grassroots organization founded by David Gershon in New York in 1990. By July 1992, 1,913 households in eight countries had joined GAP International. GAP London had sixty-six households. At the same time GAP households expanded beyond the City to establish GAP Canada for national prominence.[26]

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[25] Comparable data and maps can be found in Kelley Teahen, "So, are you in the money?-depends where you live", *London Free Press*, Wed. 29 September, 1992, A1; United Way of London and Middlesex, *Listening'94* (London: United Way), 36-63.

[26] Based on personal notes from GAP meetings from February 5, 1991 to August 31, 1992.

GAP's unique Household EcoTeam Program was designed to put households into environmental balance. It offered concrete suggestions about changes people could make in their homes that would have a significant environmental impact. Following the approach in *Household EcoTeam Workbook* (Gershon and Gilman, 1991), participants worked through a six-month program to reduce household garbage, increase home water and energy efficiency, improve transportation efficiency, adopt eco-wise consumer habits, and at the end of the program empower others to be more environmentally responsible. It offered a feedback system that regularly showed participants the results of their actions relative to the other members of the team and other EcoTeams. The mission and structure of GAP made it conceptually an ideal group for this research to use as a base for comparison with the other sample sets.

It was assumed that GAP households would have ideal levels of environmental concern. Their scores were used as reference points against which other groups were assessed.

GAP members were distributed throughout the City of London with no apparent concentration in particular neighborhoods. Most of them resided in single-family detached dwellings. Sampling was not necessary. All sixty-six GAP households were invited to form the control group for the study.

3.4 Questionnaire and Its Rationale

A structured survey questionnaire (Appendix 1) was designed to elicit information from participating households. The questionnaire was developed by adapting questions from several studies identified during a literature review; in particular, Dunlap and Van Liere

(1978), Van Liere and Dunlap (1981), Dunlap and Van Liere (1984), and Milbrath (1984).

Household environmental orientation is a complex multidimensional concept, examination of which requires measuring and analyzing a number of factors. The research was designed to measure the different dimensions and aspects of household environmental orientation and their relationships. However, it is impossible to ask every possible question; the specific individual questions were selective indicators. They are considered to be surrogates for a class of environmental information, attitudes, or behaviors. Information sought by the questions is meant to be aggregated to yield composite indicators and indexes, rather than measures of some single problems and issues.

A total of 136 items was incorporated in the design to furnish indicators for the specified parameters. Respondents were asked to check off answers, or to supply additional information, as required by specific instructions.

For the purposes of analysis, these questions were grouped according to the type of contribution to understanding various dimensions of environmental orientation. Three major types of characteristics, shown in Table 3.1, were collected as variables: (a) to fix the household's demographic and socio-economic profile, (b) to reveal motivations underlying decisions or actions, and, (c) to establish an environmental orientation. The household characteristics in types (a) and (b) were used to relate to (c), the household's environmental aspects and dimensions.

Type (a) variables included residence, household age composition, level of education, occupation, and income. Type (b) identified general and specific value commitments, through an analysis and interpretation of responses to

choice and preference scenarios, as well as relevant community involvements. Included in type (c) were questions to measure information possessed, attitude held, and behavior practiced, that is, the specifically environmental dimensions and aspects under investigation. Many questions in type (c) were used as multi-functional items, in addition to being measures of information, attitude, and behavior. Sometimes they were also designated to provide measures of temporal proximity and spatial connection in the environmental associations.

(a) Demographic/ Socio-economic	(b) Motivating	(c) Environmental
•Residence •Age •Education •Occupation •Income	•General Values •Preferred features •Social/ Organizational involvement	•Information •Attitude •Behavior •Temporal proximity •Spatial connection

Table 3.1 Variable Types in Questionnaire

The organization of the individual questionnaire items into groups, arranged in a three level hierarchy (types, dimensions, aspects), are exhibited in Tables 3.2 through 3.7, in conjunction with the discussions of them. To avoid lengthy duplication in the following discussion, and to facilitate reference, all definitions of measures are identified by numbered labels, Q1 to Q136, based on the order of their appearance in the questionnaire (see Appendix 2.)

The three variable types presented above in Table 3.1, (a) Demographic/Socio-economic, (b) Motivating, (c) Environmental, constitute a general outline or structure of the discussion below. Dimensions are given under each of

these types, and further divided into aspects, where applicable. The rationale behind the inclusion and classification of the questionnaire items is discussed, following the same structure.

Demographic/Socio-economic	
Residence	Q116 to Q117
Age	Q118 to Q122
Education	Q123 to Q126
Occupation	Q127 to Q135
Income	Q136

Table 3.2 Questionnaire Items: Demographic/Socio-economic

The length of time people resided in London and at the address when they answered the survey were expected to show the amount of familiarity with issues and problems related to the environment in the city and the neighborhood. The longer the residence, the greater the probability of being better informed, more inclined to care about and to take actions.

Age is important in that people at different stages in their lives tend to have different outlooks and expectations of the world around them. It is also an important factor in the formation of attitudes, as it can serve as a measure of life experience. Studies have shown that the young are likely to be more environmentally active.

Formal education is both a source of information and a training in use of information. How that would relate to environmental orientation is obvious on the one hand, and an important matter for investigation on the other. As total household education was collected, the influence of several children in school was counted with university graduation.

Occupation exposes individuals to different kinds of environmentally relevant situations, and often largely influences social habits and expectations. Selected types of

occupation were queried (with two "other"), to limit the options for manageable statistical generalization.

Finally, the amount of money earned by a household plays a key role in determining where the family can live, the kind of housing they can afford and their standard of living. It also affects expectations of individuals and households.

Motivating	
General Values	
Exological Focus	Q51, Q53, Q54
Endological Focus	Q50, Q52, Q55
Preferred Features	
Less Environmentally Demanding	Q79, Q80, Q83, Q84, Q86
More Environmentally Demanding	Q81, Q82, Q85, Q87, Q88, Q89, Q90
Social/Organizational Involvement	Q107 to Q115

Table 3.3 Questionnaire Items: Motivating

Environmental attitudes and behaviors are generally believed to be related to motivating values. The questions were expected to produce measures to examine those associations. There is no simple relationship between exological[27] and ecological, rather, values of each kind can be environmentally good. Given that environmentalism has been identified as a new, caring movement, it is worthwhile

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[27] *endological* and *exological* are neologisms created for the present discussion, but with potential for general usefulness. The prefixes, *endo-* and *exo-* [Greek ἐνδο–ἐξο–], meaning basically "internal" and "external" respectively, are "used in many compounds of modern formation" according to C.T.Onians, *The Oxford Dictionary of English Etymology* (Oxford: Clarendon, 1966), 313b; and formations with, *-logic* [Greek λογικός], are "numerous" in English according to Eric Partridge, *Origins: A Short Etymological Dictionary of Modern Usage*, (N.Y.: Macmillan, 1958), 347a, II, B, 23 ff., meaning "of or belonging to the reason" or account of something, following Aristotle, cited by H.G.Liddell, *An Intermediate Greek-English Lexicon*, (Oxford: Clarendon, 1959), λογικός and λογός *ad loc.* For example, compare "*exo*genous/ *endo*genous" and "ana*logical*". The advice of classicist and linguist, Dr Robert Gordon, was taken in both the construction and explanation of these terms.

to objectively validate this belief. Exological values were expressed by indicators, such as community involvement, while endological values were revealed in choices, like privacy. The selection of residential "Features" was made to find whether householders' preferences were relatively environmentally friendly (less demanding), like southern exposure, or unfriendly (more demanding), like central air. The questions on "Organizational Involvement" were intended to look at activism and the degree of synergy among memberships in this respect.

Environmental: Information	
Information	
Knowledge	
of Environmental Events	Q24 to Q30
of Environmental Organizations	Q31 to Q38
Sources and Amount	
Public	Q39 to Q42, Q45
Private	Q43 to Q44, Q46 to Q49

Table 3.4 Questionnaire Items: Information

Possession of environmental information is one of the primary determinants of the ability to respond to TEP. This dimension includes the two aspects of information dissemination: relevant content and effective medium. Recognition of specific environmental events (such as the Bhopal disaster), and organizations (such as Greenpeace) suggested openness and attention to the issues. Identification of sources, especially whether sought personally (for example, science magazines) or absorbed from public media (for example, TV), has potential practical value in understanding how to structure environmental communication.

Environmental: Attitude	
Attitude	
General views of Human-Environment Relationship	Q1 to Q5
Concern over Salient Environmental Problems	Q6 to Q15
Concern over London Environmental Conditions	Q16 to Q23
Whom to Trust	Q91 to Q97
What to Support	Q98 to Q106

Table 3.5 Questionnaire Items: Attitude

Attitude, with information, is the other basis of environmental action. It is likely the principal determinant of the environmental character of behavior, as it embodies convictions about what can be done. The survey began with a first set of questions testing respondents' adoption of the ecological paradigm - how clearly they accepted that their daily activities were relevant to TEP. The next set tested potential for action, as measured by their engagement of concern with any of a list of known issues, such as smog. Near the end of the survey, the disposition to act for the environment was again tested, by examining the extent to which other agents (environmental groups, lawyers, households, etc.) could be trusted or relied on; and finally, a group of questions asked about support for various concrete forms of action (taxes, regulations, etc.). In the next Table, are questions to examine actual, as opposed to potential for, environmental activity.

Environmental: Behavior	
Behavior	
Association with Environmental Organizations	Q31 to Q38
Choices Made as Consumers	Q56 to Q60
Environmental Actions Taken	Q61 to Q68
Recreational Preferences	
Less Environmentally Destructive	Q69, Q70, Q73, Q74, Q76, Q78
More Environmentally Destructive	Q71, Q72, Q75, Q77

Table 3.6 Questionnaire Items: Behavior

From the point of view of the TEP model, Figure 1.1 The Environmental Problem, behavior is both the result of information and attitudes formed in interaction with the environment, and the point of alteration for good or ill. The questions in this dimension were designed to find out to what extent the households were already involved in action. Membership in an environmental group very clearly shows commitment in principle. The next two groups of questions address the extent to which principle has become practice. Consumer choices that affect daily life (such as, installation of water-saving faucets), and explicit action for the environment (such as, active composting) indicate a genuine seriousness of response. Finally, recreational choices are examined for activities that are more environmentally friendly (such as, hiking) versus those less so (such as, recreational shopping).

Categorizations of the questionnaire items as indicators of environmental orientation might seem debatable, in some cases. Where argument was likely to arise, decisions were based upon recommendations of environmental manuals or the opinions of experts, as explained in the discussion. For example, a positive

response to Q85, which elicits a preference for "few windows", is interpreted as more environmentally demanding. It might be argued that it is a less environmentally demanding preference, on the grounds that, if a house has few windows, less insulation is required and less heating is needed.[28] However, in the present research, this preference is considered more environmentally demanding on the ground that windows allow passive solar energy to be a source of heating in winter and admit light in the house all year round. Heat loss associated with windows is primarily due to cracks and associated airflow. Given the available technology to insulate the windows well, a preference for more windows is usually regarded to be a positive environmental choice on balance.[29] Such a judgment is offered in green handbooks.[30]

Environmental: Temporal and Spatial Distance	
Temporal Proximity	
Far Distant Past	Q26, Q28
Medium Past	Q24, Q29, Q30
Near Past	Q25, Q27
Spatial Connection	
Global Scale	Q9, Q10, Q24, Q29, Q32, Q33, Q37
Regional Scale	Q11, Q13, Q25, Q26, Q27, Q31, Q36
Local Scale	Q6, Q7, Q8, Q12, Q14, Q28, Q30, Q34, Q35

Table 3.7 Questionnaire Items: Distance

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[28] This might be the view of Natural Resources Canada, *Consumer's Guide: Keeping the Heat In* (Ottawa: Natural Resources Canada, 1990), 85.

[29] "The major components of an energy conserving household are insulation, airtight construction, controlled ventilation, passive solar heating...", as indicated by Lorraine Johnson, *Green Future: How to Make a World of Difference* (Markham, Ontario: Penguin Books, 1990), 155.

[30] The special engineer of Green Home Check-Up of London Green Horizons supported this position when queried.

One of the main research objectives of the geographical study was to examine the effects of temporal and spatial distance on the dissemination of information, the formation of attitude, and the alteration of behavior. To this end, both aspects were scaled according to three degrees of removal: Far/Global, Medium/Regional, Near/Local.

Seven environmental events (Q24 to Q30) were used as touchstones to measure awareness and attitude. They were classified according to three temporal and three spatial categories, based on the time and location of the occurrence of each. In calculating the temporal scales, a 15-year period was used, counting from the earliest event (Love Canal in 1978) to the time of the survey in 1992. Moving backwards from 1992, in this temporal proximity range, events that happened in the previous four years belonged in the "near past", those happening in the previous five to nine years belonged in the "intermediate past", and those occurring ten or more years previously belonged to the "remote past". In calculating the spatial scales, the criterion used were: those in London were "local", those in North America "regional", and those outside the continent "global". A more detailed summary of the events definitions is provided in table below.

Spatial/ Temporal	Name	Location	Year	Media Report
S:Global T:Medium	Bhopal	Bhopal India	1984	Methyl isocyanate leaked from a chemical plant.
S:Regional T:Near	Exxon Valdez	Alaska USA	1989	The ship spilled 11 million gallons of oil into Prince William Sound
S:Regional T:Far	Love Canal	New York USA	1978	Evacuation of a neighborhood found to be situated on a hazardous chemical waste dump
S:Regional T:Near	Hagersville tire fire	Haldimand -Norfolk Ontario	1990	14 million used tires burned forcing evacuation of residents for 17 days
S:Local T:Far	Pottersburg Creek	London Ontario	1980	PCB found in the watershed caused strong response from the neighborhood
S:Global T:Medium	Chernobyl	Ukraine USSR	1986	Catastrophic nuclear power plant failure
S:Local T:Medium	Victoria Hospital Incinerator	London Ontario	1987	Controversial energy-from-waste operation

Table 3.8 Spatial and Temporal Classification of Events

The same three spatial categories were applied in classifying the environmental organizations (Q31 to Q37). Membership base and activity scope of the organization mainly determined whether it was "local", "regional", or "global".

The order of questions was structured to facilitate response, following the funnel sequence recommendation of Lounsbury and Aldrich (1986:91), by moving the respondent from general to specific, while turning from section to section. Section orders, however, were sometimes randomized to ask questions about different aspects of a particular dimension (Golledge and Stimson, 1987:29-30). Respondents were not expected to go back and check previous answers. Personal questions were placed last, as they require least effort (Bailey, 1987).

3.5 Testing the Questionnaire

The questionnaire was pre-tested by the author in the London neighborhood called University Heights, which contained a mix of households within the identified range of

the characteristic sample types of this study. Thirty households participated in the pilot study during the first three weeks of June, 1992. Because no respondent indicated having problems with the content, only minor change was made to the formatting.

Effort was made to obtain at least face validity for the selected measures. In addition to the evaluation and approval of the questionnaire by the thesis advising committee and the University's Ethics Committee, the author conducted personal discussions with most of the participants after the pilot study was completed. A few of the households' environmental orientations were known through other independent ources. There is confidence that the questions did adequately focus on the variables of the research interest at an appropriate level of wording.

The design of the study did not provide independent means to assess the reliability of the indicators. Ideally, the survey should be repeated, or independent observations should be conducted. These steps could not be realistically carried out due to time and financial constraints of the Ph.D. level project. A statistical procedure, reliability analysis, was performed to check the internal consistency of the constructed composite measures. In most cases, the correlations between the items and of the composite measures were found to be satisfactory (r >.25, alpha >.70). Some attitudinal and spatial scores were particularly positively correlated as can be seen in Table 3.9, below.

COMPOSITE MEASURES	r	Alpha
General views of human-environment relationship	.65	.89
Level of concern for salient environmental problems	.37	.86
Attitude toward local-scale environmental problems	.47	.82
Attitude toward global-scale environmental problems	.64	.78
Level of concern for London conditions	.27	.76

Table 3.9 Reliability of Measures

3.6 Household Data Collection

The questionnaire was administered to households in the five sample neighborhoods, and to all GAP households during the months of July, August, and September, 1992. The personal delivery and pickup method was used for the households of the five sample areas. Late afternoon and early evening time during the weekends were chosen, because it was possible to find more people at home than on week days. Distribution and return of the questionnaire for the GAP households were accomplished during personal attendances of the investigator at GAP meetings, a method preferred and suggested by GAP organization members.[31] Verbal instructions were given to ensure that answers reflected the whole household rather than only the views of the person(s) actually filling out the questionnaire.

The questionnaire was personally delivered to the door in each of the five sample areas. The cover letter (Appendix 3) and the questionnaire were presented to an adult of the household, after a brief introduction and explanation of the study. The householder receiving the questionnaire was told

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[31] I am particularly grateful to Diane Szoller (Director), Rosemary Dickinson, and other EcoTeam captains of GAP for assisting with the administration of the questionnaire to GAP households.

that responses given should reflect those of the primary decision maker(s) of the household. It was understood that the responses would not necessarily be agreed upon by all individuals in the houselold.

In cases where attempted delivery was unsuccessful, due to non-occupancy, language problems, or illness at the originally determined households, the questionnaire was delivered to the next house until 60 questionnaires were accepted in each area.

A mutually convenient time for pickup was agreed upon with the resident. For the most part, respondents were cooperative. The questionnaire was filled out and placed outside the door for pickup the following day. For those found not to be ready, a reminder was left at the door for the next following day, with a specified time. If that second attempt at pickup failed, a stamped envelope was left with instructions to return the questionnaire by mail to the researcher. In this third and final effort to achieve the maximum return, seven respondents used the stamped envelope to submit the completed questi aire.

The method of personal delivery and collection certainly helped to increase the returns. Personal face-to-face contact with the respondent has been known to improve return rate as once again proven in this project. An overall response rate of ninety percent for the sample areas was achieved. This was considered to be excellent, inasmuch as fifty percent is usually adequate for analysis and reporting (Babbie, 1992). The lower number of questionnaires returned (52%) from the GAP group was attributed to the researcher's indirect contact with individual GAP members. There was reduced effect of encouragement for their participation in the study.

A total of 360 questionnaires was successfully distributed; 302 (84%) returned. Table 3.10 below shows the break-down of the returns.

SAMPLE GROUP	NUMBER DELIVERED	NUMBER RETURNED	PERCENT RETURNED
Huron	60	58	96.7
Pottersburg	60	52	86.7
Downtown	60	57	95.0
Riverside	60	50	83.3
Stoneybrook	60	54	90.0
AREA TOTAL	**300**	**271**	**90.3**
GAP	60	31	51.7
GRAND TOTAL	**360**	**302**	**83.9**

Table 3.10 Summary of Questionnaire Returns

Most householders were enthusiastic about the survey, particularly those in the Stoneybrook area. Verbal expressions of willingness to accept the questionnaire, showed the highest level of interest in the research. However, for some reason, the return rate in this area fell only in the middle. Householders in the Huron area were the least verbally receptive, but produced the highest rate of return. An informal analysis of expressed or inferred reasons for non-participation by households revealed no discernible pattern. Therefore, the data can safely be considered as not biased, as discussed by Bailey (1987) and Babbie (1992).

3.7 Measurement Procedures

In order to comprehend and analyze the data quantitatively, and especially to test the hypotheses, use of structured operational definitions, rather than the research concepts, was needed.

Quantitation of constructs is a relatively creative process, compared to the methods for dealing with raw facts.

"Raw facts" often suggest natural approaches to quantitation, whereas constructs must be related to the specific objectives of the research at hand. Such measurements will not be final or perfect, but can help to make sense of a complex reality.

Statistical data of human behavior are not produced in a social vacuum. Behaviors are influenced, more or less, by the interests, values, prejudices of the people in various specific contexts. Value components are imbedded in choices made. The decisions and actions of the researcher in the assignment of quantities and weights contribute to the final shape of the data and the ultimate appearance of the findings. The quantities must be understood as created to serve concrete research exigencies (Bauer, 1966; Fox, 1974; Reid, 1987).

This study took a political or value position favoring the environmentalist view in its measurement design. Even though the operational definitions are no guarantee of the perfect measure for the purpose of the research, there is a clear logic behind them and their level of consistency can be assured. Numerical values used for the range of answers in any category were assigned logically and consistently, but according to the investigator's judgment and decision. Responses supporting environmental protection uniformly received allocations of higher values. Obviously, a given response to a particular test item was scored identically, for every household. The same formulas were used in calculating summary scores for all households.

Description of the measurement procedures developed for structuring the data includes generally three stages. In fact those were the three stages of consolidation of the data: 1) coding variables, which involves assigning absolute

numeric values, to order the items, 2) constructing indexes, which involves creating composite measures, to define the aspects and dimensions, and 3) calculating the Environmental Orientation Index (EOI), which involves putting together a number of indexes, to obtain a single summary quantity.

The 136 questionnaire items elicited responses of four data types, as shown in Table 3.11. The vast majority, 83, allowed for continuous range responses, using the standard Likert technique, in three, four, and five poir : scales, depending on the anticipated need to spread response values out. Three Likert-style question sections were open, allowing the respondent to add an item or topic, and express a pre-structured response to it. The next most common type of response, 39, was numeric, requesting a specific quantity be stated for a given factor. The third most frequent type was Boolean data, eliciting presence-absence of a given characteristic. The one single-choice question asked the respondent to place the household within one of five income levels.

		Number of Choices					
TYPE	***Total***	**1**	**2**	**3**	**4**	**5**	**Open**
Single	***1***	1					
Boolean	***13***		13				
Likert	***83***			47	25	11	
Numeric	***39***						39

Table 3.11 Response Type Distribution

To facilitate data analysis, coding of the variables was necessary for all types, except the numeric.

The single type with one choice of response was question number Q136, combined income of household. The answers were ordered by relative magnitude according to the range of dollar amount.

The Boolean type involved "yes" or "no" answers coded as "1" for "yes" and "0" for "no"; for choice of one or the other given product, those considered to be environmentally friendly received the coding "+1" while the environmentally non-friendly ones got the coding "-1".

Likert type answers were coded using the scaling technique developed by Likert (1932) as the category name indicated. The 'method of summated ratings', has been widely used in social and behavioral scientific research in measuring both fact and attitude issues. In coding the Likert-type responses in the questionnaire, the descriptive meanings were retained as much as possible. For example, in the questions Q39 to Q49, '0' was assigned to 'none' while '3' was assigned to 'lots'.

The coding process also complied with the position taken by the research in a way that a higher score on a particular item indicated something more environmentally positive. For example, code 5 was given to the category of 'strongly agree' while code 1 was for 'strongly disagree' with respect to question numbers Q1 to Q5.

The numeric type required the respondent to provide the number of persons in the household that were in the specified category or description; for example, participant in a given activity, achieved a given level of education. The specific quantity provided could be used without coding.

'No Answers' and additional information supplied were first recorded and examined separately. Then they also were coded and incorporated into the data set (relevant details are discussed in Chapter 4.1). Complete coding schemes employed for computer data entry can be found in Appendix 2.

The purpose of constructing indexes is to standardize the quantities for different types of data, so that

comparisons are possible. The inherent characteristics of one kind of phenomenon or process may call for approaches of quantitation quite dissimilar from that suited to another. More data may be available for one dimension than for another, in which case simply adding, for example, the scores for each item would be misleading. When several such dimensions are, nevertheless, related to or constitute an overall character, the many must be brought together in one measure, relating each to a fixed quantity or algorithm. This is the role of indexes.

In studying social and human behaviors, many such indexes have been constructed and published by social scientists. Especially in the last thirty years, increasing application of the approach popularized by Raymond Bauer (1966) has produced numerous indicators, rates, and indexes. Common examples include social status, crime rate, (un)employment rate, birth rate, death rate, housing satisfaction, life-change units, and quality of life. Now that people's environmental orientation has assumed an explicit character of social and behavioral prominence, there is potential value in developing indexes for this purpose.

Appropriate quantitation, as described in the previous section, is the first step. But such quantities may be and are incommensurable across different dimensions. In order that indexes be made comparable across dimensions and among groups or households, in this study, the harmonization or standardization of different kinds of quantities is achieved by converting each into a ratio.

The environmental data collected for this study were conceived as belonging to three dimensions, i.e., information, attitude, and behavior, that make up the

environmental orientation. Each was composed of several aspects. Since the aspects were different kinds of things and different approaches to their quantitation were necessary, it was necessary that they be given different weight in the indexes.

What weight to give to each factor constituted the basic problem in construction of the indexes. This required assessing relative importance of variables. Given the fact that this study was the first effort, it was already very exploratory, working with many unknown parameters. For example, some important factors might not have been included in the questionnaire, or the combination of different scales (see Table 3.11) might have created some undesirable artificiality. Furthermore, as assignment of weights is inescapably artificial (empirically unverifiable), weighting was seen as introducing more uncertainty. The decision was made to assign equal weight to each contributing factor in all computations of indexes.

Indexes were created by expressing the scores for each dimension as a percentage of the total possible score for that dimension. Following discussions of concepts and methods of rate and index creation by Reid (1987: 53-9) and Ott, et al. (1992: 130-43), a formula was adopted for index construction in this study. This formula may be expressed as:

$$\text{Household Index} = \frac{\text{observed score}}{\text{maximum possible score}} \times 100$$

The steps required to select and combine measures begin with Likert's summated rating method. This involved totaling up all the values in the given aspect to arrive at the sum of the scores of the categories the household had chosen for each of the related items. Quantities measuring the scales

were organized to be of same magnitude or direction before summing the scores.

Using ordinal data as if they were interval level is not uncommon, particularly in social sciences. Computation of an average score on the ordinal scale, such as Likert's, is generally considered to be a fairly safe statistical procedure (Bailey, 1987:129). Accordingly, the mean scores were calculated and used to create the indexes.

For each of the principal environmental dimensions, an index is derived from several quantitative scores associated with individual aspects. First, addition and subtraction of those scores were used as required to obtain observed scores for each dimension. Next, the index formula was applied to the observed scores for each dimension to obtain a mutually commensurable ratio. Detailed computing procedures can be found in Appendix 4.

One summarizing index, the Environmental Orientation Index (EOI), was created by aggregating three other indexes that were considered substantial enough to define the overall position of the households and various groupings of them. Five dimensions are listed under the variable type 'Environmental' in Table 3.1. Three of these are the controlling concepts of the study: Information, Attitude, and Behavior. For each of these dimensions, an index was calculated. These three indexes were then added together to create a composite numerator for the calculation of the overall EOI. This numerator was again divided by the total possible overall score, and multiplied by 100 to obtain the desired form.

EOI allows each household to be placed on a one-dimensional continuum indicating the general degree of positive environmental response through acquisition of

knowledge, adoption of perspective, and development of habits. This is the primary index for expressing quantitatively the relationships of households to the characteristic neighborhoods or areas, and other types of classifications. It was anticipated that this and the other three indexes would provide a basis for a statistical investigation of the various environmental patterns and relationships among the households.

3.8 Analytical Techniques

Even though some discrete values in ordinal scale were treated as interval data in order to perform some mathematical functions, the underlying nature of the data remained, and the values are not truly continuous. The shape of distribution of the data was also not known. It was considered safer to retain the ordinal nature in carrying out correlation analysis and significance tests. Only exploratory analysis and non-parametric statistical tests were used. They include comparison of descriptive statistics of samples by examining the distribution of percentages and exploratory plots for the five sample areas and GAP.

For hypothesis testing, a confidence interval of 95% was adopted. The following statistical methods were used.

The Kruskal-Wallis test was chosen to test whether the five sample areas represented different populations in their environmental orientation. Ordinal data are sufficient for this one way analysis of variance technique. The test assumes that the variables under study have underlying continuous distribution without assuming normality and homogeneity of variance (Siegel, 1956:184-93; Silk, 1979:192-5). For this test, all households in the five sample areas were combined and ranked. Average ranks were assigned in the case of ties. The ranks were summed for each

group. The Kruskal-Wallis H statistic was compute from these sums. When the observed H value, distributed as χ^2, df=4, for the previously determined level of significance (0.05) was equal to or greater than expected, the null hypothesis was rejected in favo~ of the research hypothesis.

The Kruskal-Wallis test indicated only that a difference existed between at least one pair of areas without specifying which pair was actually involved. When significant results were found, Mann-Whitney test was run for each possible pair.

The Mann-Whitney test was used also to test the hypothesis that GAP households and households of the sample areas represented the same populations having the same shape and location. This test was seen as appropriate because GAP households were assumed to be different from the other households in their environmental orientations. The test makes no assumption about the shape of the underlying distributions and uses ordinal data to compare the two independent groups (Siegel, 1956:116-27; Silk, 1979:185-92). For this test, GAP households formed one group while all sample area households were put together as the other group. The two groups were combined and their scores were ranked in order of increasing size, group membership was ignored. The lowest score was given rank 1, the next lowest rank 2, etc. For tied scores, the mean of the rank was assigned. The test statistic U was computed indicating the number of times a score from GAP households precedes a score from the sample area households. When the observed value of U had an associated probability equal to or less than 0.05 (the predetermined level of significance), the null hypothesis was rejected in favor of the research hypothesis.

The Spearman rank correlation test, the Kendall partial rank correlation test, and the Kendall coefficient of concordance test (see, Siegel, 1956:202-38) were used to identify significant associations between and among the different aspects and dimensions in the data. In all the tests, measures of correlations of variables were based on variable ranks. An increase in rank of one variable was related to either an increase or a decrease in the rank of another variable. The Spearman's correlation coefficient, r, provided a measure of the strength and direction of the association of the two variables. The Kendall partial rank correlation test provided a way to examine the intervening effect of the third variable on the relationship of the two variables by holding the third variable constant. The Kendall coefficient of concordance, w, indicated the degree of connections among the variables. The last test was used to assess how related the households in the five sample areas and GAP scored on spatial and temporal scales.

Both cluster analysis and multidimensional scaling (MDS) analysis were used to classify households in search of patterns of environmental positions. The former is the same method used for sampling described in Chapter 3.3. The latter, MDS, is a well-known psychological scaling technique, but sometimes employed by other social sciences, including geography, for different problems. It uses an algebraic equation with a simple geometric representation assuming (dis)similarities between a pair of any quantities of attributes. Numbers are assigned corresponding to locating the points in a multidimensional space. Data can be either metric or non-metric. The distances or differences are computed to create pairs of points that are projected on arbitrary orthogonal axes to obtain a graphic view. The dimensions are determined by the researcher to define

underlying patterns of the data (Shepard, et al., 1972; Brummell and Harman, 1974; Young and Hamer, 1987). Different MDS models were applied to the households environmental index scores for this study.

The methods and procedures adopted for this research, and described in this chapter, were directed toward finding central tendencies, correlations, and associations of aspects and dimensions of household environmental orientation. Spatial and temporal patterns were examined; and the results of the analysis are presented in the next two chapters.

CHAPTER 4

Descriptive Analysis and Findings

This chapter describes the patterns of the dimensional results of the London household survey. It begins with an explanation of questionnaire tabulations and transformations, which are procedures used in preparing the data for the statistical analysis that identified the patterns.

Presented next are five neighborhood profiles in terms of the demographic and socio-economic aspects, which emerged from analysis of the information supplied by the participating households. The important dimensions investigated by the research are then described. They are arranged into six sections: (1) information, (2) attitudinal, (3) behavioral, (4) temporal and spatial scale, (5) motivational, and 6) environmental orientation patterns. For clarity, the presentation of the findings from the descriptive analysis within each section consistently moves from the more specific to the general according to the relevant data structure. An easier comparison of the statistics across sections is achieved by systematically presenting first the patterns among the five sample areas, then the patterns between the five areas as one group and GAP as another.

4.1 Questionnaire Tabulations and Transformations

Three particular points are explained in this section: 1) the utilization of concrete answers to the individual questions, 2) reshaping the responses to relatively uncontrollable "Other" questions into standard forms, and 3) aggregating answers of large ranges into fewer and more meaningful categories.

The design of the research required the analysis to address itself to calculated and derived aspects and dimensions relevant to determination of the household environmental orientation. Responses to individual questionnaire items were not examined as separate single indicators in this study. They were intended to be aggregated to form composite index scores.

On the other hand, answers to individual questions provided the basic information from which aggregated aspect measures were derived for analysis, and cannot be simply forgotten. They gave substance and shape to the data set of aspects and dimensions actually used, and they ultimately defined the different patterns of household environmental orientations. Even though they were not the focus of the research, the specific details of the individual answers painted pictures potentially interesting in themselves. Therefore, although no discussion of responses to individual questions as such is undertaken at present, a summary of the household responses to the questionnaire is presented for reference, as Appendix 5.

A frequency examination of the ranges of responses showed that some answers, accepted by the initial design and form of the questionnaire, could not be meaningfully analyzed. They needed to be restructured to become practically usable. Certain details in the data were unavoidably lost during the processes of standardization and aggregation, however justifiable the sacrifice. What is to follow in this section documents how and why the data were reorganized. It will summarize as much as possible the original responses to provide some sense of the raw data.

It was necessary to transform the "Other" responses in ways that allowed them to be incorporated in the study data

set. These "Other" responses were the additional information the households had been asked to supply in "Other" categories. They involved Q15(concern over other environmental problems), Q23(urgency of other problematic environmental conditions in London), Q38(other "environmental organizations" aware of or belonged to), and Q135(other primary occupations of members of the household).

Overall, a relatively small number of households returned such supplementary responses, although they often provided interesting information not covered by the pre-selected items in the questionnaire. For the most part, the expanded ranges of answers did not generate other conceptual categories to the existing structure of the survey as had been hoped. Nevertheless, in order that those additional information could be used to contribute to the objectives of the study, they were reassigned to appropriate places in the structured format.

Of the thirty-eight (12.6%) households that specified concerns about other environmental problems, almost all expressed concrete instances of similar types of problems already represented by the given items. For example, the questionnaire items "toxic substances" and "pesticide use" may well include the problems some of the households specified as "PCBs", "oil spills", "nuclear waste", and "lack of effective control over the introduction of new chemicals". In those cases, the decision was made to incorporate the additional responses into the answers of standard identical questions. Some unique answers did not fit into the designed categories. For example, there was no common thread among the items "fast air flight and volume of air traffic", "consumers unwilling to pay for environmental protection", and "governments ignoring development of energy sources". In those cases, the answers were thought to

express particular concerns deserving special treatment. They were accepted as extra "very concerned" items in the calculation of simple attitudinal scores for the household.

Twenty-one households (7.0%) indicated they felt there were other problematic environmental conditions in London. Again, the answers pertained to two general kinds: those concerning concrete circumstances of the listed types and those providing extra items. The first kind included "Thames River water quality" as a kind of "water pollution"; "too much purchase and wrapping", as a form of "solid waste disposal"; or "Sifton, Matthews, flood land build", as an instance of "loss of open land". The second kind included citations such as "use of purified water for lawn", "PCB storage", and "public transport (bike paths, London Transit Commission routes)". The selected London environmental conditions were intended to solicit answers to compare perceptual fluctuations of the households. The stated conditions were designed to be treated as constants. In order to maintain the stable base, it was considered best to keep the existing items and answers untouched. The distinctive answers were coded separately as other major problems and added to the standard set.

Twenty-nine households (9.6%) revealed they had heard of or belonged to twenty-two environmental organizations other than the ones listed. Those were different kinds of known international, national, and local organizations and groups. Examples were: World Wildlife Fund, Canadian Wildlife Federation, McIlwraith Field Naturalists, Ontario Environmental Network, Londoners for the Safe Elimination of all PCBs, Friends of the Environment (Canada Trust), Environmental Awareness for Greater London Education, London Council of Women Environmental Committee, Kids for Saving the Earth, as well as workplace or community related

environmental committees and high school environmental clubs. Each of the specified organizations and groups was coded either as "heard of" or "belong to" in accordance with the valid answers.

Five households (1.7%) returned four supplementary types of occupation (infant, part-time, self-employed, and disability). The information was deemed not useful to the research. This questionnaire item was dropped from the data set in all subsequent analysis.

It was more useful to group nonessential details into broad categories. Both Q116(number of years lived in London) and Q117(number of years lived at the present address) generated answers in a huge range. The former had a spread of eighty-two years (mean=25.4) while the latter span was sixty-four (mean=11.5). Initial descriptive analysis was based on the interval data, for summary purposes. It was commonly believed that it would take three to five years for people to know their communities and that most differences in the level of knowledge would be within a period of twenty years. After that, it would not matter much. Therefore, the big range of values obtained for the two questions was aggregated into five larger logical categories. The five time-blocks created were: 1) under five years, 2) between six and ten years, 3) between eleven and fifteen years, 4) between sixteen and twenty years, and 5) twenty years or more. The aggregated values were used for analysis beyond the summary stage.

For Q69 to Q78(number of persons in the household participating in the listed recreational activities), Q107 to Q115(number of persons in the household involved in the listed organizations), and Q118 to Q134(number of persons in the household in the specified age groups, educational

levels, and occupational categories), the responses ranged from zero to seven. Over 92 percent of the households indicated no involvement with the listed social organizations, with the exception of the responses to Q114 which showed 55.6 percent of the households had no association with a church, synagogue, or mosque. The decision was made to allow two simple distinctions, namely, involvement (one or more persons in the household associated with the given organization) and noninvolvement. However, absolute number of persons reported in all cases could not be meaningfully compared because of the variations of the household size. They were converted into percentage of the total members of the household. The percentage values became the actual working data for analysis.

The finer scales of responses to Q1 through Q5 (statements expressing the general views of human-environment relationship) were not retained for purposes of simplicity and clarity. The 5-point scale was condensed into 3-point scale by grouping "strongly disagree" and "strongly agree" into "disagree" and "agree" respectively. Each of the five statements was agreed to or strongly agreed to by the overwhelming majority of the households (ranging from 90.4% to 96.7% with an average of 94.5%). Those households that indicated they were not in support of the statements consisted of only about two percent of the total households. Besides, the differences between those who "disagree" and those who "strongly disagree" were so small (0.3%) that combining the response categories did little to change the shape of the data.

The steps described above were necessary in avoiding diffusion of focus in later-stage data analysis. By so doing, maximum amount of information supplied by the households was used to contribute to the research

objectives. The organized data expedited statistical investigations of the various patterns the study aimed at. What resulted from the investigations will be the focus of attention next.

4.2 Neighborhood Characteristics

The five sample areas represented significantly different kinds of neighborhoods clustered according to distinctive demographic and socio-economic characteristics. Statistical analysis of the information provided by the participating households confirmed the clusters had been correctly constructed. In this section, the neighborhood profiles that actually emerged will be described.

The purpose is two fold: a) to give a basic grasp of the study areas before looking at environmentally relevant statistics, and b) to reinforce confidence in the sample areas in serving the purpose of the research.

Five categories of household characteristics were examined to define the neighborhoods: length of residence, age composition, level of education, types of occupation, and total income. The order of this list will serve as the order of discussions to follow. Descriptions of neighborhood similarities and differences will be based upon statistical findings from both exploratory analysis and significance tests.

The length of residence in London and in their respective neighborhoods differed significantly ($p<.0001$ for both) among the households in the five sample areas on average. Table 4.1 gives details of the number of years in terms of length. People in the Pottersburg neighborhood lived in London the longest (average of 33 years) while those in Stoneybrook the shortest (average of 18 years). In

general, householders had resided in London long enough to be familiar with environmental conditions in the city.

The difference of neighborhood residence length is clear in Table 4.1. Stoneybrook households had the shortest occupancy, which is not surprising as it is the youngest neighborhood among the five areas (built in the mid 1980s). The Huron area stayed in the same middle position. The Riverside neighborhood had the most stable occupancy (15.4). It was especially significant to see that households in the Pottersburg neighborhood obviously had been in London and the sub-area long enough to meet the requirement for spatial scales tests later.

Sample Area	Number of Households	Average Years in London	Average Years at Address
Huron	58	24.4	11.8
Pottersburg	52	32.9	14.0
Downtown	57	29.4	12.1
Riverside	50	22.2	15.4
Stoneybrook	54	18.0	04.6
Total	271	25.4	11.6

Table 4.1 Length of Residence in London and at Address

Table 4.2 and Figure 4.1 provide a summary view of household members in three age groups and households age composition in four major categories. The values represent the percentage of household members in the age categories.

Originally five age categories were defined in the questionnaire. Household members belonging to categories of 21-35 and 51-65 were found to be equally distributed in all sample areas. Two steps were taken to restructure the grouping to reveal meaningful patterns of age composition of household membership.

First, the middle three categories were combined into one group. The new categories defined family members as old, mature, and young. The five sample areas showed similar distribution of middle-aged people. Stoneybrook had more young family members (.70), while seniors were slightly higher in number in Downtown (.25).

Sample Area	Number of Households	Under 21 **Young**	Between 21-65 **Mature**	Over 65 **Old**
Huron	57	.54	.86	.18
Pottersburg	50	.44	.92	.20
Downtown	57	.19	.86	.25
Riverside	49	.55	.88	.24
Stoneybrook	53	.70	.98	.02
Total	266	.48	.90	.18
Pearson Value		*31.14887*	*6.34396*	*12.69054*
Significance	*df=4*	*.00000*	*.17489*	*.01289*

Table 4.2 Prevalence of Ages

The next step was creation of types of family age composition. Out of the eight possible combinations of the three age groups, four types emerged, namely: Young & Mature, Mature only, Mature & Old, and Old only, as shown in Figure 4.1.

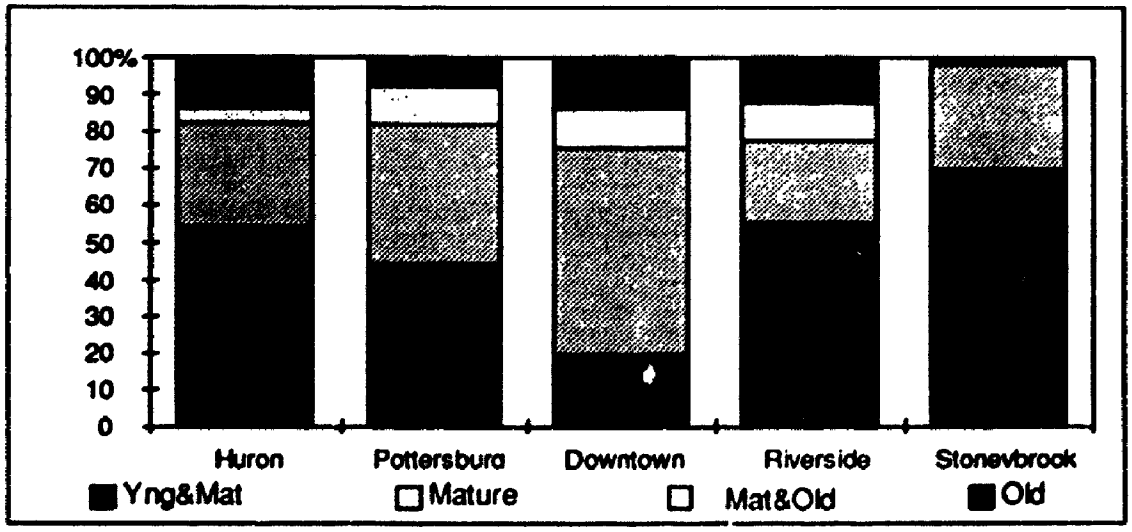

Figure 4.1 Age Composition of Areas

An interesting point to be noted is that the sample households did not have three generations of members under one roof. Significant differences were consistently revealed between and among the neighborhoods ($p \leq .001$).

All areas, except Stoneybrook, had all four combinations of ages. Households in Stoneybrook (which lacked Mature & Old), were primarily Mature & Young (70% of all households in the area) or Mature only (28%). Although the other four areas contained households of all four types, each had different proportions. Downtown had the highest number of households with three of the four combinations, except for Mature & Young. Huron area had more Old people and Mature & Young, compared with Pottersburg, where there were more working-age adults. Riverside had the most balanced distribution.

Extraction of a single number for each household's education level, was achieved through several computational steps. First, a number of years education was associated with the questionnaire categories of "Primary" (6 years), "Secondary" (13 years), "Technical or College" (15 Years), and "University" (17 years). Respondents had reported the number of persons at each of these levels. It was, therefore, possible to calculate an average level of education for each household by dividing total number of years by number of persons reported. This mean value was used as the household education indicator; see Table 4.3.

Sample Area	Number of Households	Average Number of Years	Std Dev
Huron	56	11.22	3.70
Pottersburg	46	11.02	3.67
Downtown	57	14.49	2.49
Riverside	47	11.91	3.71
Stoneybrook	53	12.04	3.56
Total	259	12.14	3.43

Table 4.3 Years of Formal Education

The five sample areas did not have comparable levels of formal education as three (primary, secondary, and university) out of the four original categories indicated significant differences ($p < .006$) in the number of people in each level. The Downtown area had the highest levels of education, followed by Stoneybrook, Riverside, Huron, and Pottersburg ($\chi^2=35.3195$, df=4, p=.0000).

Four occupational types were created to report on the eight original designations (that number being found excessively detailed). More conventional groups were used, based on the "white collar", "blue collar", and "home". The category "student" was retained, because it is not reducible to these, and was expected to have considerable relevance in the availability of environmental information to the household.

Sample Area	Number of House-holds	Includes **Office** Worker	Includes **Skilled** Worker	Includes **Home** Oriented	Includes **School** Oriented
Huron	57	.49	.47	.51	.49
Pottersburg	50	.30	.56	.54	.34
Downtown	57	.65	.19	.32	.30
Riverside	49	.73	.18	.47	.43
Stoneybrook	53	.85	.21	.32	.55
Total	266	.60	.32	.43	.42
Pearson Value		*39.68316*	*30.73338*	*9.84166*	*9.49508*
Significance	*df=4*	*.00000*	*.00000*	*.04318*	*.04985*

Table 4.4 Prevalence of Occupational Types

The types indicated for the columns of Table 4.4 are (1) Office Worker ("professional", "commerce and business", "public administrator"), (2) Skilled Work ("skilled work/trades"), (3) Home Oriented ("homemaker", "unemployed", "retired") (4) School Oriented ("student"). The numbers in the table indicate the proportion of households in the neighborhood in which at least one member follows that occupation.

Spatial concentrations of skilled work and home oriented occupations were found in the Pottersburg neighborhood. Office oriented occupations figured largely in the Stoneybrook, followed by Riverside and Downtown. Huron showed no discernible pattern. There was no significant difference among the five areas for the "student" type.

A combinational view of the data in four types was discovered by close examination of the data: (1) Office & Home & School, (2) Skilled & Home & School, (3) Home & School, (4) Office & Skilled & Home & School. Students were probably mainly dependent on other members in the household; so they were included in each of the three occupational combinations. These combinations, displayed in Figure 4.2, do show some patterns. Pottersburg had an outstanding prevalence (44%) of the Skilled & Home & School combination, while Stoneybrook was dominated (72%) by the Office & Home & School type.

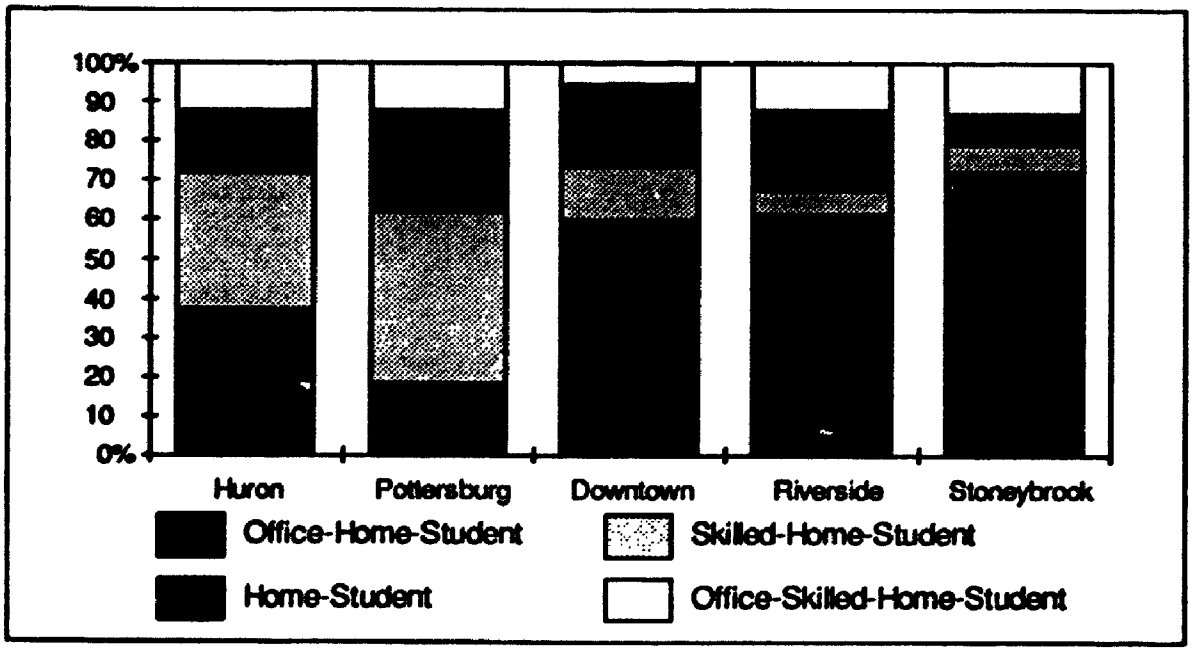

Figure 4.2 Occupational Composition of Areas

Table 4.5 shows the breakdown of total household income for the five sample areas. Significant differences were found between and among the neighborhoods (χ^2=86.44985; df=4; p=.00000).

Sample Area	Number of House-holds	Less than 25,000	25,000 to 49,000	50,000 to 74,000	75,000 to 99,000	Over 99,000
Huron	49	.10	.53	.29	.08	.00
Pottersburg	41	.24	.37	.37	.00	.02
Downtown	52	.13	.44	.25	.10	.08
Riverside	41	.12	.17	.46	.20	.05
Stoneybrook	47	.02	.13	.19	.34	.32
Total	230	.12	.33	.31	.14	.09

Table 4.5 Prevalence of Annual Income Level

Households in Stoneybrook neighborhood were the wealthiest, while people in Pottersburg were the poorest (in between were Riverside, Downtown, and Huron in descending order). This is in contrast to length of residence looked at earlier. Level of income seems negatively related to change of family residence. The rich seem to enjoy more inter/intra-city mobility.

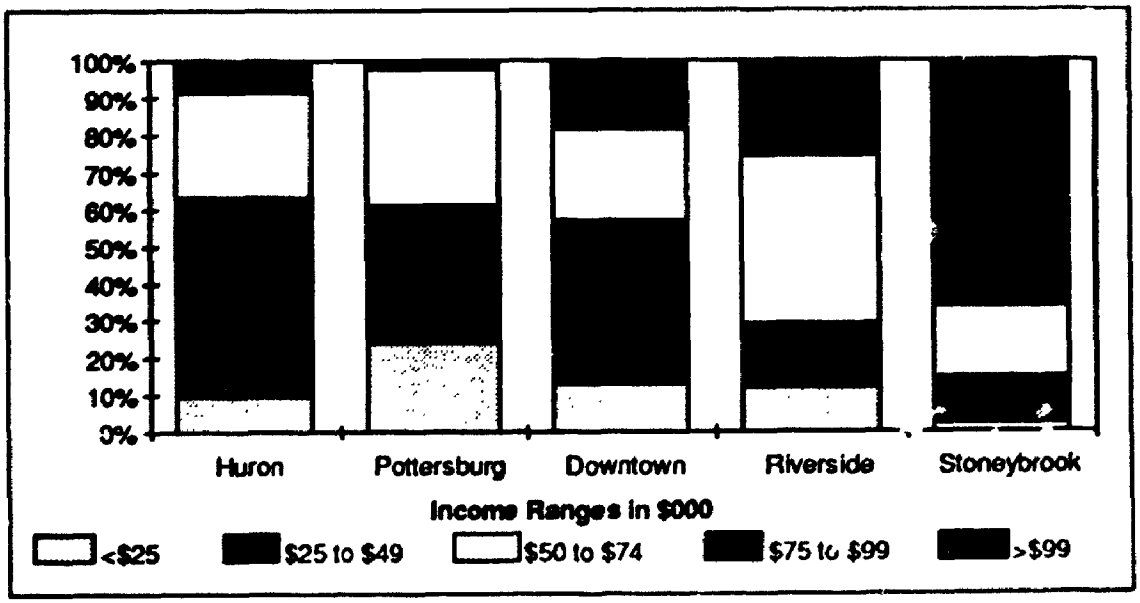

Figure 4.3 Income Composition by Area

One thing to be noted is that the two neighborhoods of highest level of income had the largest families to support; see Figure 4.4. But this conception did not appear in the other areas when rankings of size of family and levels of income were compared. Close examination of family membership composition could not support the speculation.

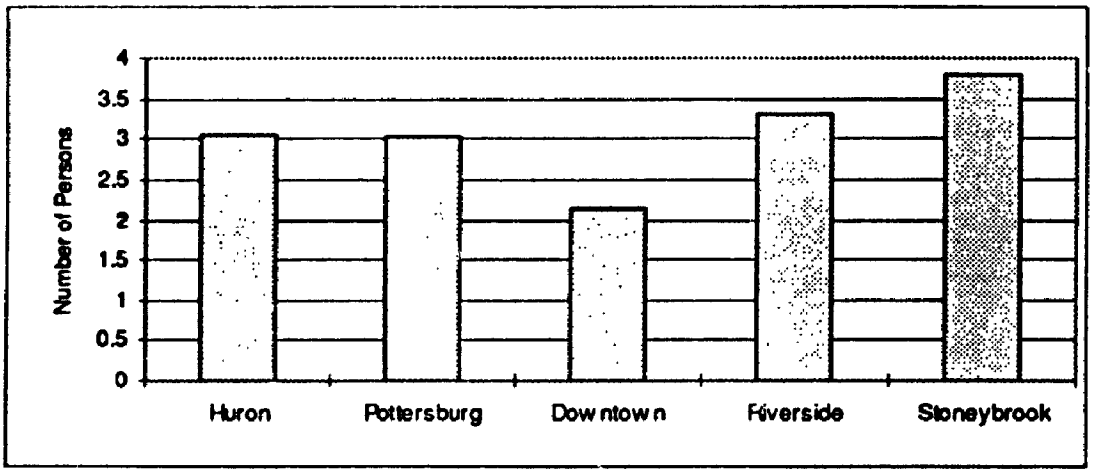

Figure 4.4 Average Household Size

In summary, the five sample areas were distinctive demographic types of neighborhood, significantly different from each other. This confirms that people in spatially defined groups have both more and less shared demographic characteristics. Neighborhood is a valid independent variable against which to explore the degree of variations of other kinds of human behavior.

GAP was not a unique group judged by socio-economic and demographic variables. Comparison of GAP with the five study areas, whether the latter were compared in aggregate or whether they were individually compared to GAP, revealed only one significantly ($p < .05$) different characteristic, namely levels of education. Households in GAP had higher education than any other group.

4.3 Information Patterns

This section presents the descriptive findings of the information dimension. Four major aspects of environmental information were measured, with eight summary scores and one overall dimensional index, as shown in Table 4.6.

	I1	I2	I3A	I3B	I3	I4A	I4B	I4	IDX
Huron	.78	.46	.43	.86	.64	.70	1.71	1.20	**51.50**
Pottersburg	.74	.42	.42	.85	.64	.63	1.85	1.24	**50.65**
Downtown	.81	.52	.42	.82	.62	.74	1.72	1.23	**52.98**
Riverside	.90	.55	.49	.85	.67	.83	1.82	1.32	**57.46**
Stoneybrook	.83	.44	.46	.88	.67	.81	1.78	1.29	**53.84**
5 Areas Mean	.81	.48	.44	.85	.65	.74	1.77	1.26	**53.28**
GAP	.95	.77	.74	.92	.83	1.52	1.96	1.74	**71.44**

I1: Knowledge of environmental events
I2: Knowledge of environmental organizations
I3A: Private source of environmental information
I3B: Public source of environmental information
I3: Private and public environmental information sources
I4A: Private amount of environmental information
I4B: Public amount of environmental information
I4: Private and public environmental information amount
IDX: Environmental information index

Table 4.6 Summary Scores of Information Dimension

The first information aspect (I1) measured the presence or absence of households' knowledge about environmental events and disasters that had occurred. The maximum possible score was calculated as 1. Among the five areas, Riverside area had most information (0.90), next in line were Stoneybrook area (0.83), Downtown area (0.81), Huron area(0.78), and Pottersburg area(0.74). GAP had a higher score (0.95) than each of the five areas and the areas combined as one group (.81). Overall the sample households showed that they had well above average level of knowledge of environmental events of different kinds and scopes.

The second information aspect measure (I2) indicated knowledge base for environmental organizations. On average, all households were found to have lower level of information on this measure in comparison with that of environmental events (I1). Environmental events related information

reached households more effectively (0.81 out of 1) than information about environmental organizations (0.48 out of 1). This was true for the sample areas; it was also true for GAP - .95 versus .77. One possible explanation for this may be that some environmental organizations do not have extensive potential memberships, being very localized working for locally defined purposes.

Comparing the five areas on I2, "information about organizations", both the Riverside (0.55) and Downtown (0.52) areas were found relatively better informed than others. The most poorly informed was Pottersburg area (0.42). Although even GAP households were less knowledgeable about environmental organizations than environmental events (0.77 vs 0.95), GAP's level of information was as high as 0.77. Of course, GAP households scores for this measure were inflated by design of the study (being one of the organizations selected for the list in the questionnaire), which gave them an advantage over the other sample households.

The third and fourth aspects measured the total source (I3) and amount (I4) of information. Each of them was subdivided into the private(A) and public(B) types. Generally speaking, all households had access to more public sources of information and accordingly gained greater amounts from those sources. In fact, public sources, consisting primarily of mass media, were almost double the private sources (0.85 vs 0.44 out of 1). As for the amount out of a possible 3, the average from the private source was 0.74 but increased more than two times for the public (1.77). This may be attributed to the impact of mass media. It could be interpreted as a result of information bombardment.

There was a striking connection between level and amount of total information and the private effort. Analysis of the six sets of numbers helped to come to this conclusion. The ranked orders were correlated between the private and the total information sources (see Table 4.7). The higher the ranking of the private effort, the higher the ranking of the total information sources. Even though public information source and amount surpassed those of the private, it was the uneven distribution of private effort that created the differences among households.

Sample Groups	Private Sources	Public Sources	Tot	Private Amounts	Public Amounts	Tot
Huron	4	3	4	5	6	6
Pottersburg	5	4	5	6	2	4
Downtown	6	6	6	4	5	5
Riverside	2	5	2	2	3	2
Stoneybrook	3	2	3	3	4	3
GAP	1	1	1	1	1	1

Table 4.7 Public and Private Sources of Information

Among the five areas, Riverside ranked first in having the most information sources and amount, and again the most active in obtaining information from private sources and from all sources. Downtown area had the least information sources, private and public, although the ranking of the amount of information for this area was not the lowest. It seemed the Downtown households relied more extensively on a much narrower range of sources. Pottersburg was at the bottom in terms of obtaining the amount of information through private effort, but ranked the second last in the private information sources. Judged by the rankings in the public amount and the total amount, Huron appeared to be the least environmentally informed. Since Huron was also relatively less active in making private effort, its overall score was clearly the lowest on this measure (I4=1.20). GAP had the leading scores for all of the six measures.

The information index (IDX) summarizes the four scores of information aspects. A comparative view of the five sample areas is shown in Figure 4.5, in addition to the list of the scores of all study groups in the last column of Table 4.6. The Downtown area was ranked in the middle (52.98), but the variation within this area was the largest (z=15.65). While the most uniform neighborhood was Huron (z=11.66), it achieved the second lowest index score of 51.50. The highest score of 57.46 (z=14.56) belonged to the Riverside area. The Pottersburg area (z=13.91) got the bottom position with a score of 50.65. The difference among the areas was 6.81.

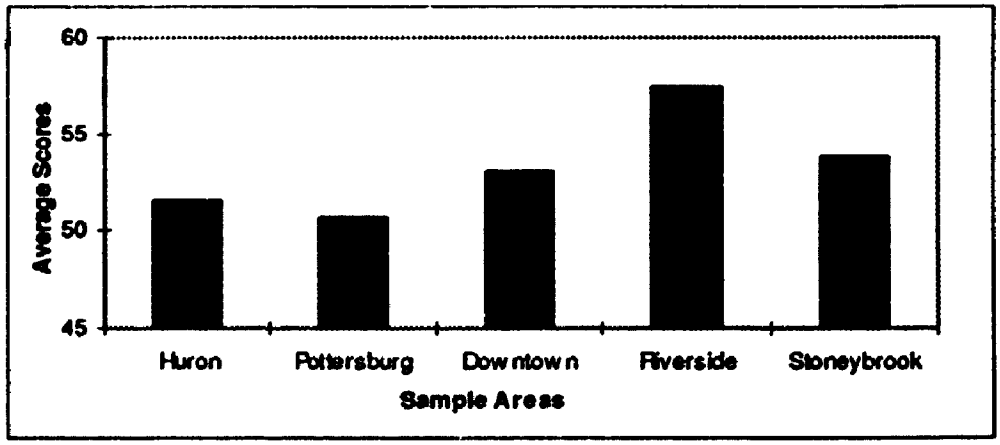

Figure 4.5 Information Dimension Index

Greater difference (18.16) was found between the GAP households (71.44) and those of the five areas (53.28). The measure of variation for this index showed that GAP households were more similar (z=10.36) than those among the five areas (z=13.90). According to this index, the sample households were about half as environmentally informed as they could have been.

4.4 Attitudinal Patterns

The patterns described in this section are the four scores of attitudinal aspects and one index score for the dimension, shown in Table 4.8.

GROUP	A1	A2	A3	A4	ADX
Huron	.92	1.20	1.59	1.31	**62.73**
Pottersburg	.88	1.13	1.61	1.24	**60.54**
Downtown	.89	1.22	1.61	1.28	**62.46**
Riverside	.95	1.20	1.69	1.31	**64.38**
Stoneybrook	.93	1.11	1.71	1.28	**62.98**
5 Areas Mean	.91	1.17	1.64	1.28	**62.62**
GAP	1.00	1.49	1.88	1.68	**75.67**

A1: General views on the human-environment relationship
A2: Concern for salient environmental problems
A3: Confidence in selected agents for the environment
A4: Acceptance of initiatives for the environment
ADX: Environmental attitude index

Table 4.8 Summary Scores of Attitude Dimension

The strong positive attitude was especially observed in the responses to general statements of human-environment relationships (A1). Among the five areas, the households ranged from 88 percent to 95 percent, with the mean of 91 percent, in support of the statements. GAP households unanimously agreed to all statements (100%). People seemed to have less trouble accepting broad general concepts, than more concrete ideas. The more specific the attitudinal measure got, the weaker the uniformity, as will be demonstrated later.

As for concern for the salient environmental problems (A2), the vast majority of the respondents (90%) indicated either "Concerned" or "Very Concerned" about the range of problems. People were most concerned about the ozone depletion problem, nearly 62 percent indicating "Very Concerned". Next on the "Very Concerned" list was toxic substances, about 53 percent. Interestingly, shoreline erosion was the problem of least concern. The differences among the areas were small as in the first attitude measure (average was 1.49 with a maximum possible of 2). However, the ranking order of the areas were, from the highest to the lowest, Downtown, Riverside, Huron, Pottersburg, and

Stoneybrook. Again, GAP households had higher level of concern (1.49) than the other groups (1.17).

When it comes to placement of trust (A3), people did not seem to place great confidence in any particular group or segment in the society to solve environmental problems. The average score for this measure was 1.64, where 3 was the highest possible. However, environmental groups scored the highest in the public's trust, followed by scientists and technologists, individuals/households, educators, business/industry, legislators/politicians, and lawyers. A closer examination of the responses revealed people appeared to have more confidence in groups they believed they were part of. In other words, people seemed to trust themselves more than others. One of the bases upon which such correlation may be accepted is the fact that 71 percent of GAP members indicated a "great" confidence in environmental groups. In contrast, other households only gave half of that amount (mean=36%) to environmental groups.

Further support was found in indications of "great" confidence by the Huron and Pottersburg neighborhoods in science and technology (44% vs. 29% by others); Downtown had confidence in business (24% vs. 15%), while Stoneybrook's confidence was toward educators (25% vs. 8%). These neighborhoods contained families whose primary occupations were, respectively: skilled work, business/commerce, and professionals.

Greater variance was shown in attitudes toward giving support to a range of initiatives (A4). Respondents were asked to indicate what they "would" or "would Never at all" support, and whether it should be done "Right away" or "In the future". Nailing down exactly what and when to do something for the well-being of the environment seemed to be

more difficult as mentioned earlier. For example, answers to the question "accept more environmental taxes/fees" indicated 34.8 percent rejection ("never at all"), 34.1 percent support ("in the future"), and 26.8 percent acceptance ("right away"). Some people simply did not know what to say. These sets of questions in general had higher non-response rates than other questions.

Interestingly enough, when the aggregated numbers were calculated and compared, the Riverside area which usually ranked in the top position among the five areas, had the same score as the Huron area while the Stoneybrook and the Downtown areas were also the same (1.31 and 1.28 for each pair respectively, with a maximum possible of 2). Perhaps, the sample households were so diversified when confronted with concrete economic and financial options, there was no real general difference, at least measured against putting environmental protection as a top priority. Despite this, the Pottersburg area remained at the bottom of the rank list. The same pattern between the five areas and GAP persisted. GAP members indicated more willingness to support environmental initiatives with greater readiness for action (1.68) than the sample areas (1.28).

The attitude index yielded higher average scores across the board for all study groups compared with the information index. But the general pattern of the groups did not alter.

Among the five areas (see Figure 4.6 and Table 4.8), Riverside neighborhood emerged again as a winner with a mean of 64.38 and a standard deviation of 9.91. Pottersburg neighborhood had the lowest mean (60.54), but the Downtown area was the most varied group (z=15.27).

GAP showed not only more positive attitude (75.67) than the five areas (60.62) but also greater unity within the

group (z=9.32) than the areas (z=12.89). Far from being perfect with still much room for improvement, this dimensional index indicated people had strong positive environmental attitude. This may be viewed as a measure of success of the contemporary environmental movement. The general public seems to have a clear commitment to the importance of the environment.

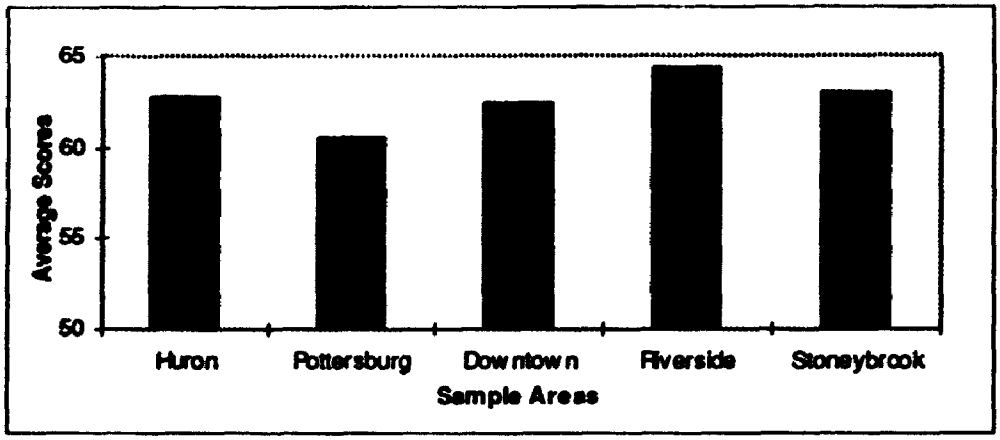

Figure 4.6 Attitude Dimension Index

4.5 Behavioral Patterns

This section presents the behavioral patterns of the sample households. Four behavioral aspects were measured producing six sets of scores and one dimensional index score. A summary of the scores is provided in Table 4.9, and the description begins with the numbers in the third column, the most interesting aspect.

Most interesting among the four aspects, perhaps among all aspects in the data set, was the behavioral dimension of "green" product choice (B2). None of the study groups purchased all environmentally friendly products. In fact, the overall mean for this dimension was -.04, out of a possible perfect score of 1. This means all households mainly shopped for products considered to be not preferable from the environment point of view. But GAP households

remained outstanding in their commitment. Their mean score on this measure was .37. Riverside turned out to be the lowest group with -.09. Even the best group among the five areas, Huron, only achieved -.01.

GROUP	B1	B2	B3	B4LD	B4MD	B4	BDX
Huron	.48	-.01	.65	.31	.14	.17	**22.34**
Pottersburg	.44	-.06	.65	.29	.23	.06	**19.11**
Downtown	.55	-.02	.65	.38	.20	.18	**23.64**
Riverside	.60	-.09	.73	.35	.17	.18	**24.68**
Stoneybrook	.46	-.04	.65	.32	.19	.13	**20.67**
5 Areas Mean	.51	-.04	.67	.33	.19	.14	**22.09**
GAP	1.10	.37	.80	.48	.18	.31	**44.85**

B1: Membership in environmental groups
B2: Green product purchase
B3: Adoption of environmentally friendly practices
B4LD: Participation in environmentally friendly recreation
B4MD: Participation in environmentally unfriendly recreation
B4: Recreation summary score = B4LD minus B4MD
BDX: Environmental behavior index

Table 4.9 Summary Scores of Behavior Dimension

Most interesting among the four aspects, perhaps among all aspects in the data set, was the behavioral dimension of "green" product choice (B2). None of the study groups purchased all environmentally friendly products. In fact, the overall mean for this dimension was -.04, out of a possible perfect score of 1. This means all households mainly shopped for products considered to be not preferable from the environment point of view. But GAP households remained outstanding in their commitment. Their mean score on this measure was .37. Riverside turned out to be the lowest group with -.09. Even the best group among the five areas, Huron, only achieved -.01.

The third behavioral measure (B3) assessed whether or not the households were engaged in environmental practices. The eight selected environmental practices were categorized into two broad types. One was related to activities away from home, such as using public transportation or ride-sharing. The other was more inside the home. The latter type

had much higher participation than the former. Except for composting which had only a 48.7 percent participation rate, all other activities in the latter type involved 91 percent of the households. Especially the Blue Box program appeared to be a real success engaging 96.4 percent of the households. However, only 20 percent of the households were engaged in the former type.

Generally speaking, environmental activities were most practised when they required little effort and cost and when means of participation were readily provided. People were less receptive to ride sharing and use of public transit. This finding gives empirical evidence to existing knowledge that environmental practice is more difficult when people are confronted with obstacles that reduce personal independence. There is reasonable doubt that people would reduce using private vehicles in favor of other means of transportation, even if the current urban plan for public transportation were altered to encourage its use.

Measured against an index score of 1, meaning fully involved, and 0, meaning not involved at all, the overall average was 0.67, , indicating the sample households were mostly engaged in practices helpful to the environment. Among the five areas, Riverside neighborhood had the best score (0.73) while the other four were identical (0.65). GAP was still a good model obtaining the best score of 0.80, but there was a bigger difference (8) between Riverside and the rest of the areas than that (7) between GAP and Riverside. A closer examination of the responses revealed that GAP's total involvement in "reusing, saving (bottles, packages, etc.)" and "newspaper recycling" separated them from other sample households while Riverside stood apart from the other four areas because of the 100 percent involvement in "the blue box program" and "turning off unused lights".

Recreational activity preference (B4) was considered a good indicator to measure households environmental behavior positions. The ten activity items were grouped into more or less environmentally destructive categories. Separate scores were calculated for each. A composite score was derived by taking the value of the environmentally more destructive category from the less destructive. It was discovered that household members engaged in a range of activities rather than predominantly in one type. Neither type could claim more than 50 percent of household members. Although people took part mainly in the less destructive type (33 %), such as reading for pleasure and gardening, than the more destructive type (19%), such as motorcycling and snowmobiling/ATV, the combined score was unexpectedly low (14%). To assist comparison, the six groups were ranked and their ranking positions are shown in Table 4.10. Surprisingly, GAP failed to maintain the usual constant leading position as an ideal group when ranked by the separate types. Despite that, the combined mean score (31%) for GAP was still higher than all other areas (14%).

Sample Groups	Combined Rank	Less Destructive Rank	More Destructive Rank
Huron	4	5	1
Pottersburg	6	6	6
Downtown	3	2	5
Riverside	2	3	2
Stoneybrook	5	4	4
GAP	1	1	3

Table 4.10 Recreational Activity Preferences

Scores for the behavioral aspect of association with or membership of environmental organizations (B1) indicated the sample households had low involvement with environmental organizations (.51 out of a maximum possible score of 2). Other than GAP, an environmental group especially chosen by

this study to compare the sample areas, Greenpeace was the only group that had more than ten percent of the households as its organizational members. The membership for the other groups ranged from four percent to less than one percent. This is not surprising because Greenpeace has been known as a very active international organization attracting attention and support at local and regional levels. However, difference was observed among the five areas. The most organizationally connected was Riverside households (.60). Ranking the scores in decreasing order, Riverside was followed by Downtown (.55), Huron (.48), Stoneybrook (.46), and Pottersburg (.44). GAP's score should not be meaningfully compared here due to the design of the study.

The distribution of the behavioral index scores for the five areas is displayed in Figure 4.7. Somewhat different from the information index and the attitudinal index, the behavioral index had a smaller variance. Both within the five areas and for GAP, households were more similar than different, the z values for both being 12.

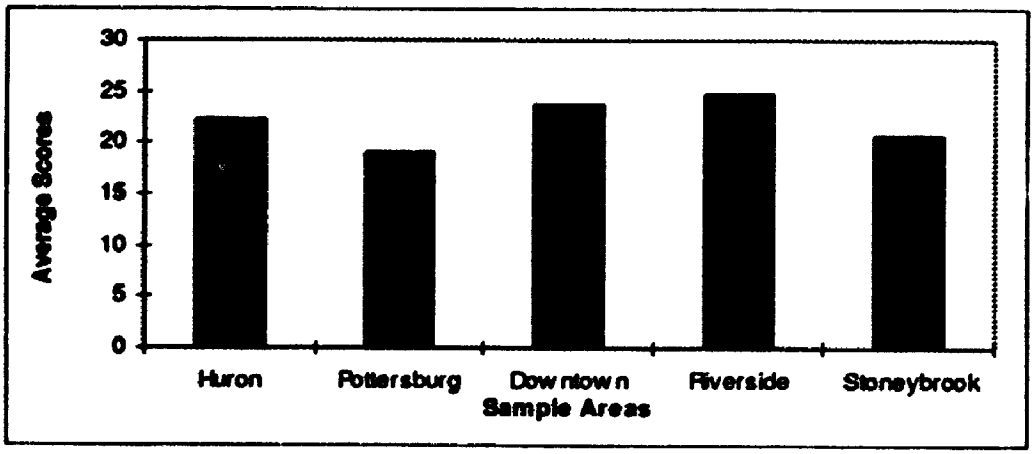

Figure 4.7 Behavioral Dimension Index

The five areas as a whole scored only half as much (22.09) as the GAP households(44.85), shown in Table 4.9. Within the five areas, Riverside was the most (24.68)

environmentally active neighborhood, yet achieved just 5.57 scores more than the least (19.11) active group, Pottersburg. The difference between GAP and Pottersburg was about 26, a larger difference than those of the information and attitude indexes (20.79 and 15.23 respectively). A comparison of the three dimensional scores revealed that behavior was the weakest of the three components of environmental orientation. This is not a surprise, insofar as action is always the most difficult to bring about. Action likely involves change in some type of behavior, and it is easiest to avoid actually taking any new action or altering of habitual behaviors.

4.6 Temporal and Spatial Scale Patterns

This section presents the patterns for both the temporal and the spatial dimensions. For the temporal dimension, three sets of index scores are described: 1) one information-derived temporal index, 2) one attitude-derived temporal index, and 3) an overall dimensional temporal index. In each set, three temporal scales are identified as far, medium, and near distance. Presented for the spatial dimension are five sets of spatial aspects scores and one composite dimensional index. The five aspects include: 1) concern for salient environmental problems, 2) opinion of environmental events, 3) association with environmental organizations, 4) knowledge about environmental events, and 5) knowledge about environmental organizations. The three scales in each of the six spatial data sets are global, regional, and local.

Table 4.11 summarizes the scores of the impact of the far, medium, and near time distance on level of environmental information and attitude, as well as on an overall index.

GROUP	TIF	TIM	TIN	TAF	TAM	TAN	TDF	TDM	TDN
Huron	72.41	74.14	90.52	58.05	59.20	81.03	65.23	66.67	85.78
Pottersburg	75.00	67.31	82.69	59.29	53.42	71.79	67.15	60.36	77.24
Downtown	79.82	77.19	88.60	66.08	64.13	76.90	72.95	70.66	82.75
Riverside	85.00	89.33	97.00	71.00	73.11	84.67	78.00	81.22	90.83
Stoneybrook	74.07	83.33	91.67	62.65	68.11	80.86	68.36	75.72	86.27
5 Areas Mean	77.26	78.26	90.10	63.42	63.59	79.05	70.34	70.93	84.57
GAP	91.94	94.62	98.39	81.18	81.00	89.25	86.56	87.81	93.82

TIF: Information at far temporal distance
TIM: Information at medium temporal distance
TIN: Information at near temporal distance
TAF: Attitude at far temporal distance
TAM: Attitude at medium temporal distance
TAN: Attitude at near temporal distance
TDF: Dimensional score for far temporal distance
TDM: Dimensional score for medium temporal distance
TDN: Dimensional score for near temporal distance

Table 4.11 Summary Scores of the Temporal Dimension

It is not difficult to see from the numbers in the table that the general tendency revealed was that events happened in the near past were remembered the most and believed to be most severe. As the time distance increased into the past, less was known and thought of the events. The dimensional index reflected the same temporal effect. For example, the sample households' average scores for information of the far past, medium past, and near past were 77.26 percent, 78.26 percent, and 90.10 percent respectively. The same effect on attitude was observed (63.42, 63.59, and 79.05 respectively), although less powerful than on information as measured against the same one hundred percentage points. For the temporal dimension index, the values were 70.34, 70.93, and 84.57 for the three distances.

More disagreement was observed along the same temporal scale. Standard deviation values for the near time, medium time, and distant time were 22.20, 24.46, and 30.92 respectively. Among the five areas, Riverside had the highest ranking on all three temporal scales in each of the three sets of measures as the best informed and least tolerant group of the environmental instances.

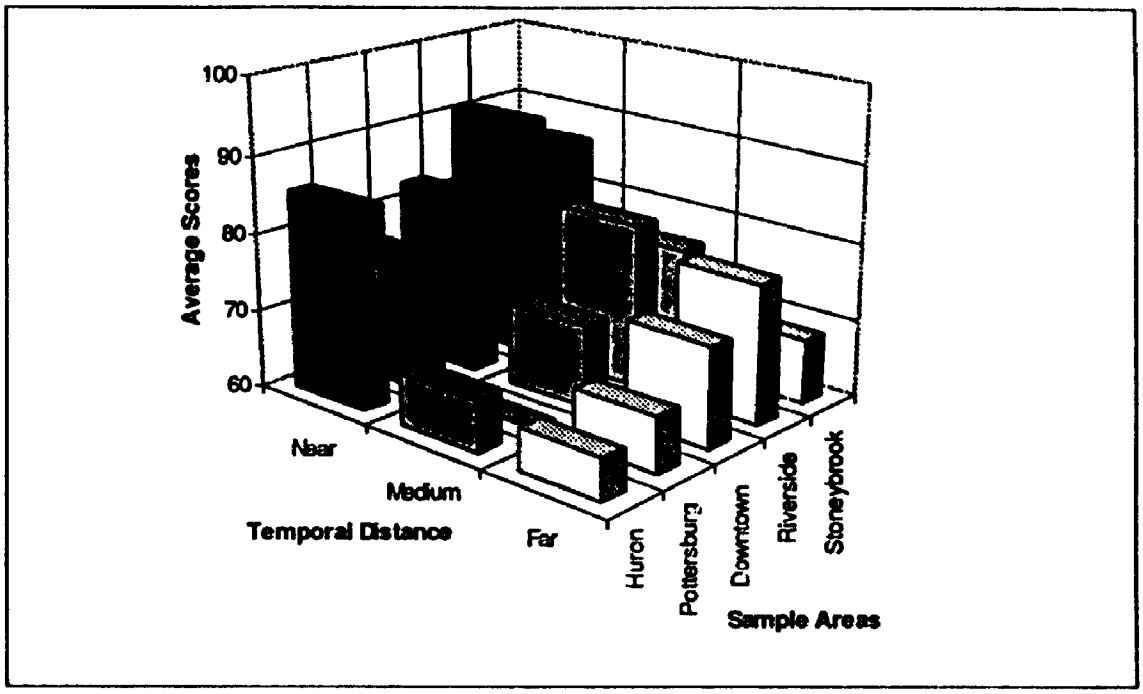

Figure 4.8 Temporal Dimension Index

More clearly depicted in Figure 4.8, some individual areas (Pottersburg and Downtown) did not support the general pattern as their scores on the medium time fell to the lowest among the three temporal categories. But the general pattern was supported by the overwhelming majority of the households.

GAP data reinforced the general pattern, scoring ahead of even the Riverside area on all temporal measures. Notice that the difference between the near and medium was much larger than the medium and the far distance. This scale, like any others resulting from mostly ordinal data, can serve as only a rough guide.

The presentation of the spatial patterns for the five aspects and one overall dimension focuses on the impact of the global, regional, and local scales on environmental information, attitude, and behavior. Because of the observed inconsistencies of how the three scales influenced different aspects among the sample areas, the summary scores for each

of the aspects will be visually displayed for quick identification.

In addition to the graph showing dimensional scores, five graphs showing the spatial aspects are provided to assist the discussions.

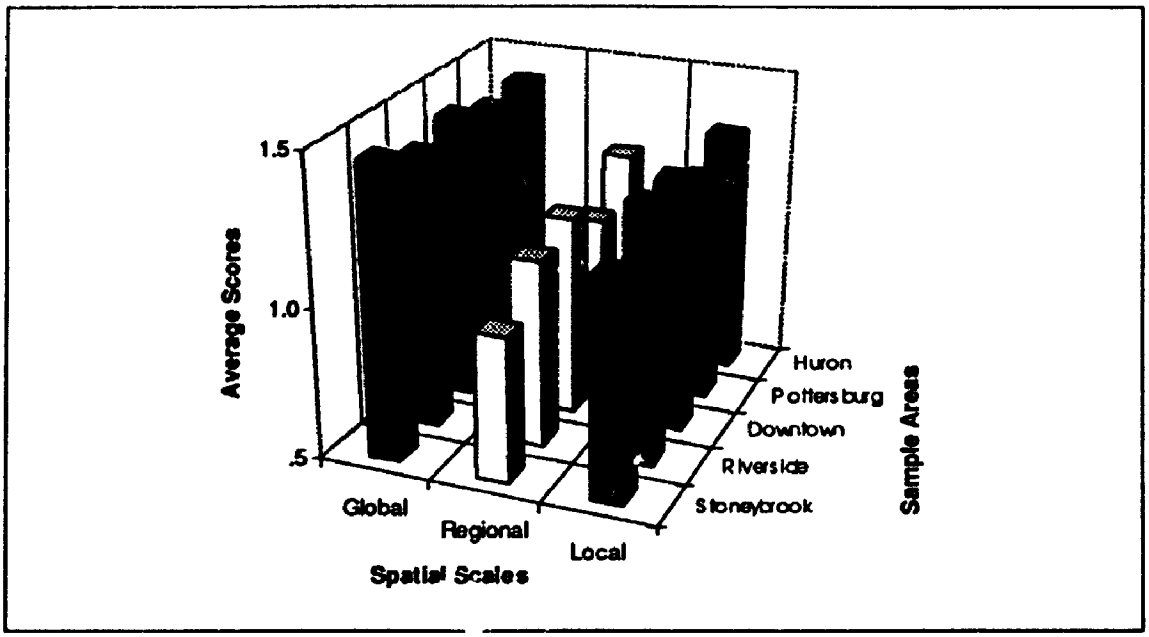

Figure 4.9 Spatial Scale Concern: Problems

The first spatial measure (Figure 4.9) was about concern for salient environmental problems. All sample households indicated most concern for problems of global scale (1.42). The next most concerned problems were of local scale (1.29). Regional scale (1.10) did not capture as much attention as the other two (a perfect score being 2). This pattern also applied to each of the five areas, as well as GAP (global=1.76; regional=1.40; local=1.61). This may suggest that problems of regional scale are neither directly experienced as are the local problems nor well communicated to the public compared with those of the global and local scales to affect people's attitudes.

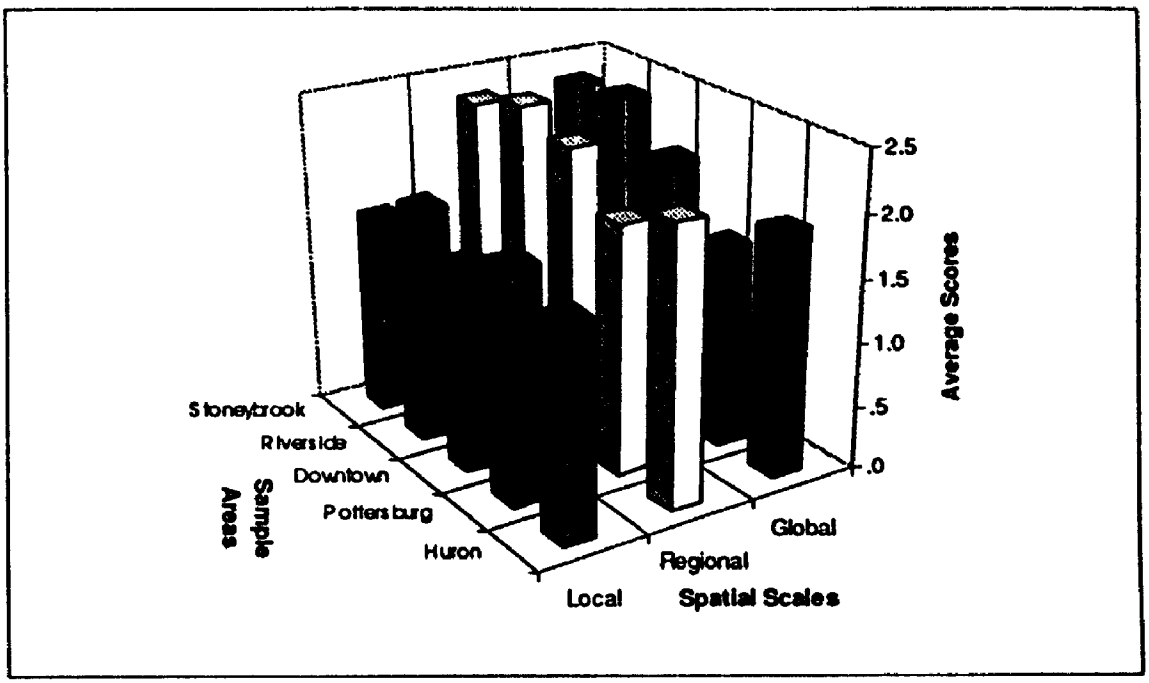

Figure 4.10 Spatial Scale of Attitudes: Events

The second spatial measure (Figure 4.10) assessed the opinion of the households of the list of environmental events grouped into three sets according to the geographical distance of place of occurrence. On average, regional disasters were thought of as most serious (2.26), next the global (2.06), and lastly local (1.69). Perhaps this was more of a reflection of the grouping of the specific environmental disasters chosen for this measure. The three indicators for the regional scale, "Exxon Valdez", "Love Canal", and "Hagersville tire fire", received middie ratings individually (2.36, 2.08, and 2.45 respectively out of a maximum of 3). Chernobyl disaster was thought to be the most serious one (2.71). However, because the other indicator, Bhopal, for the global scale was scored very low at 1.52, the combined global scale average was pulled down. The regional scale got the top ranking due to the formula according to which the numbers were calculated. This was viewed as an example of challenge for developing composite indicators.

This regional-global-local pattern did not hold for all sample groups. Pottersburg area placed most seriousness on the regional scale (1.96), followed by the local (1.82), and the global (1.59). GAP gave another different rating as the global, regional, and local in descending order (2.68, 2.63, and 2.13 respectively). Among the five sample areas, Riverside ranked the first in attaching negative feelings to all events with the highest average scores for all three scales. GAP households perceived all the events as being more serious than those in the sample areas. There was a big difference (0.8) between the highest (Riverside=2.40) and the lowest (Pottersburg=1.59) scores for the global scale.

It is interesting that the Pottersburg neighborhood gave the second highest score for local scale events. The spatial continuum significance test on this variable and the questionnaire item "Pottersburg Creek" failed. This middle ranking of local scale, however, weakly indicated that the effect of distance decay cannot be completely disregarded.

The third spatial measure, households' association with environmental organizations, showed the organizations with global scope came on top in making themselves known and attracting members in comparison with the other two scales (see Figure 4.11). This pattern was observed either including GAP (global=1.44; regional=1.13; local=0.53) or excluding GAP (sample areas average, .77; .59; .20, respectively) in the analysis. Logically, GAP members scored way ahead of other areas on this measure, because it was the selected control group for the study and GAP was one of the seven environmental organizations on the list.

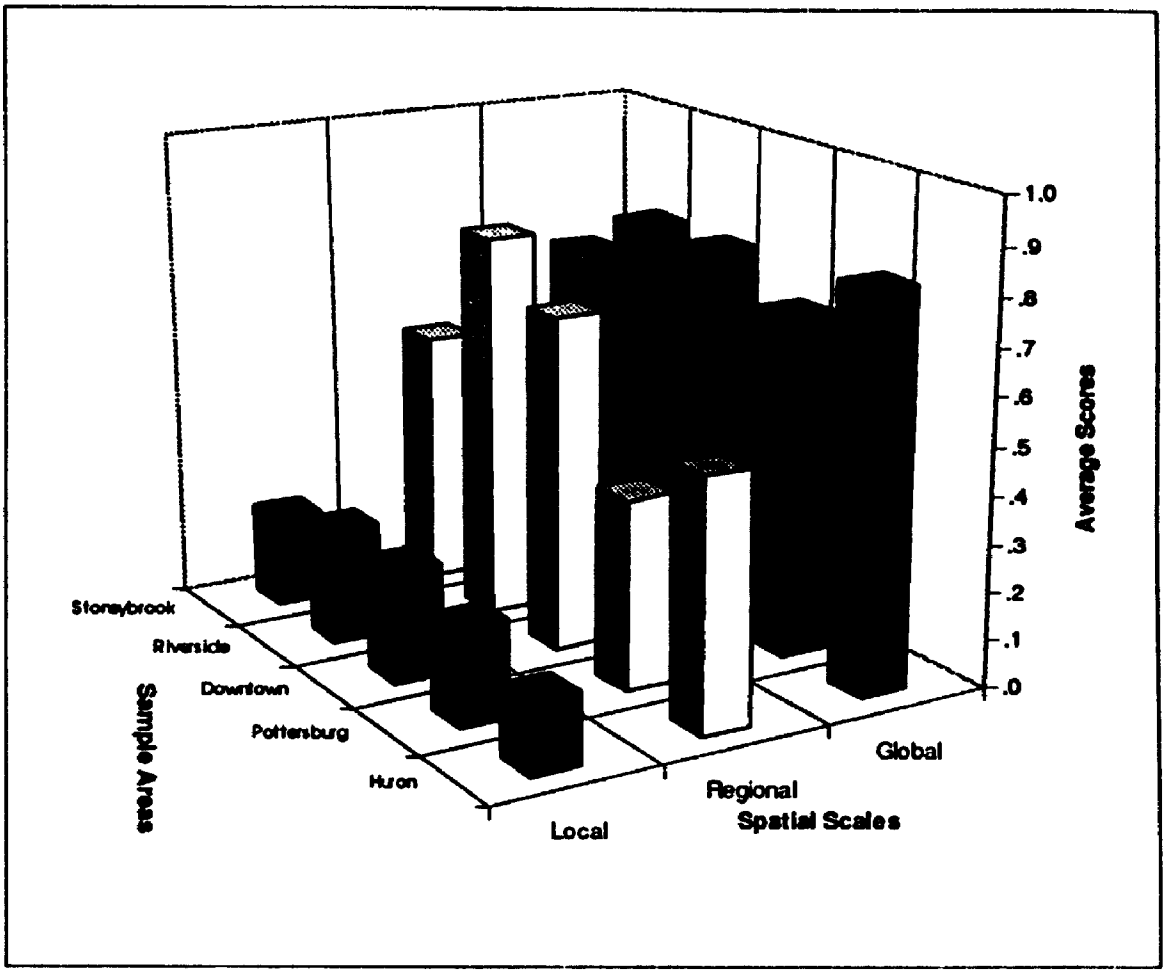

Figure 4.11 Spatial Scale of Association: Groups

Perhaps it can be speculated that the local and regional organizations did not put out much effort in gaining publicity and membership. Similar to the previous spatial measure, this third measure also revealed large internal variance among the five areas. The biggest variance (.42) was found in the regional scale between the highest and the lowest scores (Riverside=.81 and Pottersburg=.39). Unlike the previous one, this measure showed no consistent rankings of the areas for the three spatial scales.

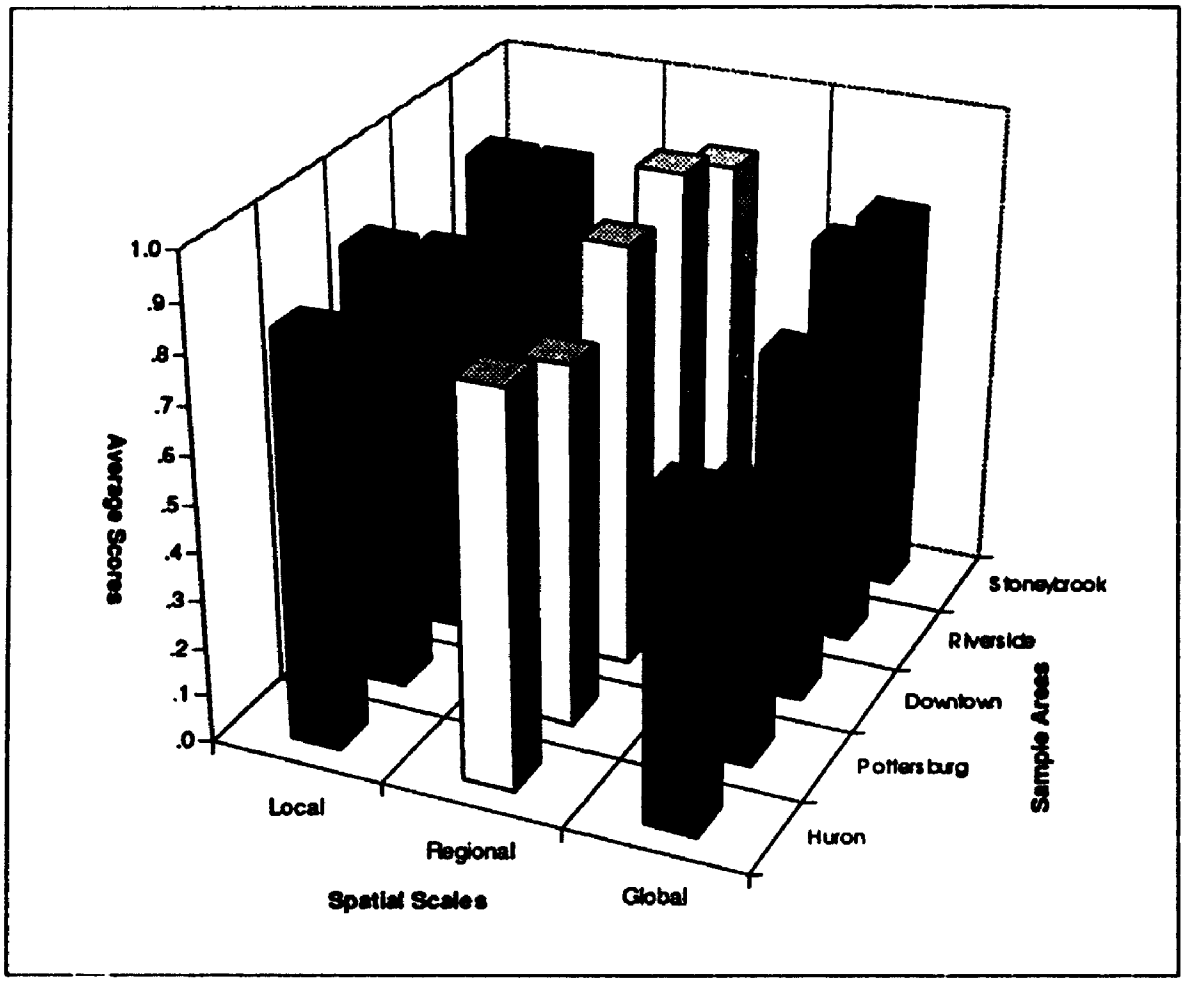

Figure 4.12 Spatial Scale Information: Events

The fourth and fifth were spatial information measures of environmental events (Figure 4.12) and environmental organizations (Figure 4.13). In terms of the overall patterns, they provided pictures opposite of each other. The former revealed a progressive scale of local-regional-global (0.86, 0.85, 0.74) and the latter displayed a scale of global-regional-local (0.73, 0.58, 0.20).

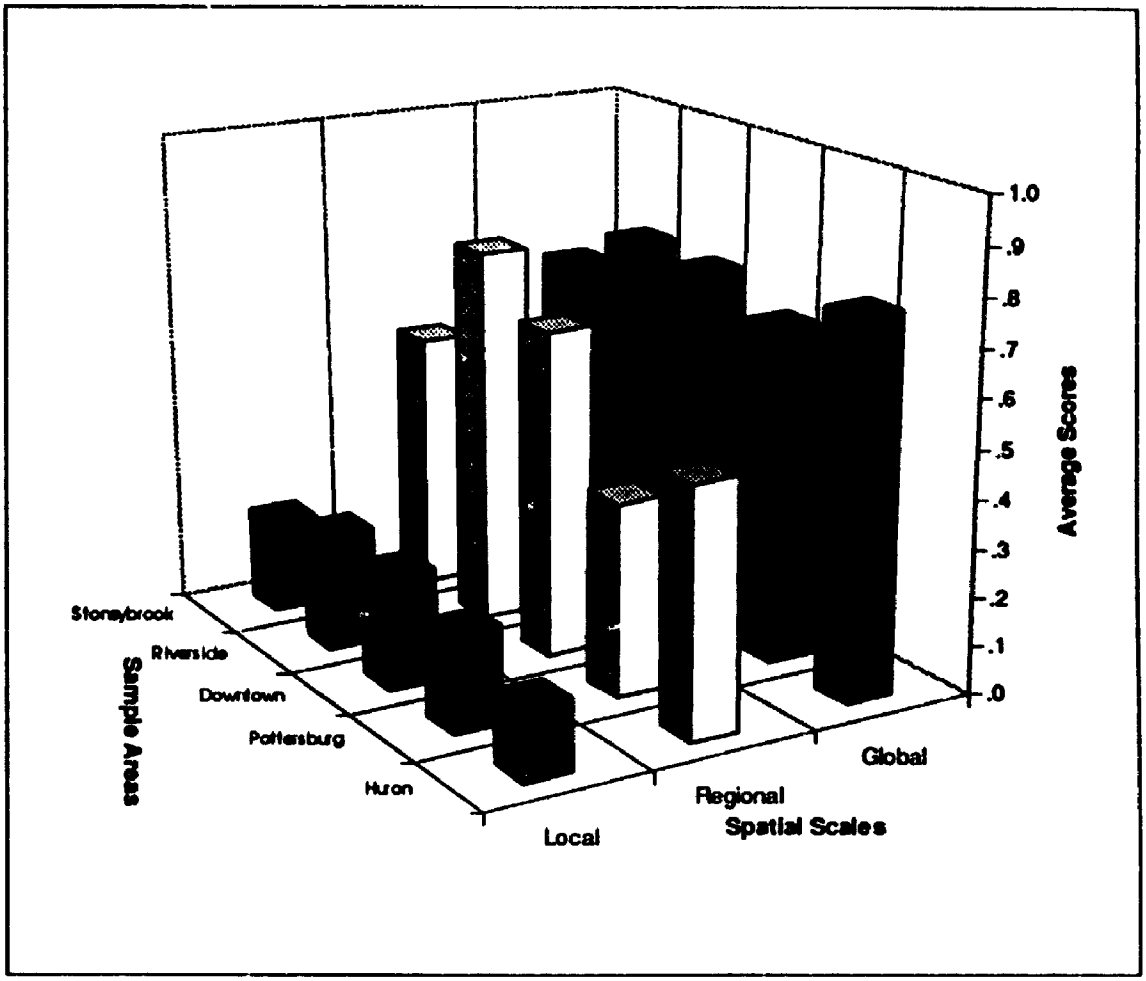

Figure 4.13 Spatial Scale Information: Groups

For the five areas, great differences were found in information about global and regional events and information about regional organizations. Among the five areas, Riverside neighborhood had most information about all three scales of environmental events, but only maintained the leading position for information about regional and local environmental organizations. There were no other meaningful patterns for the other areas in either rankings. Comparing the two spatial information measures, it was found that people had much more information about environmental events (81.67) than environmental organizations (53.67). Again the measure of information about environmental organizations revealed the same spatial pattern as did the measure about

environmental organizational involvement. In both measures, GAP households obtained the highest scores for each of the three scales.

The spatial dimension was derived from the combination of the five aspects scores. The index scores, displayed in Figure 4.14, revealed that the global scale was given higher values by most of the sample households than the regional and the local, except for those in the Downtown area that indicated a slight shift, the regional a little higher than the global.

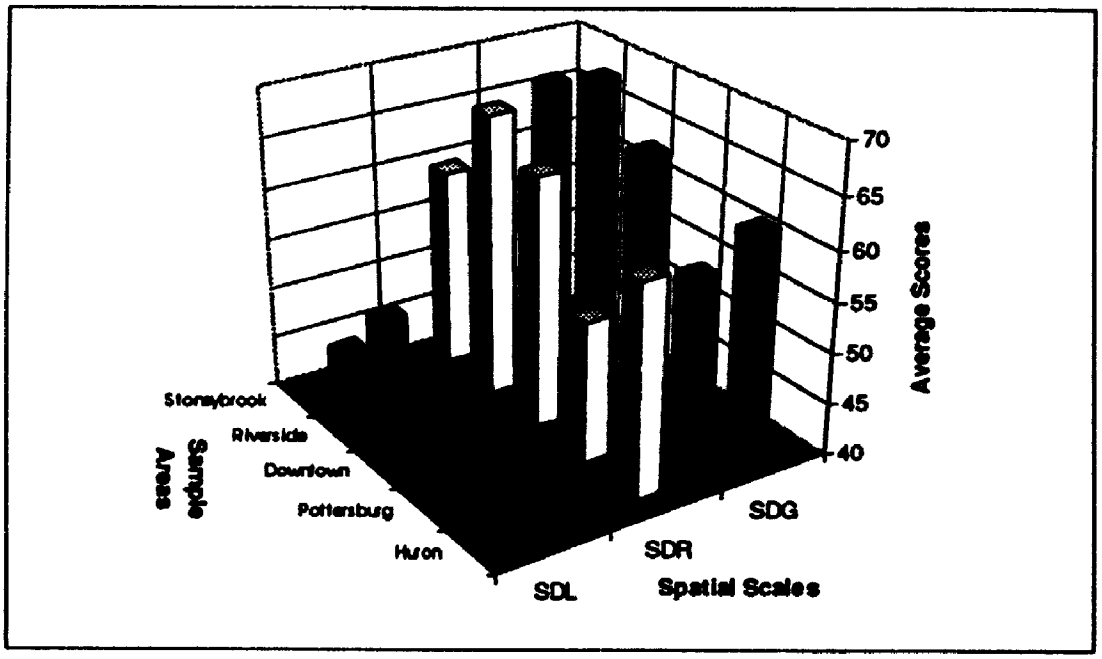

Figure 4.14 Spatial Dimension Index

For the spatial index, Riverside had the highest scores among the five areas for all three scales (68.89; 67.89; 50.82). The other four areas could not be ranked in this manner because no particular pattern could be meaningfully ascertained with the switching of positions of the areas on the scales. Responses of the GAP group supported the pattern of such global-regional-local scale, giving higher scores for all the scales than any other groups in the study

(global=86.50; regional=78.91; local=63.62). However, it helps to be reminded that this general pattern was not consistently found in all the five spatial aspect measures, as the preceding descriptions have demonstrated.

4.7 Motivational Patterns

Three sets of questions yielded five motivational measures. The first set of questions aimed at uncovering basic broad focus in life, giving the (1) exological and (2) endological focus scores. The second set of questions targeted concrete hypothetical living features, giving (3) natural or (4) artificial as values were placed on less or more environmentally demanding features. The third set of questions gave a measure of the level of (5) organizational and social involvement.

The first four measures were put together to compute the single motivational index. Exological focus scores and natural feature scores were combined and considered to be positive values. Endological focus scores and artificial feature scores were combined and treated as negative values. Since this index measured value judgement of the households, it was identified by a more accurate term, value index (VDX).

Household member involvement in social organizations did not turn out to be as useful a measure as expected. As noted earlier, most households did not have membership in such organizations. The ranking is displayed below, as column "Org" of Table 4.12, without further comment.

GROUP	Exol	Endol	Natur	Artif	VDX	Org
Huron	2.90	.92	1.27	1.26	36.76	.08
Pottersburg	2.86	.85	1.11	1.28	31.99	.09
Downtown	2.95	.92	1.19	1.38	35.11	.09
Riverside	3.04	.95	1.21	1.22	34.57	.13
Stoneybrook	3.03	.86	1.29	1.10	39.32	.13
5 Areas Mean	2.96	.90	1.21	1.25	35.55	.10
GAP	3.54	1.01	1.34	1.37	41.68	.16

Exol: Views with exological orientation
Endol: Views with endological orientation
Natur: Preference for natural residential features
Artif: Preference for artificial residential features
VDX: Environmental value index
Org: General organizational involvements

Table 4.12 Summary Scores of Motivation Dimension

The vast majority of households showed more exological than endological focus as measured against the perfect score of 4. The average exological and endological scores were 2.96 and 0.90 for the five areas, and 3.54 and 1.01 for GAP. Among the five areas, the ranking in the order of more exological to less exological was as the following: Riverside, Stoneybrook, Downtown, Huron, and Pottersburg. GAP households were more uniformly exologically focused than the sampled areas as measured by the Z-scores (0.45 and 0.71 respectively).

Interestingly enough, the scores for the endological did not just show the reverse of the exological as one commonly might believe. Some households in all the study groups apparently valued both kinds of world views, not thinking of them as being different. Therefore, GAP households scored the highest for this dimension, not quite in their favor judged by the research. For the same reason perhaps, Riverside neighborhood got the highest mark among the five areas. Huron and Stoneybrook switched places on the ranking order

The value differences toward the natural and artificial features did not seem to be very large, mean scores for the sample households being 1.21 and 1.25 respectively out of a maximum possible of 2. Within the five areas, Stoneybrook area placed highest value on natural features(1.29). Next were Huron(1.27), Riverside(1.21), Downtown(1.19), and Pottersburg(1.11). On the whole, all households appeared to value the two kinds of features equally, including GAP households (1.34 vs 1.37). But GAP valued both features more than the households in the sampled areas did.

In evaluating artificial features, GAP households did not stand out apart from the five areas as in most cases. Instead, more differences existed among the five areas. The Downtown neighborhood indicated almost identical preference (1.38) to artificial features as the GAP group (1.37). Stoneybrook area preferred the artificial the least (1.10), the only neighborhood appearing to be logically consistent in choosing the two types of features. The rest exhibited not such clear value attachment to one or the other type as revealed by the ranking orders of the groups.

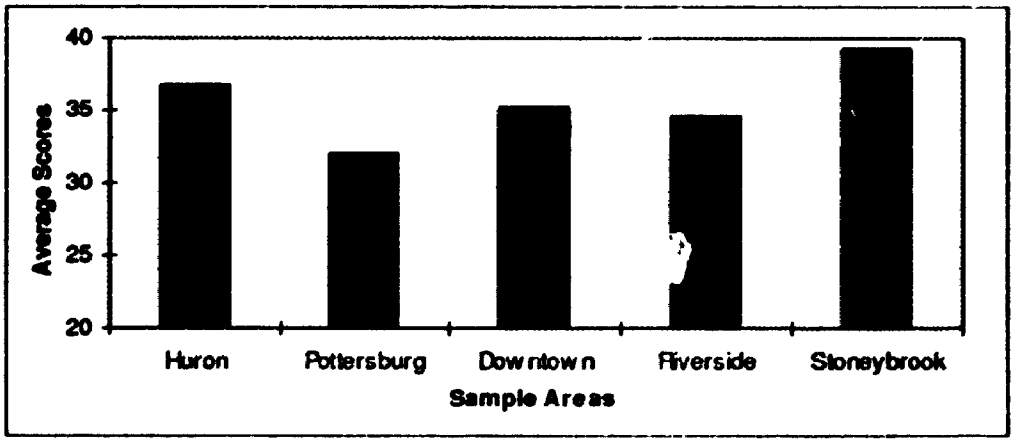

Figure 4.15 Value Dimension Index

Ranking the overall value index scores of the five areas (see Figure 4.15) resulted in the following order from

the highest to the lowest scores: Stoneybrook, Huron, Downtown, Riverside, and Pottersburg. Examination of z scores showed that Riverside and Stoneybrook areas were more uniform (17.58 and 17.98) than Downtown and Huron areas (19.09 and 19.24). Pottersburg area had the widest range of values (23.92). Even though there was no major difference between GAP and the five areas, GAP got the best score at 41.68.

The patterns revealed by the value dimension index clearly indicated that people in various degrees had different general or environmental values at the same time. It seemed also those values were not mutually exclusive and correlated in a certain way to the households as the study had expected. Perhaps as a result of this, the scores for all groups on this measure were low, ranging from as low as 32% to the highest at only 42%. This meant caution must be applied in using the value index.

4.8 Environmental Orientation Patterns

The single number that sums up households' environmental positions is the Environmental Orientation Index (EOI). Figure 4.16 displays the average scores of the five sample areas. For quick reference, the graph includes together the index scores for Information (IDX), Attitude (ADX), and Behavior (BDX); these are components of the households' overall Environmental Orientation (EOI).

The data showed that the five sample areas together had a mea[illegible] 46.00 (z=10.23). The variations in the composite EOI s[illegible]e were slight (note the scale of the graph masks the similarity). Out of a perfect score of 100, the Riverside area obtained the highest of 48.84; the lowest score was that of the Pottersburg area at 43.46. In between were the Downtown (46.40), Stoneybrook (45.83), and Huron (45.52)

areas. In terms of variation, the Riverside households were the most uniform group (z=8.52). The Downtown area had the greatest variation (z=11.69).

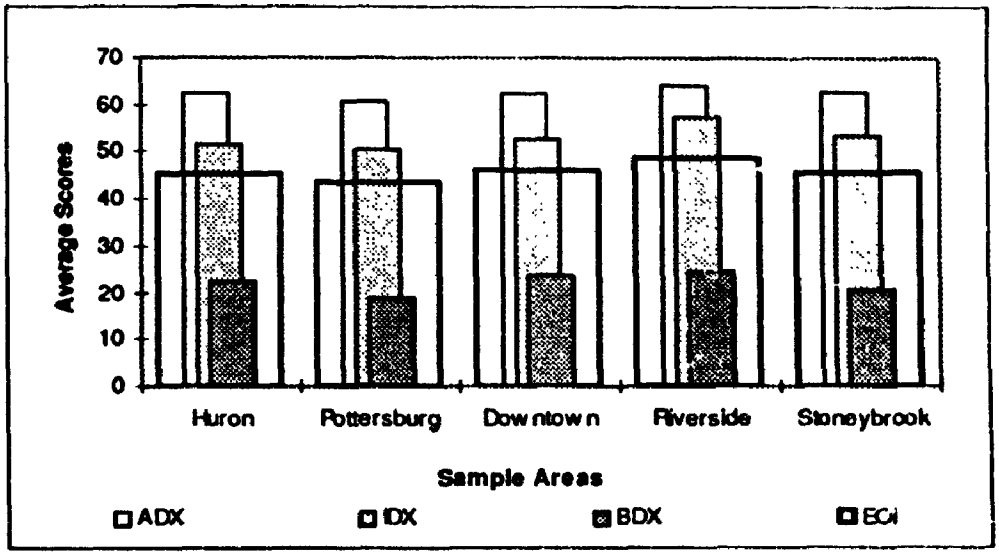

Figure 4.16 Composite Environmental Orientation Index Scores

GAP households had notably different scores, much higher, as shown in Figure 4.17.

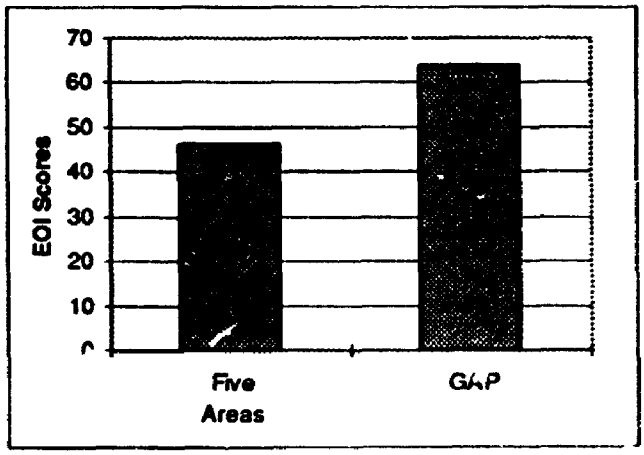

Figure 4.17 Comparison of 5 Areas and GAP for EOI

The EOI for GAP group was 63.98 (z=9.04). Such results were not surprising because the households of the GAP organization were expected to be environmentally more sound than the sample households.

When EOI scores were examined at individual household level, a more revealing picture was brought into view. Even though the overall EOI average (47.87) was far from being perfect, there was a huge difference between the least (-2.93) and the most (80.04) environmentally desirable positions. The difference almost doubled for the range of the sample households (lowest=-2.93; highest=69.44) compared with that of the GAP households (lowest=40.31; highest=80.04). This indicated perhaps that membership in environmental organizations was a variable deserving extra attention.

4.9 Summary

The above descriptive data analysis and findings revealed that the sample households in this study have a good command of knowledge of environmental issues and events. They had a fair knowledge of environmental organizations. The amount and breadth of information were also good.

There was no indication that sources of environmental information were lacking. However, environmental information was found to come from mainly public sources, that is, from the mass media. Where information was obtained from private efforts, the amount of information was higher.

There was broad concern for environmental problems and issues. The widely held view was that human activities affect the environment and that there was need for behavioral change to assure a healthy environment. Willingness to undertake initiatives and support a range of environmental actions was expressed. There was less agreement about the reliability of any one particular segment in society, except that most directly identified with.

When it came to behavior, joining environmental groups was more prevalent than such practices as buying environmentally friendly products. Which is not to say that environmentally friendly practices were not quite widely adopted. Participation in recreational activities was fairly low, with a very slight bias for environmentally friendly kinds, but no noteworthy differences across households.

The effect of temporal distance on information and attitude about environmentally significant events was, as might be expected, with less effect at increasing distance. The effect of spatial distance was paradoxical on first sight, with local events having the least effect in stimulating knowledge or attitude, and regional matters edging out global in few cases. But this may be due to a combination of objective seriousness and mass media focus.

Environmental values were stronger on the exological than the endological side. Choices of residential options were equally environmentally good in both natural and artificial features. Organizational involvement was low.

When the three environmental dimensions were compared, environmental concern was highest, with less in awareness, and environmental action mostly lacking, in all sample households.

The households in each of the five areas in London had distinctive socioeconomic and demographic characteristics. Environmental orientation scores ranged widely among individual households, but rankings of neighborhood seemed to follow some patterns - Riverside consistently ranked highest and Pottersburg lowest - with a relatively tight range in area scores. GAP households were a special group, with mixed demographics, but an outstanding EOI.

The findings suggest several interesting observations. Information is widely available and received in most households, though some patterns seem to indicate the pervasive effects of the character of mass-media communication. Attitudes are very favorable, which implies a certain receptiveness important for future efforts. Behavioral change is already observable, and warrants an expectation that further change is possible.

Differences in themselves are not surprising. The evident patterns are more so. But a more rigorous examination is necessary. The next chapter discusses the findings of statistical significance tests.

CHAPTER 5

Significance Tests and Results

This chapter presents the significant findings from testing the hypotheses. It is organized in five sections corresponding to the implied propositions hypothesized as discussed in Chapter 3.2. In the first section, the central concern is on how differences in household environmental orientation were spatially configured. Section two focuses on the impact of geographical and temporal distances upon households' environmental information, attitude, and behavior. In the third section, the correlations of the three components of environmental orientation are examined. Section four addresses the non-spatial classifications of households that were found to have statistically significant validity as general patterns. Finally, in section five, some explanatory factors of household grouping are presented.

5.1 Neighborhood Consistencies

The five distinctive sample areas in London were tested on all the environmental measures designed in this study. In this section, eighteen significant spatial patterns of household environmental orientation are presented.

Under the null hypotheses, it was assumed that there was no difference among the five areas on each of the variables tested. Any observed differences among them were merely chance variations. In other words, spatial distributional patterns of all aspects and dimensions of environmental orientation were expected to be identical, not reflecting the neighborhood geographical and demographic characteristics. The Kruskal-Wallis test statistic at 95% confidence level was used to determine acceptance or rejection of the null hypothesis.

	Descriptions	Five Areas	A1-A2	A1-A3	A1-A4	A1-A5	A2-A3	A2-A4	A2-A5	A3-A4	A3-A5	A4-A5
1	Spatial Dimension: Global Distance Index	.0021			.0205		.0091	.0005	.0044			
2	Spatial Dimension: Regional Distance Index	.0008	.0431		.0319		.0015	.0002				.0020
3	Temporal Dimension: Medium Distance Index	.0004			.0017	.0469	.0252	.0000	.0023			
4	Value attached to Artificial Features	.0010		.0461		.0133			.0141	.0081	.0001	
5	Value attached to Natural Features	.0492	.0446						.0071		.0302	
6	Information about Environmental Events	.0012			.0012			.0001	.0228	.0244		
7	Information about Environmental Organizations	.0044			.0082		.0288	.0015				.0037
8	Information about Events of Medium Temporal Distance	.0001			.0007	.0282	.0433	.0000	.0015	.0125		
9	Information about Events of Near Temporal Distance	.0247			.0465			.0013		.0399		
10	Information about Global Distance Events	.0000			.0033	.0144	.0153	.0000	.0002	.0340		
11	Information about Regional Distance Events	.0007			.0028		.0044	.0001	.0277			
12	Information about Regional Scope Organizations	.0000		.0175	.0002		.0004	.0000				.0014
13	Attitude toward Events of Medium Temporal Distance	.0004			.0014	.0375	.0253	.0001	.0022			
14	Attitude toward Global Distance Events	.0001			.0067	.0149	.0164	.0001	.0003			
15	Attitude toward Regional Distance Events	.0192					.0136	.0017	.0189			
16	Membership in Environmental Organizations	.0033			.0144		.0174	.0014				.0057
17	Membership in Regional Scope Organizations	.0000		.0141	.0001		.0002	.0000			.0359	.0006
18	Participation in Recreational Activities	.0093	.0046				.0040	.0016	.0323			

A1=Huron Area; A2=Pottersburg Area; A3=Downtown Area;
A4=Riverside Area; A5=Stoneybrook Area.

Table 5.1 Significant Measures Among Five Areas

Table 5.1 is a summary of the eighteen measures for which the corresponding null hypothesis was significantly not proven (probability of null hypothesis being true was less than 0.05). Of those, 5 had a probability between 0.01 and 0.001; 10 had less than 0.001, all very significant. The relationships thus shown to be significant are arranged thematically, in the table and in the following discussion, for ease of exposition.

Two of the eighteen measures (1,2)[1] are overall differences related to the global and regional spatial dimension respectively, and one (3) is a temporal dimension on medium distance. Two (4,5) are aspects of values related to natural and artificial residential features. The next seven significant differences have to do with information: two (6,7) as specified in terms of the basic subject matter division, and five in terms of temporal (8,9) and spatial (10,11,12) distances. Another three significant differences among the areas have to do with attitude, as specified in terms of temporal (13) and spatial (14,15) distances. The last three (16,17,18) have to do with differences in aspects of the behavior measure.

Notably absent from the table are any significant differences among or between the neighborhoods in overall environmental orientation or in the three major contributing indexes (information, attitude, and behavior).

In addition to the presentation of significant relationships among all five areas, the table also presents significance levels (p values produced by the Mann-Whitney U test) for all pairs of areas for each of the eighteen significant measures. For example, membership in regional scope organizations, the second last measure on the list,

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[1] Please refer to the row numbers to the left of the descriptions.

was revealed by the Kruskal-Wallis test to differ in extremely significant ways (p=.0000) among the five areas. When each of the ten possible pairs of areas was analyzed, the Mann-Whitney test statistic indicated six significant pairs, involving all five sample areas. No real statistical difference was discovered for the other four pairs, i.e., between Huron and Pottersburg, Huron and Stoneybrook, Pottersburg and Stoneybrook, and Downtown and Riverside. Another example may be the fifth measure, value attached to natural features. Sufficiently significant difference (p=.0492) was found among the five areas. Looking across the table shows the differences actually occurred among three pairs of areas: Huron and Pottersburg, p=.0446; Stoneybrook and Pottersburg, p=.0071; Stoneybrook and Downtown, p=.0302.

Following the order of rows in Table 5.1, the eighteen significant measures are presented below in detail. The statistics reported in each of the following tables are the values obtained, after correcting for ties in the ranking of the original scores. As an aid to reading and grasping the mean rankings quickly, a "Relative Rank" is provided giving "1" to the highest and "5" to the lowest mean rank.

The present exposition moves on in terms of composite indicators. As stated previously the composite indicators are derived by quantitative methods from the survey questions. In some cases, individual questions were very important in determining significant measures at the composite level. When such very influential questions have had this effect on a composite index, this fact is raised in the discussion.

The first of the eighteen significant measures is the global distance index for the spatial dimension. Based on the test statistics (last row in Table 5.2), the null

hypothesis could be rejected. The research had to conclude that the five sample areas responded in significantly different ways to environmental matters of global scale in general. Among the five areas, Riverside neighborhood was found to be the most responsive as indicated by its highest ranking shown in Table 5.2. Pottersburg neighborhood was the least responsive, accordingly ranked the lowest. In between were the neighborhoods of Stoneybrook, Downtown, and Huron in decreasing average ranks.

Sample Area	Relative Rank	Mean Rank	Number of Households
Riverside	1	159.89	50
Stoneybrook	2	150.74	54
Downtown	3	140.79	57
Huron	4	126.41	58
Pottersburg	5	103.16	52
		Total	271
χ^2=16.8050 df=4 p=0.0021			

Table 5.2 Spatial Dimension: Global Scale Distance

Four significant relationships were found out of the ten possible pairs of the five areas, as summarized in Table 5.1. Three involved Pottersburg neighborhood with one of the following neighborhoods: Downtown (p=.0091), Riverside (p=.0005), and Stoneybrook (p=.0044). In all the three cases, Pottersburg area was found to be ranked at a significantly lower level. The fourth pair was between Huron and Riverside (p=.0205), with Huron at the lower rank.

Responses to the regional distance on the spatial dimension were also significantly different as shown in Table 5.3. Similar to the findings for global distance, Riverside neighborhood remained in the top ranking position among the five areas. Pottersburg neighborhood stayed at the bottom. But ranked in descending order in between were the Downtown, Huron, and Stoneybrook areas. Five significant

pairs were located among the five areas. They were between Huron and Pottersburg (p=.0431), Huron and Riverside (p=.0319), Downtown and Pottersburg (p=.0015), Riverside and Pottersburg (p=.0002), and Riverside and Stoneybrook (p=.0020). Once again, the statistics for the three pairs with Riverside involved showed Riverside area had consistent higher ranking than its partners. In the other two pairs, Pottersburg was always in the lower position.

Sample Area	Relative Rank	Mean Rank	Number of Households
Riverside	1	162.19	50
Downtown	2	155.60	57
Huron	3	131.13	58
Stoneybrook	4	127.64	54
Pottersburg	5	103.45	52
		Total	271
χ^2=18.9915 df=4 p=0.0008			

Table 5.3 Spatial Dimension: Regional Scale Distance

Of the far, medium, and near time distances on the temporal dimension, the five areas differed significantly in their responses to only the medium distance. Variations in the ranks of the neighborhoods are displayed from the highest to the lowest in Table 5.4.: Riverside, Stoneybrook, Downtown, Huron, and Pottersburg.

Sample Area	Relative Rank	Mean Rank	Number of Households
Riverside	1	165.71	50
Stoneybrook	2	151.34	54
Downtown	3	139.17	57
Huron	4	121.17	58
Pottersburg	5	104.57	52
		Total	271
χ^2=20.2514 df=4 p=0.0004			

Table 5.4 Temporal Dimension: Medium Distance

The five significant pairs were between Huron and Riverside (p=.0017), Huron and Stoneybrook (p=.0469), and

between Pottersburg and each of Downtown (p=.0252), Riverside (.0000), and Stoneybrook (p=.0023). In the two pairs involving Huron, Huron was the lower ranked area in each case. In the other three pairs, Pottersburg was repeatedly ranked lower than the partners.

Statistical significance was found in placing relative importance on specific residential features among the five sample areas. The next two tables provide summary findings on average degree of desirability of natural and artificial features expressed by the five areas. Value attachment to the features was given on a three-point scale with decreasing worth from absolutely essential, to useful, to no value or interest.

Sample Area	Relative Rank	Mean Rank	Number of Households
Downtown	1	161.37	54
Pottersburg	2	140.45	50
Huron	3	134.72	56
Riverside	4	125.07	50
Stoneybrook	5	100.84	54
		Total	264
χ^2=18.5323 df=4 p=0.0010			

Table 5.5 Desirability of Artificial Residential Features

On artificial features (Table 5.5), Downtown neighborhood placed the highest value. The next was Pottersburg neighborhood followed by Huron and Riverside. Stoneybrook neighborhood, in ranking the last on this aspect, was the only neighborhood to have expressed a consistent value scheme in consideration of the given residential features, as will be shown in Table 5.6 and related discussion. Such consistency could not be found in the other four neighborhoods. Five pairs of neighborhoods had statistically significant differences. Some differed more than others as can be seen in the level of the

probability. They were Huron and Downtown (p=.0461), Huron and Stoneybrook (p=.0133), Stoneybrook and Pottersburg (p=.0141), Downtown and Riverside (p=.0081), and Downtown and Stoneybrook (p=.0001).

On natural features, Stoneybrook area placed the highest value. The next highest average ranking was to the Huron area. Riverside area was third, Downtown fourth, and Pottersburg last as indicated by the rank order in Table 5.6. Significant differences were found for three pairs of areas. They were between Huron and Pottersburg (p=.0446), Stoneybrook and Pottersburg (p=.0071), and Downtown and Stoneybrook (p=.0302).

Sample Area	Relative Rank	Mean Rank	Number of Households
Stoneybrook	1	152.69	54
Huron	2	143.91	56
Riverside	3	131.18	50
Downtown	4	122.44	54
Pottersburg	5	113.14	51
		Total	265
χ^2=9.5270 df=4 p=0.0492			

Table 5.6 Desirability of Natural Residential Features

These two value aspects, presented above, were based on twelve individual items presented in a hypothetical opportunity to purchase a new house in the questionnaire. Only one individual item in the artificial category was found with significant difference (p=.0003) among the five sample areas. Judged by the average rank, Stoneybrook area desired "central air-conditioning/climatic-controlled environment" the most. Riverside area was the next followed by Huron, Pottersburg and Downtown areas.

This finding is a good illustration of composite measures yielding more balanced pictures than individual indicators. Stoneybrook desired one artificial feature (air-

conditioning) the most, but favoured natural features overall. Behavioral studies of environmental orientation benefit from evaluation of multiple attitudinal and behavioral dimensions and aspects.

The next seven tables outline the significant differences concerning different information aspects among the five sample neighborhoods. Table 5.7 shows level of information about environmental events. It is based on a combination of information of seven events (details in Table 3.8) at local, regional, and global scales over the time period of 15 years. In order of most to least average amount of knowledge of the specified events, the five areas were the Riverside, Stoneybrook, Downtown, Huron, and Pottersburg. As for differences between the areas, four significant pairs ($p < .01$) were found. One was between Stoneybrook and Pottersburg areas. Three were between Riverside and each of the bottom three areas.

Sample Area	Relative Rank	Mean Rank	Number of Households
Riverside	1	168.01	50
Stoneybrook	2	145.31	54
Downtown	3	136.62	57
Huron	4	122.61	58
Pottersburg	5	109.81	52
		Total	271
χ^2=18.0951 df=4 p=0.0012			

Table 5.7 Information about Environmental Events: Areas

Four of the seven events revealed individual significant differences among the five areas. Table 5.8 gives relative ranking orders by level of information for the five sample areas on each of the four events. Since these were the main basis for the information aspect summarized in Table 5.7, similar rankings were expected; and this was found, with the exception of some order exchange

among the two or three lower ranked areas (Huron, Pottersburg, Downtown).

AREA	Bhopa	Exxon Valdez	Love Canal	Chern-obyl
Huron	4	4	4	4
Pottersburg	5	5	5	5
Downtown	3	3	2	2
Riverside	2	1	1	1
Stoneybrook	1	2	3	3
χ^2	21.749	12.777	19.775	15.268
df=4 p<0.01				

Table 5.8 Information about Environmental Events: Examples

As pointed out earlier, no particular pattern could be generalized from most responses to individual questions. However, the details here are suggestive in a special way. These and similar specific questions are at the base of most of the differences which appeared among the neighborhoods. It may be speculated that responses to specific questions are more effective in capturing nuances of difference than are reactions to slogan-type general statements.

The second information aspect on which the five sample areas showed significant differences was knowledge about environmental organizations as indicated in Table 5.9. In comparison with the first information aspect, areas having the most and the least knowledge were the same, Riverside and Pottersburg respectively. The middle ranked areas changed their positions. Both the Downtown and Huron areas had more knowledge than Stoneybrook area. Four pairs of areas were found significantly different. One was between Downtown and Pottersburg (p=.0288). The other three were between Riverside and each of the areas of Huron (p=.0082), Pottersburg (p=.0015), and Stoneybrook (p=.0037).

Sample Area	Relative Rank	Mean Rank	Number of Households
Riverside	1	164.98	50
Downtown	2	149.84	57
Huron	3	129.98	58
Stoneybrook	4	122.19	54
Pottersburg	5	114.01	52
		Total	271
χ^2=15.1505 df=4 p=0.0044			

Table 5.9 Information About Environmental Organizations

Two individual questions under this information aspect that tested statistically different were knowledge about Pollution Probe (p=.0000) and Thames Region Ecological Association (p=.0024). In both cases, the rank from the highest to the lowest was: Riverside, Downtown, Stoneybrook, Huron, and Pottersburg. Both questions were used in the measure "Information about Regional Scope Organizations", and will be presented when that measure is addressed.

The five sample areas were also found to differ significantly with respect to two temporal information aspects which comprised medium (Table 5.10) and near (Table 5.11) distance of information about environmental events.

Sample Area	Relative Rank	Mean Rank	Number of Households
Riverside	1	167.06	50
Stoneybrook	2	152.55	54
Downtown	3	134.11	57
Huron	4	122.43	58
Pottersburg	5	106.16	52
		Total	271
χ^2=23.6587 df=4 p=0.0001			

Table 5.10 Information of Events of Medium Temporal Distance

Ranked according to the neighborhood average scores, Riverside area had most knowledge of the specified events for both temporal scales. Stoneybrook area was the next best

informed. Pottersburg area had the least idea of what those events were. The Downtown and Huron areas, however, were found to be somewhat different. Both were in the middle and lower rank among the five areas on the two aspects. But, while the Downtown neighborhood had more information about the events of medium distance, Huron neighborhood knew more about the events that happened more recently.

Sample Area	Relative Rank	Mean Rank	Number of Households
Riverside	1	152.52	50
Stoneybrook	2	140.34	54
Huron	3	135.28	57
Downtown	4	133.97	58
Pottersburg	5	118.63	52
		Total	271
χ^2=11.1731 df=4 p=0.0247			

Table 5.11 Information of Events of Near Temporal Distance

Six significant pairs were found for medium temporal distance. They were Huron-Riverside, Huron-Stoneybrook, Pottersburg-Downtown, Pottersburg-Riverside, Pottersburg-Stoneybrook, Downtown-Riverside. In each pair involving either Huron or Pottersburg, these areas were the lower of the two in the pair. Of the pair of Downtown-Riverside, the former was the lower. With regard to the temporal distance, there were three significant pairs, in which Riverside was the higher above each of Huron, Pottersburg, and Downtown.

As discussed in Chapter 4, the effect of time on knowledge increased with increase in temporal distance. All sample households had the least awareness of events that had occurred ten years or more previously. Within the ten-year period, people remembered more as the temporal distance decreased from medium to near. The statistics presented above showed there was also a differential pattern in how people were affected, according to the socioeconomically

different kinds of households. The wealthier households appeared to manage information differently, or at least to retain knowledge longer.

The five areas also differed significantly on three information aspects of spatial scales. The first two concerned environmental events of global distance (Table 5.12) and regional distance (Table 5.13). The third was environmental organization of regional scope (Table 5.14).

Sample Area	Relative Rank	Mean Rank	Number of Households
Riverside	1	162.68	50
Stoneybrook	2	156.19	54
Downtown	3	135.37	57
Huron	4	124.52	58
Pottersburg	5	102.88	52
		Total	271
χ^2=25.0713 df=4 p=0.0000			

Table 5.12. Far Distant Events Information

Sample Area	Relative Rank	Mean Rank	Number of Households
Riverside	1	159.95	50
Downtown	2	147.89	57
Stoneybrook	3	138.79	54
Huron	4	124.48	58
Pottersburg	5	109.89	52
		Total	271
χ^2=19.1733 df=4 p=0.0007			

Table 5.13. Regional Distance Events Information

Sample Area	Relative Rank	Mean Rank	Number of Households
Riverside	1	173.52	50
Downtown	2	154.46	57
Stoneybrook	3	128.46	54
Huron	4	122.57	58
Pottersburg	5	102.50	52
		Total	271
χ^2=30.0517 df=4 p=0.0000			

Table 5.14. Regional Scope Organizations Information

As can be seen in these three tables, people in Riverside area not only knew the most about environmental events of both the global and regional distances, but also were most knowledgeable about environmental organizations of regional scope. In comparison, people in Pottersburg area were the least informed on all three spatial aspects.

On information about environmental events of global distance, Stoneybrook was ranked the second, Downtown the third, and Huron the fourth. On both measures of information about environmental events of regional distance and about environmental organizations of regional scope, Downtown area moved ahead of Stoneybrook area.

There were four significant pairs on level of information of environmental events of regional distance. They involved Huron and Riverside (p=.0028), Downtown and Pottersburg (p=.0044), Riverside and Pottersburg (p=.0001), and Stoneybrook and Pottersburg (p=.0277).

There were five significant pairs on level of information of environmental organizations of regional scope. They were Huron and Downtown (p=.0175), Huron and Riverside (p=.0002), Downtown and Pottersburg (p=.0004), Riverside and Pottersburg (p=.0000), and Riverside and Stoneybrook (p=.0014).

Responses to one information question, "Radio programs", were found to have significant differences among the sample areas. As a measure of amount of information, the areas were ranked (p=.0200) from the most to the least in the following order: Pottersburg, Riverside, Stoneybrook, Downtown, and Huron. However, at the aggregated level, this individual indicator did not carry much weight.

Significant variations were found concerning how strongly people in the five sample areas felt toward the

environmental events. Table 5.15 shows the ranked positions of the five areas on the medium temporal distance.

Sample Area	Relative Rank	Mean Rank	Number of Households
Riverside	1	165.27	50
Stoneybrook	2	151.80	54
Downtown	3	139.78	57
Huron	4	119.93	58
Pottersburg	5	105.23	52
		Total	271
χ^2=20.2443 df=4 p=0.0004			

Table 5.15 Attitude to Events of Medium Temporal Distance

A closer examination revealed five pairs of significantly different neighborhoods on attitude toward the events of medium temporal distance. They were Riverside and Huron (p=.0014), Stoneybrook and Huron (p=.0375), Downtown and Pottersburg (p=.0253), Riverside and Pottersburg (p=.0001), and Stoneybrook and Pottersburg (p=.0022). Huron and Pottersburg were ranked lower in each of the pairs either of them were involved in.

Notice that the rank order on the medium temporal attitude aspect is the same as the medium temporal of the information aspect. Riverside area having most knowledge of the events of the medium time distance felt those events were most serious. The other four areas having less knowledge reported diminished strong feelings accordingly. That is to say, on average, the areas found to know more about environmental events were more likely to believe those events to be serious. Likewise, those less informed of the events were more inclined to think those events being less severe.

Table 5.16 and Table 5.17 show the similar rankings of neighborhoods for attitude on the global and regional distances; Stoneybrook and Downtown areas switched positions

only. Riverside and Pottersburg continue to hold their usual first and last places.

Sample Area	Relative Rank	Mean Rank	Number of Households
Riverside	1	161.01	50
Stoneybrook	2	157.82	54
Downtown	3	135.93	57
Huron	4	124.22	58
Pottersburg	5	102.51	52
		Total	271
χ^2=22.7685 df=4 p=0.0001			

Table 5.16 Attitude to Global Distance Events

A more interesting comparison may be the number of significant pairs on the attitude and information of global distance events. The patterns for these two measures were found to be almost exactly the same and between the same areas. The five identical pairs were Riverside-Huron, Stoneybrook-Huron, Downtown-Pottersburg, Riverside-Pottersburg, and Stoneybrook-Pottersburg. One single exception was when the Riverside area was ranked significantly (p=.0340) ahead of the Downtown area on the information aspect of global distance but not on the attitude aspect of global distance (see, Table 5.1 in row numbers 10 and 14).

Sample Area	Relative Rank	Mean Rank	Number of Households
Riverside	1	153.94	50
Downtown	2	146.14	57
Stoneybrook	3	143.92	54
Huron	4	128.19	58
Pottersburg	5	108.13	52
		Total	271
χ^2=11.7692 df=4 p=0.0192			

Table 5.17 Attitude to Regional Distance Events

Only three pairs had real statistical significance in the differences observed on attitude toward environmental events of regional distance. All of them were between Pottersburg area and one of these three: Stoneybrook (p=.0189), Downtown (p=.0136), and Riverside (p=.0017).

The first of the three behavioral aspects found to have significant difference among the five areas was membership in environmental organizations (Table 5.18).

Sample Area	Relative Rank	Mean Rank	Number of Households
Riverside	1	163.70	50
Downtown	2	151.32	57
Huron	3	131.97	58
Stoneybrook	4	122.23	54
Pottersburg	5	111.36	52
		Total	271
χ^2=15.7828 df=4 p=0.0033			

Table 5.18 Membership in Environmental Organizations

The rankings of the five neighborhoods on this measure were the same as those on the aspect of information about environmental organizations. So were the significant pairs between areas.

Membership in environmental organizations differed significantly across areas for only two organizations, namely, Pollution Probe and Thames Region Ecological Association; Riverside had most membership in both. Four pairs of differentiated areas were identified: Huron-Riverside, Pottersburg-Downtown, Pottersburg-Riverside, Riverside-Stoneybrook. Pollution Probe caused most of the difference, for there was no membership in TREA among Pottersburg, Stoneybrook and Huron - suggesting, perhaps that the more mature neighborhoods (Riverside and Downtown) had more investment in the local environment.

In relation to the environmental organizations, the matching ranks of the five sample areas on the information and behavior aspects revealed a positive connection between information and behavior. It might be tempting to conclude that this match is due to the fact that the aspects share the same question base. However, direct statistical correlations between information and behavior measures not sharing the same base questions were also found, and will be presented later in this chapter.

A different ranking was discovered when membership in regional scope environmental organizations was examined (Table 5.19). Here, as for the differences in environmental organizations generally, this was due primarily to membership in Pollution Probe, which was used as the regional measure.

Six significant pairs were found on membership of environmental organizations of regional scope among the five areas. They were Huron and Downtown (p=.0141), Huron and Riverside (p=.0001), Downtown and Pottersburg (p=.0002), Riverside and Pottersburg (p=.0000), Downtown and Stoneybrook (p=.0359), and Riverside and Stoneybrook (p=.0006).

Sample Area	Relative Rank	Mean Rank	Number of Households
Riverside	1	175.10	50
Downtown	2	155.88	57
Stoneybrook	3	126.68	54
Huron	4	122.64	58
Pottersburg	5	101.20	52
		Total	271
χ^2=32.6692 df=4 p=0.0000			

Table 5.19 Membership in Environmental Organizations of Regional Scope

Significantly unequal rates of participation in recreational activities were found among the five neighborhoods (Table 5.20). Riverside ranked first in households' participation in activities of the kind considered less environmentally demanding, while Pottersburg area recreational participation ranked as most demanding. Once again the same ranking order of the five areas persisted on this behavior aspect.

Sample Area	Relative Rank	Mean Rank	Number of Households
Riverside	1	151.87	50
Downtown	2	147.79	57
Huron	3	142.45	58
Stoneybrook	4	134.41	54
Pottersburg	5	102.28	52
		Total	271
χ^2=13.4456 df=4 p=0.0093			

Table 5.20 Participation in Recreational Activities

Four pairs of areas were found having significant differences. They were between the neighborhoods of Pottersburg and Huron (p=.0046), Pottersburg and Downtown (p=.0040), Pottersburg and Riverside (p=.0016), and Pottersburg and Stoneybrook (.0323). In each pair, Pottersburg was the lower-ranked neighborhood of the two areas. Therefore, the real substantial difference on this measure occurred between Pottersburg and the other four areas, not among all the five areas.

Two of the ten specific activities for this behavior aspect were reported to be enjoyed by substantially different percentage of people in the five London areas. When it came to "reading for pleasure" (p=.0039), the Downtown area had the highest percentage of participants, followed by Riverside, Stoneybrook, Huron, and Pottersburg areas. As for enjoyment of "snow-mobiling/ATV" (p=.0350),

Pottersburg turned out to be number one. Next in line were Stoneybrook, Huron, Downtown, and Riverside neighborhoods.

These two individual activities (reading and snow-mobiling) were designated to represent each of the two types of recreational activities, more and less environmentally destructive. When the ten specific activities were sorted into the two types, however, no significant difference was found The emerged patterns of significant difference among the five areas shown in Table 5.20 were the testing result of subtracting the score of more environmentally destructive type from that of the less environmentally destructive one. The higher average score indicated greater engagement in environmentally less destructive recreational activities.

Two individual measures of behavior aspect concerning environmental activities currently involved in, "composting" and "water conservation", got significantly different responses among the five areas ($p=.0413$ and $p=.0429$ respectively). In composting, Riverside area was found to be most active. Next was Stoneybrook followed by Pottersburg, Downtown, and Huron. In water conservation, again Riverside area had the best performance. Second best was the Downtown area. Stoneybrook area was ranked at the very bottom, after Huron and Pottersburg areas. However, no significant aggregate measure resulted from those indicators.

The above presentations of significance test results have shown that the five neighborhoods in London differed in eighteen aspects (Table 5.1). A clear pattern surfaced. Riverside area demonstrated greater knowledge about environmental events and organizations than any other area, was more inclined to judge the events to be serious, and had a higher propensity to join environmental organizations. Pottersburg was consistently lowest in these areas. Between

these two, however, no reliable patterns emerged. The tests failed to discover significant differences on the four key index measures (information, attitude, behavior, and overall orientation); so, the study had to conclude that household environmental orientation is generally aspatial in nature.

5.2 Spatial-Temporal Scales

This section explores how spatial and temporal distances are related to variations in household environmental orientation. The geographical and temporal aspects of event occurrence and organizational scope were examined to identify patterns of space-time dimensions.

The commonsense assumption and much reported finding about the effect of spatial and temporal distance on information, attitude and behavior is that the influence of source diminishes proportionally with distance. The null hypotheses proposed that neither residential location nor lapse of time would affect households' environmental information, attitudes, and behavior.

The relationships of the spatial and temporal variables to the distance scales were analyzed using the Kendall Coefficient of Concordance W. The test was run on six sets of spatial measures, with the scales of global, regional, and local. It was run on three sets of temporal measures, with scales of far, medium, and near.

SPATIAL/TEMPORAL DISTANCE	EXPECTED INFLUENCE	OBSERVED SPATIAL	OBSERVED TEMPORAL
Local/Near	Most	Least	Most
Regional/Medium	Less	More	Least
Global/Far	Least	Most	More

Table 5.21 General Spatial/Temporal Patterns

Only in the temporal dimension s the expected pattern of distance decay discoverable at all. In the spatial

dimension, the paradoxical opposite seems to be operative. Table 5.21 summarizes the general findings.

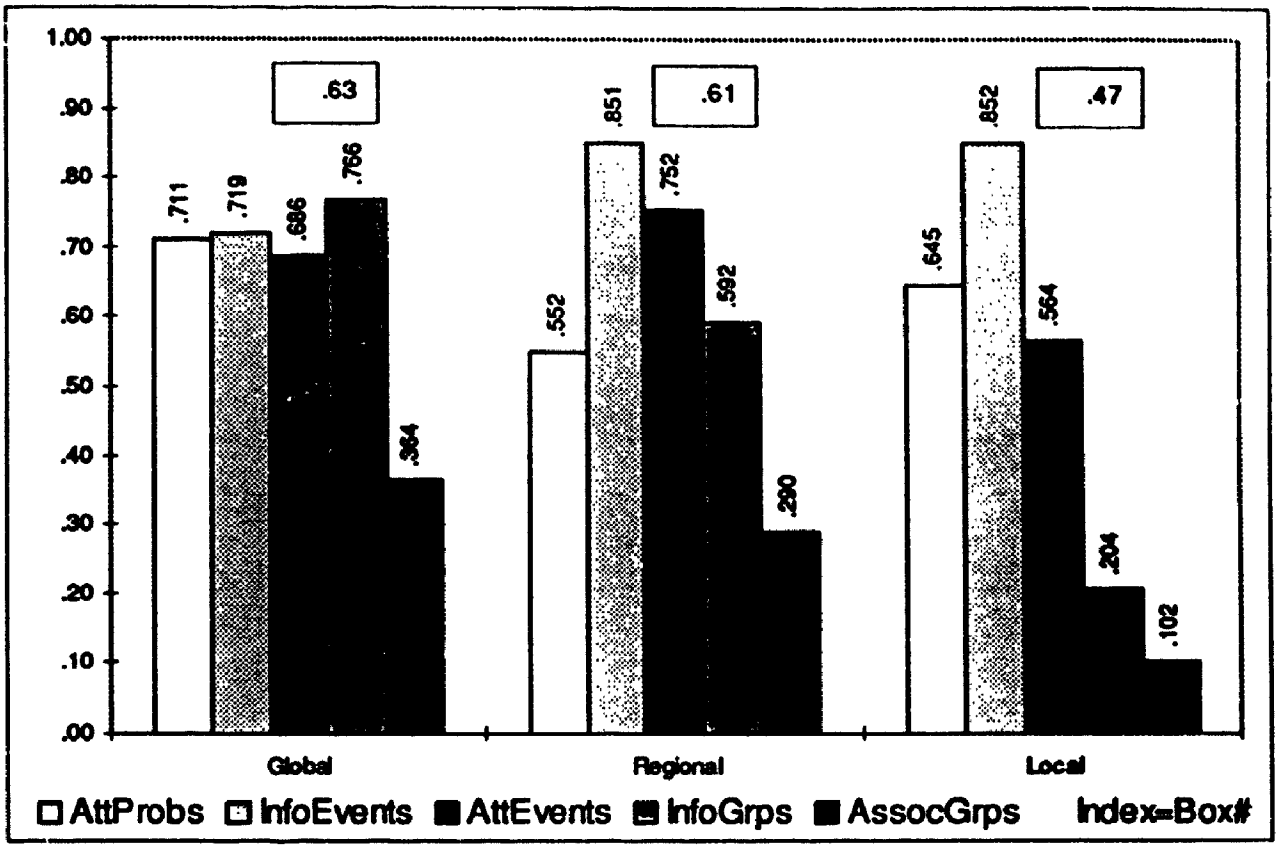

Figure 5.1 The Global, Regional, Local Scales

Five sets of spatial aspects (portrayed in Figure 5.1, left to right) and one general spatial index (given in the floating boxes) were examined. This graph is provided to offer a quick visual summary of the variables tested on the global, regional, and local scales. The five sets were: (1) Attitude Toward Environmental Problems, (2) Information about Environmental Events, (3) Attitude toward Environmental Events, (4) Information About Environmental Groups, (5) Association with Environmental Groups. The sets of aspects were calculated as average scores for all households, and combining them in a new average produced the spatial index.

The null hypothesis (contradictory to positive linear decay of effect over distance) could not be rejected in any case. However, heuristic examination of the data revealed that the opposite (contrary) pattern appeared to hold. That is, distance seemed to increase effects.

As observed in Chapter 4, the reversal of the classic distance decay may be due to the effects of the mass media perspective. That is, since mass media by their essential function must address a global-scale public, they must select or give prominence to stories involving places that are of interest to a public that is spread over a very large area, including even many nations. Such stories will likely (a) have occurred at considerable spatial distance (on average for any one location, including London) and (b) be of great objective importance (relative to the many events occurring in any one location). When householders obtain most of their information from such sources, rather than from local exposure or investigation, the first characteristic (a) would tend to make them more aware of events that are spatially distant. The classic temporal decay works for events near in time, but it breaks down again due to the second characteristic (b), which would make them retain memory of these mass media communicated events longer.

This non-confirming finding is supported by statistics from results for three of the six tested measures. Table 5.22 shows detailed statistics on the spatial index ranking. The same significant ($p<0.0000$) pattern was found with information about (mean ranks: global=2.56, regional=2.15, local=1.29) and association with (mean ranks: global = 2.58, regional=2.14, local=1.28) environmental groups.

The otner three measures were equally non-confirming, but exhibited alternative patterns of spatial effect at very significant levels ($p<0.0000$), as judged by their mean ranks. In the case of attitudes toward environmental problems, the level of concern moves from global (2.32) to local (2.02) to regional (1.65). In the case of information about environmental events, the amount of knowledge moves from regional (2.16) to local (2.12) to global (1.73). In the case of perceived seriousness of environmental events, the level of severity moves from regional (2.29) to global (2.10) to local (1.61).

Description	Relative Rank	Mean Rank
Global Dimension	1	2.35
Regional Dimension	2	2.24
Local Dimension	3	1.40
Households 271 W=0.2799 χ^2=151.6801 df=2 p=0.0000		

Table 5.22 Spatial Index Ranking

In addressing these hypotheses through the questionnaire, particular items focused on anticipated differences among neighborhoods in spatial and temporal mediation of responses. The null hypotheses predicted that, on average, each area was similar to any other. In other words, the five areas were challenged to give identical answers to the various spatial and temporal questions.

One event used to measure spatial differences was Pottersburg Creek. The Pottersburg neighborhood sample area was compared with the other four sample areas in London (Table 5.23). The Mann-Whitney U Test revealed that the slightly higher score of the Pottersburg neighborhood was not significantly different from the other neighborhoods, in relation to the information ($z=-1.1849$, $p=0.2360$) and perceived seriousness ($z=-0.9407$, $p=0.3469$) of that event. The null hypothesis could not be rejected. The research

concluded that location may not be a determining factor in how people felt about events in the locality.

Sample Groups	Number of Households	Mean Rank
Pottersburg	52	161.32
Other Groups	250	149.46
Households 302	z=-0.9407	p=0.3469

Table 5.23 Attitude To Events By Location

For the temporal dimension questions, the effect of distance was more apparent than it was with the spatial. In all cases, far and medium were very close. The near was always ranked first in the temporal scales. Even though the straight linear progression of near-medium-far time distance hypothesized could not be supported, the effect of nearness could not be totally denied. This pattern is illustrated by the significance test results of the temporal dimension index shown in Table 5.24.

Description	Relative Rank	Mean Rank
Near Dimension	1	2.44
Medium Dimension	3	1.75
Far Dimension	2	1.81
Households 271	χ^2=91.8373 df=2	p=0.0000

Table 5.24 Temporal Index Ranking

The mean rank values of 2.44 for the near dimension, 1.81 for the far dimension, and 1.75 for the medium dimension, indicated in the table, reflect least effect of the medium distance in the temporal scale. Similar rankings were obtained for information and attitude measures, with the medium producing the least effect.

The same tests were run on the same spatial and temporal measures, based on data of GAP households. No discernible difference was found between GAP household data and those revealed in the household data of the five areas.

The findings for both temporal and spatial scales were not able clearly to reject the null hypotheses. The spatial scales seemed to show a reverse relationship; while the temporal scale was non-linear. Further research is necessary to verify these interesting results.

5.3 Information, Attitude, and Behavior

This section presents the results of statistical tests of the relationships among the three key components of environmental orientation. The contribution of each of the three to the overall environmental orientation index is shown. The section also identifies other significant aspects shaping the general environmental position.

Spearman rank correlation, r, was used to examine the strength and consistency of the environmental dimensions under investigation. Bivariate and multivariate statisitics were obtained. In general, all the hypotheses were supported by rejection of their null hypothetical counterparts.

The direct relationship between reception of information and concern was found. Behavior proved to be a function of information and concern. Table 5.25 presents the correlations among the three dimensional index scores: information (IDX), attitude (ADX), and behavior (BDX).

IDX	*r*	.3826		
	N	267		
	p	.000		
BDX	*r*	.3917	.4204	
	N	267	271	
	p	.000	.000	
EOI	*r*	.7135	.8015	.7779
	N	.267	267	267
	p	.000	.000	.000
		ADX	**IDX**	**BDX**

Table 5.25 Correlations of Environmental Orientation Dimensions

The statistics in Table 5.25 are based on the five sample areas. The highest correlation among the three components is between information and behavior(r=.42); next is between attitude and behavior(r=.39); third is between information and attitude(r=.38). The information component contributed the most (r=.80) to the EOI.

As hypothesized, information was proven to be a significant influential factor on environmental awareness, attitudes and behaviors. Attitudes and behavior were consistent, at least from the statistical point of view. Households environmental orientation was highly significantly shaped by information possessed. This does not mean that there is no room for improvement, because the correlations could be much higher than they are.

Fourteen aspects (Table 5.26) grouped under the three components of EOI made significantly positive contributions to the overall EOI. The strengths of correlation of these aspects with the EOI are various, ranging from r=0.33 to r= 0.70, but all significantly positive (p=0.000).

Aspects	r p=.000
Information of Events	.40
Information of Organizations	.69
Information Sources	.60
Information Amount	.65
Attitude General Statements	.32
Attitude Toward Salient Problems	.55
Attitude Toward Advocates	.46
Attitude Toward Voluntary Contribution	.46
Environmental Organization Membership	.70
Product Choices	.52
Household Practices	.39
Recreation Activities	.33
Values: Exological Focus	.46
Values: Natural Residence Features	.33

Table 5.26 Correlations of Aspects to EOI

Most of the highest correlations are among aspects of the information dimension (average .59). The highest correlation (.70) was with membership in environmental organizations, part of behavior (average .49). Attitude correlated .45 with EOI, on average. The average correlation of values with EOI is the lowest, at only .40.

The highly positive correlations among different aspects and dimensions of environmental orientation indicated that there was a rough consistency. Behavior reported in this study did fit with the knowledge and attitudes expressed.

5.4 Differences in Typologies of Households

The findings presented in this section represent the results of segmentation analyses in delineating groups of households on the basis of the EOI scores. Both statistical (for example, clusters analysis of EOI scores) and non-statistical (for example, GAP membership) techniques were used. Some such classifications were found to have statistical validity as general patterns.[32]

When the five sample areas failed to show overall significant differences on the major environmental measures as geographically outlined, aspatial groupings were sought. It was hypothesized that there were identifiable patterns of environmental orientations regardless of the spatial structures. The households were able to be classified into different groups.

Firstly, all the households were combined into one group, and then split into four quartiles, on the basis of

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[32] Other kinds of statistical analyses, for example, logistic regression analysis of household EOI scores, could have been appropriate and might have yielded different useful results. Some such alternative and additional approaches may be used in future examinations of these data.

the EOI scores. Household EOI scores in the five sample areas fell into a near normal distribution. No distinguishing characteristics were found among the quartiles.

The next attempt at finding meaningful groupings employed the K-mean Cluster technique, again on EOI scores. Groupings into three, four, and five were tried. It should be noted that one household, due to its extremely anomalous responses and scores, constitutes a group by itself in this method. The grouping into four clusters did provide a basis for identification of explanatory features. Significant explanatory factors for differences among these groups were education, social-organizational involvement, and environmental organizational membership.

GAP was successfully proven to be an environmentally ideal group in comparison with the five areas combined into one group, as anticipated in the design of this study. As expected, on each of the environmental variables tested, GAP households were significantly more environmentally sound than were the non-GAP households.

This suggested an analysis based on a division of all households into those belonging to any environmental group and those not belonging to any such a group. This division provided most explanatory options. Other than being environmental activists, those households had higher levels of education, with a presence of all age types, and were mostly office-oriented in occupation, with home-oriented and school-oriented members. They were also more involved in social activities. They tend to see the enterprise of protecting the environment as a very serious one.

Multidimensional scaling analysis was tried but failed to yield meaningful patterns. When household indexes were

plotted, the households were not clustered as the principal hypotheses would have predicted. Instead, they exhibited a shallow U shaped band, with a couple of the households identifiable on each end. The rest aligned themselves in between overlapping on one another. One of the interpretations of this graph could be that London households were relatively homogeneous. The shades of green are really continuous rather than in classified partitions as theorized by O'Riordan (1989 four types; 1991 deep, shallow, and dry ecology descriptions).

Principal components analysis was also explored for purposes of scaling the households. Even though this analysis is commonly used as a data-reduction technique to extract a few main underlying dimensions from multiple associated variables, plotting the variances of newly composed variables is used to identify clusters visually (Daultrey, 1976; Dunteman, 1989). By recreating the data represented by some common factors, PCA models assume that the new components capture the maximum variation in a given population. The observed data structure can be explained more objectively by comparison of the eigen-values.

Since the households' scores of different dimensions were highly correlating, it was no surprise to end up with just one single component summarizing the total variance of all households. Plotting this one set of eigenvalues produced a graph similar in pattern to that of the MDS, except more unidimensional and less meaningful. The straight flat shape was like that of a sawblade with irregularly lined teeth on both sides. This confirmed the belief that it would not be fruitful to try any more scaling techniques. London households had to be accepted as a largely homogeneous group in their environmental orientations.

5.5 Demographic Traits and Environmentalism

Spearman correlation analysis was used to identify the socio-economic and demographic characteristics of households, with regard to their environmental positions on the dimensions measured. Most relationships were very weak. The Kruskal-Wallis test was used to investigate socioeconomic determinants for different clusters of households.

Analysis was also carried out to see how exological values were related to values for natural features, and how endological values were related to values for artificial features. Both scatter plots and correlation analysis revealed some relationships ($r=0.27$, $p=.001$ in both cases) for all households. Examining GAP and the five areas separately showed various strengths of relationships. When the five areas were combined, the correlation between exological and natural feature values decreased ($r=0.23$, $p=.000$); but increased between endological and artificial features ($r=0.28$, $p=.000$). This reversed for GAP. The correlation for the first pair increased to 0.56 ($p=.001$), yet for the second pair decreased dramatically to 0.0027. As for each of the five areas, the fluctuations were equally irregular without any clear pattern.

There were significant differences among areas for household involvement in other social and community organizations; see Table 5.27.

Sample Area	Relative Rank	Mean Rank	Number of Households
Stoneybrook	1	158.57	54
Riverside	2	156.88	50
Downtown	3	125.83	57
Huron	4	121.55	58
Pottersburg	5	119.74	52
		Total	271
χ^2=15.0103 df=4 p=0.0047			

Table 5.27.Other Organizational Involvement

Stoneybrook area had the highest other organizational involvement. Pottersburg area had the lowest. In between were Riverside, Downtown, and Huron areas. Various levels of statistical difference were found between six pairs. They were Huron and Riverside ($p=.0134$), Huron and Stoneybrook ($p=.0068$), Riverside and Pottersburg ($p=.0141$), Stoneybrook and Pottersburg ($p=.0074$), Downtown and Riverside ($p=.0303$), and Downtown and Stoneybrook ($p=.0185$).

It should be noted that 40% of individuals in sample households belonged to religious organizations, whereas all other organizations together enjoyed only 26% of household members' involvement. Thus, religious membership counted for a large part of the organizational involvement, although all organizational involvement was correlated with EOI around the 20% level with a strong significance ($p<.001$).

Conventional socio-economic and demographic variables correlated with household environmental orientations in more complex ways than normally thought. Households with members in all the three (young, mature and old) age groups and in the occupation mix group of "Office & Home & School" scored significantly higher on environmental attitudes and behaviors than other household groups. But the only significant group on the measure of overall environmental orientation was the "Young & Mature & Old" age mix group. Household income was not significantly related with environmental attitude at all, but variably related to environmental information. As level of income increased, there was more information about environmental events and organizations on the global and regional scale. However, the simple linear relationship disappeared when total information sources and amount were considered. Households with income range of $75,000 to $99,000 ranked the first, followed by households with income range of $50,000 to

$74,000, in both sources and amount of information. The highest category, at the income level of $100,000 or more, did not stay in the top position.

5.6 Summary

Testing showed that there were significant relationships on eighteen environmental measures among the five areas. They were different aspects of information, attitudes, and behavior. Riverside had higher scores on all three, Pottersburg lowest, the remaining areas inconsistent. The overall environmental index and major dimensions were not significantly different among the areas. Therefore, the overall household environmental orientation was aspatial in nature.

In relation to temporal and spatial distance effects, the traditional belief in the linear decay of the power of proximity could not be confirmed. Instead, findings indicated various unexpected patterns.

Significant positive statistical correlations were present among household levels of environmental information, attitude and behavior. The information factor was most highly associated with overall environmental orientation, for the sample areas. For the GAP group, the behavioral factor was the largest component of EOI. In all cases, the connection between attitude and behavior was stronger than that between attitude and information.

Significant differences in household environmental orientation were discovered between households that were members of environmental organizations and those which were not. GAP as a group, was statistically consistently an ideal environmental group in almost every aspect, ahead of both non-green and other green group members. GAP thus proved its role in the study design as an ideal group for comparisons.

Environmental orientation was strongly correlated with exological values, active community involvement, high levels of education, and a balanced range of ages in the household. Income, up to upper-middle level was positively correlated, but after that level dropped off.

Findings such as these suggest that caution should be exercised when using household socio-economic characteristics to generalize environmental orientation types, and when judging a particular household to be "environmentally-sound". Where people live may not define their positions on the environmental spectrum. It seems a complex choice process is involved. Exploration of deeper belief and value factors, or of other behavioral mechanisms beyond indexing information, attitude and behavior dimensions, may be necessary to throw more light on this murky problem.

CHAPTER 6

Explanations and Conclusions

In this concluding chapter, major research findings will be discussed in relation to objectives of the study. Specifically, the summary discussions in the first three sections will address: 1) information relevance, 2) attitude characterization, and 3) behavior status. These are the three dimensions of the household environmental positions identified and analyzed in this study. In addition to interpreting the research results, this chapter gives an overall evaluation of the study. Section four discusses the strengths and weaknesses of the research, focusing particularly on the review of questions that have been generated by the research, but have been left unexplored. In section five, an assessment is provided of contributions this study makes to the discipline of geography and to understanding the spatial dimension of TEP. After that, the discussion will turn to suggestions for future research paths. Finally, a profile of an emerging Human-Environment Sustainability Paradigm (HESP) is outlined.

6.1 Information Relevance

The London household survey has shown that people are generally well informed about environmental issues and problems. There are no significant differences in their awareness of the importance of the environment and the interaction between the state of the environment and human activities. The acquired information of households has direct influence on relevant environmental attitudes and behaviors, as demonstrated by the observed statistical correlations. Even though variations exist on different aspects of attitude and behavior among the households, the important role of information in fostering environmental

awareness and encouraging environmental commitment is apparent.

This is not to suggest that no further improvement is necessary, but rather that dissemination of information is widespread cutting across socioeconomic and demographic differences among households. Information from interpersonal and mass media sources has channeled through geographical space reaching people in diverse localities. Conceptualizing the world environmentally has become part of life.

This finding may be related to the results of the studies of The Roper Organization (1992) and the National Opinion Research Center in Chicago (reported by Immen, 1995). In their separate surveys, similar conclusions were drawn. In the former case, Canadians were found to be the "greenest" in their environmental knowledge and action among North Americans. In the latter case, Canadians ranked the highest in environmental knowledge among citizens of 20 countries. It can not be mere coincidence that Canadians were better informed and acted in a more environmentally responsible manner. It seems they behave according to what they know.

The relevance of information in effective promotion of environmental practices was demonstrated by Kearney and De Young (1995). In their study, a knowledge-base' intervention was used to increase carpooling among 645 employees of US Environmental Protection Agency. Concrete, personalized, interesting stories were told to supply information for adcption of the practice. Those who received the information felt more comfortable with their carpooling knowledge greater confidence and increased willingness to try car-pooling.

The direct relationship between environmental knowledge and environmental activism was observed by Paul Stern (1992) when he compared environmental activists and non-activists. Environmental activists have greater knowledge about particular issues or how to participate more effectively. They are more concerned about environmental problems. Their interest in political involvement is higher. They further increase their information base through a higher level of contact among themselves.

The observed correlation of information and awareness provides criticism against the argument that people have turned numb about environmental problems and issues, as stated by Bailey (1988). Londoners mostly had knowledge that may be described as transmitted from the popular media. They knew more about general environmental issues and problems, such as air pollution, deforestation, global warming, and recycling. They got most of their information from television and newspapers.

It may be true that there is a problem of "infoglut". "Infoglut, the product of the burgeoning information society, creates a plethora of entertaining and commercial distractions from our many problems, and often makes these problems more difficult to comprehend, for those few who are willing and attempt to fully understand them." (Marien, 1996:307). Communication of environmental information seems to have overcome major barriers to capture people's interest and affect their environmental orientation.

More importantly, this study has found that being "green" is an active behavioral process. The act of searching for information, the decision to increase household awareness, and the conscious adoption of behavior toward sustaining a healthy environment form the necessary

steps. Exological values motivate the search for information. But it is the voluntary dedication of private resources of time and initiative, directed toward seeking out environmental information, that produce real significant differences in meaningful environmental orientation.

If, as seems to be the case, the general population must be effectively moved toward greater sustainability, then people need to understand what they are dealing with and how they can take steps to achieve the goal. Information is crucial to this process. This study has found that media are a powerful tool to reach people. Given that we cannot wait to find out the full implications of environmental threats, media have an advantage over conventional methods of public education. It is known that media have the ability to raise or lower profiles of issues. This factor should be kept to maintain and increase the level of environmental concern. Particularly needed is a concentration on informing people about local matters having long-term implications relating to harm or benefit to their communities. Such coverage, uniting immediate relevance to full information, is likely to be highly persuasive.

Both public and private sources of information need to be increased in quality and quantity. In the face of uncertainty, people must have sufficient information in forms and locations that will attract and encourage them to approach and access them. Then they will be able to assess what is known, and take steps to reduce the risk of the consequences of the unknown.

Sound scientific information must be disseminated as quickly as possible in society. Our current mass media are effective, but other means may now be relevant. Internet style communications, for example, are used for

communication about the environment. Most use of the internet relating to the environment is still of the "private" type, serving academics and activists. But highly graphic and accessible sites are being also formed and put on the Web daily, by both individuals and organizations. It is impossible to be certain at this time which means will be most effective. The important thing is to employ those means which have a likelihood of capturing the attention of a population more pre-disposed to get information through "public" means.

6.2 Attitude Characterization

At the beginning of this study, it is stated that the environment matters. Empirical evidence supplied by the findings from this research has reaffirmed that people do care about the environment. They are concerned over a wide range of environmental problems and issues. They are prepared to take responsibility and make contributions for a healthy and life-enhancing environment.

However, this study has also found a situation similar to the conclusion of Dunlap (1991): "clear consensus, ambiguous commitment". The attitude index score was the highest among the three index scores. There is obvious high level of awareness of the importance of caring for the environment. The overwhelming majority of the households indicated "concerned" or "very concerned" about environmental issues and problems of global, regional, and local scales. Great willingness was indicated to support environmental protection. But in the end, hesitation was expressed as to exactly when and what to support.

This finding echoes the results of many environmental studies. Among the more recent examples are Statistics Canada's household surveys and the study by Scott and

Willits. According to the reports by Statistics Canada (1992, 1995), there was repeated lower level of actual use of recycling facilities than expected. Composting and energy conservation were practised by less than fifty percent households in all Canadian provinces. Scott and Willits (1994) found Pennsylvanians were less likely to engage in environmental activities, even if they said they strongly supported environmental protection. Great concern about the environment and willingness to carry out environmentally sound practices did not necessarily lead to high levels of real performance.

This study has some different findings compared with other research. For example, Kuhn (1990) found there was no socio-economic correlation with environmental worldviews and energy use in the Calgary and Edmonton study. Van Liere and Dunlap (1980) identified a consistent link between youth, higher education, and political liberalism with environmental concern. Age, education, and income were found to be predictors of environmental concern by Howell and Laska (1992). Age as a predictor was also found in the studies of Hallin (1995), which correlate environmental concern and motivation with five age cohorts: the "Depression Generation", "Children of the Depression Generation", "the Vietnam Generation", "Role Models", and "Gradual Evolvers". The present study confirms the link with education: years of education mostly do predict household EOI; the other demographic factors do not have nearly as much impact.

Of course, the study recognizes that it is not easy to compare findings. Besides the lack of comparable measurements in studies addressing different environmental matters, the unit of study can make comparison problematic. Different studies are based on specialized study units; for

example, some address individuals, others households. Sometimes studies use the same unit, households, but the social and cultural contexts are different. In the case of McGranahan and Songsore's (1994) study, a cross-cultural study was achieved, but the focus of questions was not suited to the kinds of issues addressed here. They found that household income affects the range and immediacy of environmental hazards, and hence the issues of concern to residents. Unfortunately, the structure and focus of their study does not allow comparison with the present results.

The lack of commonalities among research results indicates the early stage of this kind of inquiry. One factor, however, which did emerge clearly is the link between education and higher environmental orientation. If the educational factor is as influential in forming attitudes, as shown by this study, it is reasonable to conclude that education provides people with cognitive skills to address the kind of complex dynamic issues and problems common in TEP. As a practical conclusion, this suggests that it would be helpful to design a variety of environmental education programs, at all levels in the educational channel, to facilitate ecological thinking. This may also help to create general social expectations favoring environmentalism and to reinforce these as a norm.

6.3 Behavior Status

The most striking behavioral pattern is that people remain insufficiently committed to bring about actual changes through strong actions. This was shown by the extremely low behavioral index score. While the level of information about TEP is high, and attitudes are favorable to support alterations in behavior, concrete endeavor for behavioral change on the part of households are not apparent.

The finding suggests that the households under study need the greatest improvement on the behavioral aspect. Lower scores on the behavior dimension measured by choice of modes of transportation could be improved with improved bicycle paths and public transit facilities to enable reduced private automobile transportation without causing dramatic difficulties for the functioning of individual and society. Urban planning is to be addressed in addition to households' efforts.

Behavioral change is not easy. Direct initiatives for change involve expenditure and risk. Especially now, in the midst of an economic recession, these are formidable barriers to unaccustomed forms of environmental action.

This very understandable focus on fiscal issues today is reinforced by social communication. In the late 1980s, the news media gave prominent coverage to the environment. Ecological concerns were at the top of public opinion polls. Lately, media concentrate more on economic issues. Environmental issues have faded.

However, TEP is a system, as discussed in Chapter 1. When action at one point is difficult, action at another may become easier. Because certain kinds of projects are put on hold does not mean others may not be emphasized. New opportunities may present themselves.

The system as a whole is moving in the right direction. Concern for the environment is believed to have permeated public awareness. According to Jeremy Barker (1995), the London blue box program has become so successful that it has attracted recycling scavenging. In Toronto similar things have been reported. This phenomenon may be interpreted variably. One way to look at it is that people can be concerned about more than one thing at a time.

On the one hand, there is a general environmental commitment in households to cooperate with recycling. On the other, there is a recognition that environmentalism can be profitable. Both are good things, based in the fact that, more than ever, private effort is needed as governments currently are unable or unwilling to pay all the bills.

This suggests that the current dearth of funding for environmental protection may be an opportunity to help shift culturally shared assumptions to an expectation that environmental friendliness can pay. This may be the moment to integrate the environment and the economy, by encouraging private citizens to look to the "business" of caring for the environment. Trade-offs must be made. But priorities can be sorted out in a way that promotes strategies to avert environmental crises. Even short-term financial profit may also be conducive to long-term environmental gains.

6.4 Research Strengths and Weaknesses

Study of human environmental behavior is itself a form of human environmental behavior. Individuals' knowledge accumulates within the constraints and contexts of the environments they occupy and the interests they develop in other areas. With each new stage of understanding, there is a better awareness of the fact that there is much more to be understood. This study is a preliminary exploration, an attempt to identify some ideas about information, attitude, and behavior relationships, and to see how they might be developed and tested. Much of it is speculative and tentative.

In this study, an attempt is made to develop measures for human responses to TEP, and to provide a way to make the complex problem quantifiable, perceptible, and understandable. To do this, several distinctive

methodologies of classifying, analyzing, and evaluating the data were used. The usefulness and applicability of the conceptual and empirical work of this study involves primarily the validity and proper application of these methodologies.

Other than the particular strength of using composite indicators and the development of indexes, the research also built in some measures for checking the relative objectivity of the responses. The sample households are reasonably believed to be generally objective in reporting their attitudes. This was checked by using the set of questions about London environmental conditions. Based on the official environmental standards, the listed items were not problems.[33] Given the choice of scoring them on the scale from 0 to 2, the households average score for them was .97.

The main problem with the study concerns measuring complex human-environmental orientation by three dimensions depending only on the questionnaire. A more comprehensive measure of EOI may be derived from a combination of a questionnaire with in-depth interviews, participant observation, and field observation. A questionnaire could incorporate more items on the value dimension; more specific events to reflect time and place range. Additional and different results might have been obtained if data of actual behavior, instead of reported actions, could have been collected.

However, the measurements used were initial rather than final, tentative rather than settled, somewhat arbitrary

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[33] For example, according to Air Quality Index issued by The Ministry of the Environment and Environment Canada, the air quality in the city of London for the year 1992 was excellent. There were only 21 hours in that year the city experienced moderate air pollution levels of 32 to 49. The majority of the sample households indicated air pollution was not a problem or minor problem.

rather than fully reasoned. And inevitably the interpretation was subject to biases, known or unknown; though in this case, an effort was made to explain the "pro-environment" value position of the study, at the beginning.

Further refinement could be achieved, as is always the case with any scientific research. However, imperfections can be regarded as natural parts of any research undertaking. It is impossible to know everything. Only by building upon what has been learned, can better tools be developed and more knowledge acquired.

6.5 Geographic Contributions

This study uses geographic knowledge and techniques in understanding and analyzing the intrinsic spatial dimension of TEP. It demonstrates how urban patterns of spatial aspects in TEP can be discovered by application of the perspectives of behavioral geography. Analysis of the households' data showed that the spatially defined neighborhoods fail to display expected statistical difference. Geographic locations do not determine environmental positions.

The global-regional-local continuum measures do not provide strong support for traditional geographical theory of distance decay. These findings, in a limited way, offer empirical evidence for the opposite. In some cases, the households associate themselves the least with the local scale. In other cases, either the global or the regional scale has more impact. Does this suggest that households are less likely to be aware of or interested in their immediate surroundings?

The aspatial environmental patterns found by this study may be attributed to successful penetration of "green" effort over the last two decades in broadly informing the

public and in raising environmental consciousness. Mass media, and the information revolution have greatly affected every aspect of human life. They have begun to make people conscious of events on a global scale, and begin to acquaint them with environmental problems on a broad front.

These findings, perhaps, demonstrate the impact of the emerging information revolution in our civilization, specifically the mass media and even the computer internet. The changing means of human communication have reduced the physical barriers to the dispersion of information. Information about the most distant events and problems are made part of local information domains virtually everywhere.

These findings, should not be too surprising. Back in the 1960s the Canadian writer Marshall McLuhan argued that electronic media and communications were turning the world into a "global village". Webber(1964:67) also identified this phenomenon in the 'elastic mile' description when he characterizes human activities as being increasingly "freed from the restraints of territorial place". Geographical distance in many cases can no longer be measured by the merely physical mileage. Harvey (1990) provides another good interpretation of the globalization process of time-space compression. Taking a "post-modern" stance, he argues that the residents of the global village are moving to a new sense of oneness with all other humans on the earth. He does not intend this as a pious observation, but as an objective feature of a new flexible attitude toward space. Watts (1992) underlines the decreasing solidity of space, as he discusses the spatial scales from global to regional to local as a "dialectic interactive continuum". The findings of the present study lend empirical support to these ideas. The simple conceptions of space from traditional geography are demonstrably breaking down.

In one sense the world is geopolitically fragmented. In another way, the world is increasingly reassembled together through rapid movement of people, goods, technology, and ideas across borders. The world coming together is more of a reality than ever before. To geography, this represents a new form of spatial dimension. How can we reconceptualize space to account for its technologically altered "geometries"?

Both the biophysical and human worlds are changing locally, regionally, and globally in complex ways at unprecedented rate. The importance of the role of space and time in the changes has been increasingly recognized. The growing social scientific effort to understand these complicated new sets of spaces and times challenges geography to play a more active role in addressing contemporary issues in society (Gregory, 1994; Johnston, 1993).

Geography is surprisingly less prominent in claiming and contributing to the research domain of TEP. It should be expected to have been much more involved, given it is a discipline well situated in both the natural and social sciences, eminently capable of making such contributions. Clearly, when these issues were first entering public consciousness in the 1960s and 1970s, geography failed to take on the leadership role in the modern environmental movement that it could have (Caldwell, 1990:40).

Kates (1987) refers to this problem as "The road not taken, but still beckoning". Gradually, geographers are taking a more active role in the debates about humans and the environment (Adams, 1995:370). In a small way, this research represents such an effort.

6.6 Research Prospects and Needs

This and numerous other studies have shown that people care about a safe and healthy environment. Natural resources are more than commodities to be exploited and depleted, nor are they only there to fulfill people's needs for food, clothing, shelter, and energy. Public awakening to their need to care for the natural environment is more than a green movement. It is not just a political enthusiasm, but the incipient realization of a fundamentally human mode of life.

Anti-environmental backlash in society reflects another reality - that people act according to their beliefs, and not necessarily always based entirely on logic. For these reasons, TEP is once more shown to be a problem especially relevant to human attitude and behavior.

Social scientific environmental studies have shown a shift in the public trend to environmental concern. Earlier research reveals that this shift is related to most socioeconomic indicators. During the 1980s, a new view emerged. Studies have found concern for the environment has been much more broadly dispersed (Morrison and Dunlap, 1986; Mohai, 1992; Bryant and Mohai, 1992). They are widespread across most, and perhaps all, strata of society.

Environmental awareness has now reached a level where questions must be asked beyond the superficial type to which slogans are appropriate answers. Questioning needs to probe much deeper into structures to reveal the governing variations. Empirical work is necessary to test commonly held ideas about level of interest, support, and intent regarding the environment.

The absence of statistically significant support for the spatial hypotheses in this study does not rule out the

possibility of a spatial interpretation. The study may not have used scales completely appropriate to the question. Further study of the very surprising spatial phenomena discovered are obviously suggested.

Studies by Macey and Brown (1983) as well as Finger (1994) show that past experience is the best predictor of behavior. Matthias Finger's study conducted in Switzerland using a so-called "life-world" approach in particular reveals that environmental behavior is mainly related to environmental experiences. This clue suggests that questions about past experience could be added in future research to increase the explanatory power.

Milbrath (1984), Stern and Dietz (1994), and Stern et al. (1995) have found that belief and value variables explain much more than demographic categories in measuring environmentalism. Other explanatory variables, including the roles of gender, emotion, religion, and ideology, may also need more examination (Anderson, 1996).

Another avenue of investigation is to use the locus-of-control theory, usually employed in hazard perception, to see whether those believing in the power of their own actions are more favorably disposed to preventive action than those who see events as beyond their control.

Environmental organizations and groups can be distinguished in their positions along a range from the most "radical" to more "practical", along a "value" range from biocentric, through self-centered, to others (Kempton et al., 1995:88). Furthermore, such groups can be distinguished by their breadth of interest (for example, single/multi-issue), by scope of objectives (for example, species, carbon-cycle, global), or by their degree of "action orientation" (that is, developing concepts for change or

actually initiating it). The focus of some groups is local or "micro" (for example, advocating home composting) while others focus on high-profile or "macro" issues (for example, Greenpeace taking ships onto the high-seas). In the present research all such organizations were counted as similar; and it is doubtful that separating them would have made any difference in this context. However, these distinctions could be explored in a second-level of research.

To test how the measurements reflect the real world, repeated surveys may be conducted in London and other urban centers in Canada, even in other countries. "Systematized findings are invaluable to give precision to the hunches of common sense, to challenge and overthrow mere opinion or ideas" (Lowenthal, 1972:333-42).

Households are important decision-making, producing, and consuming units as discussed in the introductory chapter. They should continue to be an important focus of research about environmental behavior and attitudes. Their transactional functions means individual choice, collective action, and social strategies may be analyzed by using "rational choice theory" which works on the assumption that humans make reasoned social choices based on a multiplicity of factors (Coleman, 1986; Wallace and Wolf, 1991).

The need for indicators for the human behavioral dimension in TEP may be inferred from a recent discussion by Corson (1996). Among the wide variety of indicators and indexes about human-environmental activities, a general behavior index is missing. Since such indexes can be developed for other dimensions, social behavioral scientists need to develop general behavioral measures, instead of working on isolated individual issues and problems. One of the most innovative contributions of this study was the

development of a high-level behavioral index, the EOI. Further studies will be needed to confirm its validity and to perfect its accuracy as a potentially valuable means of social-scientific communication.

6.7 Human-Environment Sustainability Paradigm (HESP)

This study of the relationships of the environmental information, attitude and behavior of urban households is part of an expanding effort to understand the human dimension in the context of increasingly rapid and complex environmental changes. It has theoretical as well as pragmatic applicability beyond the discipline of geography. In this final section, the empirical findings are related to a new sociocultural move toward a sustainable world. Some early evidence of an emerging perspective, Human-Environment Sustainability Paradigm (HESP), that may come to be dominant in the twenty-first century, is identified and discussed.

Environmental changes are increasingly recognized as strongly linked to human activity. A most recent confirmation of this kind is a draft UN summary of a new report by the International Panel on Climate Change indicating humanity as cause of global warming. According to the report of New York Times Service (1995), the scientific experts are more convinced than before that global climate change is indeed in progress, and that at least some global warming is attributable to human action. A particular practice, carried out everywhere in the world that releases carbon dioxide into the local, regional, and global atmosphere, is the burning of coal, oil, and wood. This example illustrates that human activities of different kinds and scales have a cumulative impact that induces environmental problems with potentially destructive effects.

Responsible human-environmental interaction requires people actively engage themselves in changing the current environmentally unsustainable ways of life, and in adopting ways that are compatible with maintaining long-term harmonious human-environment relationship. This is an immensely challenging task, especially as the conditions in both the human and the biophysical worlds are getting more complex and changing faster.

Effective information acquisition, attitude adoption, and behavior alteration on a massive scale in varying and constrained contexts need to have general strategies and assisted by coordinated scientific endeavors. A recent proposal by Dennis C. Pirages (1996) of the "sociocultural genome project" in the social and behavioral sciences is attractive. The fundamental premise of this proposal is that human beings have the capability of modifying maladaptive traits in anticipation of negative future consequences. "Such a ... project would focus on analyzing the cognitive and structural aspects of the existing dominant social paradigm and evaluating the usefulness of its components for future sustainability" (Pirages, 1996:7). His proposal can be heard, therefore, as a call for serious studies, from the HESP perspective, to enable action through understanding.

The importance of the role that information plays, in shaping and changing the ways that human societies relate to their local environments and to the larger ones they are part of, is supported by the empirical findings of this research. People must perceive the need for new information, ethical guide, and goals for human activities to be carried out in environmentally sustainable manners. Changes need to take place in people's minds to enable them to map the course of a sustainable lifestyle that suits themselves.

Direct personal experience and indirect socioculturally communicated information is necessary.

Drawing from the results and the broad perspectives acquired from the conduct of the research, appearing in scientific and scholarly publications, and from the accounts from the public press and other media, there is some early evidence of the emergence of the Human-Environment Sustainability Paradigm. It is not unlikely that it will become the dominant worldview in the next millennium.

London households need to be seen as a snapshot of a much more extended event. They offer a glimpse of the perceptions, attitudes, and behaviors toward the environment, at the present time prevalent in modern Western society. They reflect relatively recent trends in the long history of human environment interactions. The consistently environmentally "positive" pattern of scores in each of the dimensions confirms the transactional-behavioral model, displayed as Figure 1.2 Environmental Orientation Circle.

That model also predicts that higher component scores are reliable indicators of increasing environmentalism overall, that is, EOI. Since educationally reinforced information, and culturally encouraged attitudes, are linked with everyday behaviors of an essentially environmental character, there is good reason to believe that the circle is a virtuous one, capable of sustaining and increasing itself. It is plausible, if still currently unverifiable (see the discussion of Figure 2.1), to expect the emergence of HESP as characteristic of the current shift in environmental position. Longitudinal studies will be necessary to obtain data for confirmation of the predictions of the present research.

Humanity has been at a cross-roads. But the findings of this study suggest that most people are taking the fork that will lead to a hopeful future. HESP will be centered on several ideas or propositions that have been important features of this research. They are outlined now, by way of a final conclusion to the study.

The global environment as the home of humankind does matter. Both environmental limits and limits of human environmental abuses are appreciated. The meaning and purpose of human life are qualitative enrichment not quantitative expansion.

The future of the environment and humankind is a choice and creation of the interaction of both these two forces, through the process of coevolution. Humans are significant and essential components of the earth's systems. People create and use artifacts in the form of both physical and mental models. These artifacts mediate human behavior, regulating human impact on the environment. Human beings have the ability to analyze and plan action and to seek for ways to construct a sustainable world.

Change is accepted and understood through learning. Continual research and information gathering is essential. An ever broadening spectrum of investigators and others become involved in the dissemination, and utilization of newly created research findings and information.

Individuals and groups in every kind of circumstances have a direct responsibility to conduct their lives in a way that will ensure a healthy and sustainable environment. Sociocultural diversity is respected and cherished.

Different values, beliefs, ideologies, and interests are unavoidable. Conflicts are inevitable. They are reconciled through willing communication and self-

regulation, from the deepest value of long-term sustainability.

The continuum of space is understood, and all points on the globe are felt to be present; no one supposes that action here will not be felt there. The integration of time gives a rediscovered dignity to the past and the future; the value in traditional schemes of a life in harmony with nature is respected equally with the most intensive forays into the future through technological innovation.

Within the Human-Environment Sustainability Paradigm, all recognize the inescapable unity of the human enterprise and expect to share knowledge freely, they take the habits of voluntary simplicity as commonsense, so they are relieved of anxiety about the necessities of existence, and can cultivate a "reflective consciousness" of experience, and with inexhastible access to knowledge about our world they conceive every plan and make every decision from the point of view of the interests of the global habitat.

Appendix 1

ENVIRONMENTAL INFORMATION SURVEY: SUMMER 1992

	Check the box which best reflects your opinion.	Strongly Disagree	Disagree	Don't Know	Agree	Strongly Agree
1.1	People's daily activities produce environmental change.					
1.2	People's lifestyles contribute to environmental damage.					
1.3	We need to change our daily practices in dealing with the environment.					
1.4	Our whole society will need to work together to take care of the environment.					
1.5	Individuals and households can help to reduce damage to the environment.					

2.1 How concerned are you over the following environmental problems?

	Not Concerned	Concerned	Very Concerned
urban smog			
ground water contamination			
toxic substances			
ozone depletion			
global warming			
endangered species			
pesticide use			
shoreline erosion			
landfill sites			
Other (specify)			

2.2 Which environmental conditions are a problem in London? How urgent are they?

	Not a Problem	Minor Problem	Major Problem
air pollution			
water pollution			
solid waste disposal			
loss of open land			
noise			
destruction of trees			
methane gas			
other (specify)			

2.3 What is your opinion of these?

	Never heard of this	I have heard about this. I believe it was ...		
		Not Serious	Serious	Very Serious
Bhopal				
Exxon Valdez				
Love Canal				
Hagersville tire fire				
Pottersburg Creek				
Chernobyl				
Victoria Hospital Incinerator				

2.4 Which of these environmental organizations are you aware of or belong to?

	Not heard of	Heard of	Belong to
Pollution Probe			
Friends of the Earth			
Greenpeace			
Project Environmental City			
Citizens' Advisory on Medway Environment			
Thames Region Ecological Assn (TREA)			
Global Action Plan (GAP)			
Others (Please List)			

3.1 Where do you get your environmental information? And estimate the amount.

	How much from each?			
	None	Small	Some	Lots
newspapers				
magazines				
TV programs/TV news				
radio programs				
environmental publications				
organizational involvement				
green business advertisers				
industry trade journals				
technical/academic journals				
science magazines				
personal contacts				

3.2 How much do you value the following?

	Not at all	Not much	Slightly	Quite a bit	Very much
Privacy					
Clean water & air					
Convenience					
Global vision					
Community involvement					
Comfortable lifestyle					

3.3 For each kind of product, check the choice you normally make.

Category	Your Choice	
Household cleaners	home recipe	store bought
Bathroom tissue	regular	recycled
Batteries	rechargable	disposable
Light bulbs	standard	energy-saving
Water faucets	water saving	free-flowing

3.4 Which activities are you currently involved in?

	YES	NO
reusing, saving (bottles, packages, etc.)		
composting		
the blue box program		
newspaper recycling		
ride sharing		
public transit		
water conservation		
turning off unused lights		

3.5 For each recreational activity, indicate how many members of your household enjoy and take part in the activity, at least 5 times each year.

	Number of persons
hiking	
canoeing/kyaking	
snow mobiling/ATV	
motercycling	
boating	
skiing	
recreational shopping	
gardening	
heavy partying	
reading for pleasure	

4.1 If given the chance to purchase a new house, which features would you regard as being absolutely essential, useful, or as having no value or interest to you?

	Essential	Useful	No value
south or east facing exposure			
insulated walls and ceilings			
central air conditioning/ climatic controlled environment			
two-car heated garage			
solar-heated hot water system			
high energy efficient central heating system			
few windows			
minimal care household lot			
well-landscaped lot with weed-free lawns			
fully electric kitchen			
trunk sewer			
City water-supply			

4.2 Which of the following do you think could help to solve environmental problems? How much confidence do you have that they will actually do something?

	My confidence that this group will help is...			
	none	little	medium	great
environmental groups				
legislators/politicians				
business/industrial people				
scientists and technologists				
lawyers				
educators				
individuals/households				

4.3 Which of the following initiatives would you support? When?	I would support the initiative		
	Never at all	In the future	Right away
accept more environmental taxes/fees			
make private contributions for environmental improvement			
support legislation to reduce environmental damage			
support land-use restrictions			
exploit more resources for a high growth economy			
increase price of gas to discourage use of cars			
increase consumer confidence and spending			
encourage development of current waste management practices			
expand recycling program			

5.1 Are any members of your household involved in these organizations?	Number of persons
Boy Scouts	
Girl Guides	
London Co-op Store	
Conservation authorities	
School Board/Committees	
Urban League	
Chamber of Commerce	
A church, synogogue, mosque	
Service clubs	

5.2 How long have you lived in this area?

	Number of years
In London	
at this address?	

5.3 **Age group of family members.**
Please show number of persons in each age group.

under 21	21 - 35	36 - 50	51 - 65	66 and over

5.4 **Different education levels of members of household.**
Please show number of persons at each level.

primary	secondary	technical or college	university

5.5 **Primary occupations of members of the household.**
Please show number of persons in each occupation.

professional	
commerce and business	
skilled worker/trades	
home maker	
public administrator	
student	
unemployed	
others ?	
others ?	

5.6 **Combined income of entire household.**

under $25,000	
$25,000 to $49,999	
$50,000 to $74,999	
$75,000 to $99,999	
$100,000 or over	

Thank-you very much for your participation in this study!

If you would like a summary copy of the results, please indicate where it should be sent.

Name:

Adress:

Postal Code:

Additional comments:

Appendix 2

VARIABLE CODES FOR DATA ENTRY

		Check the box which best reflects your opinion.	Strongly Disagree	Disagree	Don't Know	Agree	Strongly Agree
Q1	1.1	People's daily activities produce environmental change.	1	2	3	4	5
Q2	1.2	People's lifestyles contribute to environmental damage.	1	2	3	4	5
Q3	1.3	We need to change our daily practices in dealing with the environment.	1	2	3	4	5
Q4	1.4	Our whole society will need to work together to take care of the environment.	1	2	3	4	5
Q5	1.5	Individuals and households can help to reduce damage to the environment.	1	2	3	4	5

2.1 How concerned are you over the following environmental problems?

		Not Concerned	Concerned	Very Concerned
Q6	urban smog	0	1	2
Q7	ground water contamination	0	1	2
Q8	toxic substances	0	1	2
Q9	ozone depletion	0	1	2
Q10	global warming	0	1	2
Q11	endangered species	0	1	2
Q12	pesticide use	0	1	2
Q13	shoreline erosion	0	1	2
Q14	landfill sites	0	1	2
Q15	Other (specify)	0xx	1xx	2xx

2.2 Which environmental conditions are a problem in London? How urgent are they?

		Not a Problem	Minor Problem	Major Problem
Q16	air pollution	0	1	2
Q17	water pollution	0	1	2
Q18	solid waste disposal	0	1	2
Q19	loss of open land	0	1	2
Q20	noise	0	1	2
Q21	destruction of trees	0	1	2
Q22	methane gas	0	1	2
Q23	other (specify)	0xx	1xx	2xx

2.3 What is your opinion of these?

		Never heard of this	I have heard about this. I believe it was ...		
			Not Serious	Serious	Very Serious
Q24	Bhopal	0	1	2	3
Q25	Exxon Valdez	0	1	2	3
Q26	Love Canal	0	1	2	3
Q27	Hagersville tire fire	0	1	2	3
Q28	Pottersburg Creek	0	1	2	3
Q29	Chernobyl	0	1	2	3
Q30	Victoria Hospital Incinerator	0	1	2	3

2.4 Which of these environmental organizations are you aware of or belong to?

		Not heard of	Heard of	Belong t.
Q31	Pollution Probe	0	1	2
Q32	Friends of the Earth	0	1	2
Q33	Greenpeace	0	1	2
Q34	Project Environmental City	0	1	2
Q35	Citizens' Advisory on Medway Environment	0	1	2
Q36	Thames Region Ecological Assn (TREA)	0	1	2
Q37	Global Action Plan (GAP)	0	1	2
Q38	Others (Please List)	0 x n	1 x n	2 x n

3.1 Where do you get your environmental information? And estimate the amount.

		How much from each?			
		None	Small	Some	Lots
Q39	newspapers	0	1	2	3
Q40	magazines	0	1	2	3
Q41	TV programs/TV news	0	1	2	3
Q42	radio programs	0	1	2	3
Q43	environmental publications	0	1	2	3
Q44	organizational involvement	0	1	2	3
Q45	green business advertisers	0	1	2	3
Q46	industry trade journals	0	1	2	3
Q47	technical/academic journals	0	1	2	3
Q48	science magazines	0	1	2	3
Q49	personal contacts	0	1	2	3

3.2 How much do you value the following?

		Not at all	Not much	Slightly	Quite a bit	Very much
Q50	Privacy	0	1	2	3	4
Q51	Clean water & air	0	1	2	3	4
Q52	Convenience	0	1	2	3	4
Q53	Global vision	0	1	2	3	4
Q54	Community involvement	0	1	2	3	4
Q55	Comfortable lifestyle	0	1	2	3	4

3.3 For each kind of product, check the choice you normally make.

	Category	Your Choice				*Mix*
Q56	Household Cleaners	home recipe	+1	store	-1	*0*
Q57	Bathroom tissue	regular	-1	recycled	+1	*0*
Q58	Batteries	rechargable	+1	disposable	-1	*0*
Q59	Light bulbs	standard	-1	energy-save	+1	*0*
Q60	Water faucets	water save	+1	free-flow	-1	*0*

3.4 Which activities are you currently involved in?

		YES	NO
Q61	reusing, saving (bottles, packages, etc.)	1	0
Q62	composting	1	0
Q63	the blue box program	1	0
Q64	newspaper recycling	1	0
Q65	ride sharing	1	0
Q66	public transit	1	0
Q67	water conservation	1	0
Q68	turning off unused lights	1	0

3.5 For each recreational activity, indicate how many members of your household enjoy and take part in the activity, at least 5 times each year.

		Number of persons
Q69	hiking	#
Q70	canoeing/kyaking	#
Q71	snow mobiling/ATV	#
Q72	motercycling	#
Q73	boating	#
Q74	skiing	#
Q75	recreational shopping	#
Q76	gardening	#
Q77	heavy partying	#
Q78	reading for pleasure	#

4.1 If given the chance to purchase a new house, which features would you regard as being absolutely essential, useful, or as having no value or interest to you?

		Essential	Useful	No value
Q79	south or east facing exposure	2	1	0
Q80	insulated walls and ceilings	2	1	0
Q81	central air conditioning/ climatic controlled environment	2	1	0
Q82	two-car heated garage	2	1	0
Q83	solar-heated hot water system	2	1	0
Q84	high energy efficient central heating system	2	1	0
Q85	few windows	2	1	0
Q86	minimal care household lot	2	1	0
Q87	well-landscaped lot with weed-free lawns	2	1	0
Q88	fully electric kitchen	2	1	0
Q89	trunk sewer	2	1	0
Q90	City water-supply	2	1	0

4.2 Which of the following do you think could help to solve environmental problems? How much confidence do you have that they will actually do something?

		My confidence that this group will help is...			
		none	little	medium	great
Q91	environmental groups	0	1	2	3
Q92	legislators/politicians	0	1	2	3
Q93	business/industrial people	0	1	2	3
Q94	scientists and technologists	0	1	2	3
Q95	lawyers	0	1	2	3
Q96	educators	0	1	2	3
Q97	individuals/households	0	1	2	3

	4.3 Which of the following initiatives would you support? When?	I would support the initiative		
		Never at all	In the future	Right away
Q98	accept more environmental taxes/fees	0	1	2
Q99	make private contributions for environmental improvement	0	1	2
Q100	support legislation to reduce environmental damage	0	1	2
Q101	support land-use restrictions	0	1	2
Q102	exploit more resources for a high growth economy	0	1	2
Q103	increase price of gas to discourage use of cars	0	1	2
Q104	increase consumer confidence and spending	0	1	2
Q105	encourage development of current waste management practices	0	1	2
Q106	expand recycling program	0	1	2

	5.1 Are any members of your household involved in these organizations?	Number of persons
Q107	Boy Scouts	#
Q108	Girl Guides	#
Q109	London Co-op Store	#
Q110	Conservation authorities	#
Q111	School Board/Committees	#
Q112	Urban League	#
Q113	Chamber of Commerce	#
Q114	A church, synogogue, mosque	#
Q115	Service clubs	#

5.2 How long have you lived in this area?

		Number of years
Q116	In London	#
Q117	at this address?	#

5.3 Age group of family members.

Please show number of persons in each age group.

Q118	*Q119*	*Q120*	*Q121*	*Q122*
#	#	#	#	#
under 21	21 - 35	36 - 50	51 - 65	66 and over

5.4 Different education levels of members of household.

Please show number of persons at each level.

Q123	*Q124*	*Q125*	*Q126*
#	#	#	#
primary	secondary	technical or college	university

5.5 Primary occupations of members of the household.

Please show number of persons in each occupation.

Q127	professional	#
Q128	commerce and business	#
Q129	skilled worker/trades	#
Q130	home maker	#
Q131	public administrator	#
Q132	student	#
Q133	unemployed	#
Q134	retired	#
Q135	others ?	#

Combined income of entire household.

Q136	under $25,000	1
	$25,000 to $49,999	1
	$50,000 to $74,999	1
	$75,000 to $99,999	1
	$100,000 or over	1

Appendix 3

The UNIVERSITY of WESTERN ONTARIO

Department of Geography

Dear Householder:

I am a graduate student in the Department of Geography at the University of Western Ontario. I am studying London householders' response to environmental matters. I believe that, if we work together to learn about what the public thinks, and about how they act toward the environment, we may be able to help make our environment more liveable.

Your household is one of 300 randomly selected for this study to find out what environmental information people have and how they use it. All information you give will be treated in strictest confidence. The results of this survey will be statistically summarized, and no individual household will be identified. The findings will be presented at the University as research in partial fulfillment of my degree requirements.

The questions enclosed will take a few minutes of your time to answer. If you cannot answer the questions now, do so at your earliest convenience. In that case, please place your completed questionnaire in the bag supplied and hang it outside your door. I will call back to collect it.

If you are interested in receiving a brief summary of the results, or have additional comments, please indicate this at the end of the questionnaire.

Please do not hesitate to phone me at (519) 679-2111 Extension 5019, if you have any questions.

Yours sincerely,

Shouchao Fu

S.C.Fu

Graduate Student
Department of Geography
University of Western Ontario

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Fax (519) 661-[illegible]

Appendix 4

SPSS Computing Procedures for Index Construction

Information

```
recode Q24i to Q30i (0=0) (1,2,3=1).
compute i1=mean(Q24i,Q25i,Q26i,Q27i,Q28i,Q29i,Q30i).
variable labels i1 'information 1: events'.

recode Q31i to Q38i (0=0) (1,2,3,4,8=1).
compute i2=mean(Q31i,Q32i,Q33i,Q34i,Q35i,Q36i,Q37i,Q38i).
variable labels i2 'information 2: groups'.

recode Q39i to Q49i (0=0) (1,2,3=1).
compute i3a=mean(Q43i,Q44i,Q46i,Q47i,Q48i,Q49i).
variable labels i3a 'private sources'.

compute i3b=mean(Q39i,Q40i,Q41i,Q42i,Q45i).
variable labels i3b 'public sources'.

compute i3=mean(i3a,i3b).
variable labels i3 'information 3: sources'.

compute i4a=mean(Q43,Q44,Q46,Q47,Q48,Q49).
variable labels i4a 'private amount'.

compute i4b=mean(Q39,Q40,Q41,Q42,Q45).
variable labels i4b 'public amount'.

compute i4=mean(i4a,i4b).
variable labels i4 'information 4: amount'.

compute idx=(i1+i2+i3+i4)/6*100.
variable labels idx 'information index'.
```

Attitude

```
compute a1=mean(Q1,Q2,Q3,Q4,Q5).
variable labels a1 'attitude 1: general views'.

compute a2=mean(Q6,Q7,Q8,Q9,Q10,Q11,Q12,Q13,Q14,Q15).
variable labels a2 'attitude 2: concern for problems'.

compute lc=mean(Q16,Q17,Q18,Q19,Q20,Q21,Q22,Q23).
variable labels lc 'London conditions'.

compute a3=mean(Q91,Q92,Q93,Q94,Q95,Q96,Q97).
variable labels a3 'attitude 3: level of confidence'.

recode Q102a Q104a (0=2) (2=0).
compute
a4=mean(Q98,Q99,Q100,Q101,Q102a,Q103,Q104a,Q105,Q106).
variable labels a4 'attitude 4: scope of support'.

compute adx=(a1+a2+a3+a4)/8*100.
variable labels adx 'attitude index'.
```

Behavior

```
compute b1=mean(Q31,Q32,Q33,Q34,Q35,Q36,Q37,Q38).
variable labels b1 'behavior 1: group association'.

compute b2=mean(Q56,Q57,Q58,Q59,Q60).
variable labels b2 'behavior 2: product choice'.

compute b3=mean(Q61,Q62,Q63,Q64,Q65,Q66,Q67,Q68).
variable labels b3 'behavior 3: current action'.

compute b4ld=mean(Q69w,Q70w,Q73w,Q74w,Q76w,Q78w).
variable labels b4ld 'behavior 4ld: less destructive'.

compute b4md=mean(Q71w,Q72w,Q75w,Q77w).
variable labels b4md 'behavior 4md: more destructive'.

compute b4=b4ld-b4md.
variable labels b4 'behavior 4: recreational participants'.

compute bdx=(b1+b2+b3+b4)/5.75*100.
variable labels bdx 'behavior index'.
```

Value

```
compute v1=mean(Q51,Q53,Q54).
variable labels v1 'value 1: exological focus'.

recode Q50v Q52v Q55v (0=4) (1=3) (2=2) (3=1) (4=0).
compute v2=mean(Q50v,Q52v,Q55v).
variable labels v2 'value 2: endological focus'.

compute v3=mean(Q79,Q80,Q83,Q84,Q86).
variable labels v3 'value 3: natural features'.

recode Q81v Q82v Q85v Q87v Q88v Q89 Q90 (2=0) (0=2).
compute v4=mean(Q81v,Q82v,Q85v,Q87v,Q88v,Q89,Q90).
variable labels v4 'value 4: artificial features'.

compute vdx=((v1-v2)+(v3-v4))/6*100.
variable labels vdx 'value index'.

compute
org=mean(Q107,Q108,Q109,Q110,Q111,Q112,Q113,Q114,Q115).
variable labels org 'organizational membership'.
```

Spatial

```
compute s1g=mean(Q9,Q10).
variable labels s1g 'spatial 1: global scale'.
compute s1r=mean(Q11,Q13).
variable labels s1r 'spatial 1: regional scale'.
compute s1l=mean(Q6,Q7,Q8,Q12,Q14).
variable labels s1l 'spatial 1: local scale'.

compute s2g=mean(Q24,Q29).
variable labels s2g 'spatial 2: global distance'.
compute s2r=mean(Q25,Q26,Q27).
variable labels s2r 'spatial 2: regional distance'.
compute s2l=mean(Q28,Q30).
variable labels s2l 'spatial 2: local distance'.

compute s3g=mean(Q32,Q33,Q37).
variable labels s3g 'spatial 3: global scope'.
compute s3r=mean(Q31,Q36).
variable labels s3r 'spatial 3: regional scope'.
compute s3l=mean(Q34,Q35).
variable labels s3l 'spatial 3: local scope'.

compute s4g=mean(Q24i,Q29i).
variable labels s4g 'spatial 4: global event info'.
compute s4r=mean(Q25i,Q26i,Q27i).
variable labels s4r 'spatial 4: regional event info'.
compute s4l=mean(Q28i,Q30i).
variable labels s4l 'spatial 4: local event info'.

compute s5g=mean(Q32i,Q33i,Q37i).
variable labels s5g 'spatial 5: global group info'.
compute s5r=mean(Q31i,Q36i).
variable labels s5r 'spatial 5: regional group info'.
compute s5l=mean(Q34i,Q35i).
variable labels s5l 'spatial 5: local group info'.

compute sdg=(s1g+s2g+s3g+s4g+s5g)/9*100.
variable labels sdg 'spatial dimension: global'.
compute sdr=(s1r+s2r+s3r+s4r+s5g)/9*100.
variable labels sdr 'spatial dimension: regional'.
compute sdl=(s1l+s2l+s3l+s4l+s5l)/9*100.
variable labels sdl 'spatial dimension: local'.
```

Temporal

```
compute tif=(mean(Q26i,Q28i))/1*100.
variable labels tif 'temporal information: far distance'.
compute tim=(mean(Q24i,Q29i,Q30i))/1*100.
variable labels tim 'temporal information: medium distance'.
compute tin=(mean(Q25i,Q27i))/1*100.
variable labels tin 'temporal information: near distance'.

compute taf=(mean(Q26,Q28))/3*100.
variable labels taf 'temporal attitude: far distance'.
compute tam=(mean(Q24,Q29,Q30))/3*100.
variable labels tam 'temporal attitude: medium distance'.
compute tan=(mean(Q25,Q27))/3*100.
variable labels tan 'temporal attitude: near distance'.

COMPUTE tdf = (taf + tif)/2.
VARIABLE LABELS tdf 'time dimension: far distance' .
COMPUTE tdm = (tam + tim)/2.
VARIABLE LABELS tdm 'time dimension: medium distance' .
COMPUTE tdn = (tan + tin)/2.
VARIABLE LABELS tdn 'time dimension: near distance' .
```

Environmental Orientation Index

```
compute EOI=(adx+bdx+idx)/300*100.
variable labels EOI 'environmental orientation index'.
```

Appendix 5

SUMMARY OF HOUSEHOLD RESPONSES

		Check the box which best reflects your opinion.	Strongly Disagree		Disagree		Don't Know		Agree		Strongly Agree	
Q1	1.1	People's daily activities produce environmental change.	2	0.7%	7	2.3%	20	6.6%	173	57.3%	100	33.1%
Q2	1.2	People's lifestyles contribute to environmental damage.	3	1.0%	4	1.3%	10	3.3%	147	48.7%	138	45.7%
Q3	1.3	We need to change our daily practices in dealing with the environment.	3	1.0%	3	1.0%	11	3.6%	146	48.3%	139	46.0%
Q4	1.4	Our whole society will need to work together to take care of the environment.	3	1.0%	2	0.7%	5	1.7%	96	31.8%	196	64.9%
Q5	1.5	Individuals and households can help to reduce damage to the environment.	3	1.0%	2	0.7%	6	2.0%	135	44.7%	156	51.7%

2.1 How concerned are you over the following environmental problems?

		Not Concerned		Concerned		Very Concerned	
Q6	urban smog	46	15.2%	172	57.0%	84	27.8%
Q7	ground water contamination	24	7.9%	130	43.0%	148	49.0%
Q8	toxic substances	11	3.6%	130	43.0%	161	53.3%
Q9	ozone depletion	9	3.0%	106	35.1%	187	61.9%
Q10	global warming	32	10.6%	140	46.4%	130	43.0%
Q11	endangered species	23	7.6%	147	48.7%	132	43.7%
Q12	pesticide use	26	8.6%	160	43.0%	116	38.4%
Q13	shoreline erosion	84	27.8%	161	53.3%	57	18.9%
Q14	landfill sites	26	8.6%	163	54.0%	113	37.4%
Q15	Other (specify)	264	87.4%			38	12.6%

2.2 Which environmental conditions are a problem in London? How urgent are they?

		Not a Problem		Minor Problem		Major Problem	
Q16	air pollution	64	21.2%	198	65.6%	40	13.2%
Q17	water pollution	40	13.2%	153	50.7%	109	36.1%
Q18	solid waste disposal	34	11.3%	116	38.4%	152	50.3%
Q19	loss of open land	52	17.2%	100	33.1%	150	49.7%
Q20	noise	104	34.4%	153	50.7%	45	14.9%
Q21	destruction of trees	66	21.9%	125	41.4%	111	36.8%
Q22	methane gas	96	31.8%	159	52.6%	47	15.6%
Q23	other (specify)	281	93.0%			21	7.0%

2.3 What is your opinion of these?

		Never heard of this		I have heard about this. I believe it was ... Not Serious		Serious		Very Serious	
Q24	Bhopal	138	45.7%	1	0.3%	27	8.9%	136	45.0%
Q25	Exxon Valdez	46	15.2%	3	1.0%	50	16.6%	203	67.2%
Q26	Love Canal	72	23.8%	8	2.6%	47	15.6%	175	57.9%
Q27	Hagersville tire fire	9	3.0%	8	2.6%	124	41.1%	161	53.3%
Q28	Pottersburg Creek	57	18.9%	30	9.9%	122	40.4%	93	30.8%
Q29	Chernobyl	20	6.6%	3	1.0%	23	7.6%	256	84.8%
Q30	Victoria Hospital Incinerator	25	8.3%	102	33.8%	133	44.0%	42	13.9%

2.4 Which of these environmental organizations are you aware of or belong to?

		Not heard of		Heard of		Belong to	
Q31	Pollution Probe	88	29.1%	208	68.9%	6	2.0%
Q32	Friends of the Earth	70	23.2%	225	74.5%	7	2.3%
Q33	Greenpeace	9	3.0%	257	85.1%	36	11.9%
Q34	Project Environmental City	259	85.8%	40	13.2%	3	1.0%
Q35	Citizens' Advisory on Medway Environment	206	68.2%	95	31.5%	1	0.3%
Q36	Thames Region Ecological Assn (TREA)	144	47.7%	146	48.3%	12	4.0%
Q37	Global Action Plan (GAP)	143	47.4%	128	42.4%	31	10.3%
Q38	Others (Please List)	273	90.4%	4	1.3%	25	8.3%

3.1 Where do you get your environmental information? And estimate the amount.

		How much from each? None		Small		Some		Lots	
Q39	newspapers	11	3.6%	34	11.3%	152	50.3%	105	34.8%
Q40	magazines	28	9.3%	43	14.2%	167	55.3%	64	21.2%
Q41	TV programs/TV news	8	2.6%	14	4.6%	126	41.7%	154	51.0%
Q42	radio programs	35	11.6%	84	27.8%	131	43.4%	52	17.2%
Q43	environmental publications	102	33.8%	80	26.5%	81	26.8%	39	12.9%
Q44	organizational involvement	180	59.6%	54	17.9%	38	12.6%	30	9.9%
Q45	green business advertisers	129	42.7%	109	36.1%	49	16.2%	15	5.0%
Q46	industry trade journals	237	78.5%	38	12.6%	19	6.3%	8	2.6%
Q47	technical/academic journals	215	71.2%	41	13.6%	32	10.6%	14	4.6%
Q48	science magazines	158	52.3%	64	21.2%	55	18.2%	25	8.3%
Q49	personal contacts	65	21.5%	101	33.4%	96	31.8%	40	13.2%

3.2 How much do you value the following?

		Not at all		Not much		Slightly		Quite a bit		Very much	
Q50	Privacy	7	2.3%	2	0.7%	13	4.3%	101	33.4%	179	59.3%
Q51	Clean water & air	4	1.3%	0	0.0%	0	0.0%	44	14.6%	254	84.1%
Q52	Convenience	8	2.6%	14	4.6%	77	25.5%	152	50.3%	51	16.9%
Q53	Global vision	27	8.9%	13	4.3%	65	21.5%	122	40.4%	75	24.8%
Q54	Community involvement	16	5.3%	27	8.9%	80	26.5%	129	42.7%	50	16.6%
Q55	Comfortable lifestyle	5	1.7%	5	1.7%	45	14.9%	159	52.6%	88	29.1%

3.3 For each kind of product, check the choice you normally make.

	Category	Your Choice				Mix	
Q56	Household Cleaners	home recipe	41	13.6%	store	240	79.5%	21	7.0%
Q57	Bathroom tissue	regular	94	31.1%	recycled	185	61.3%	23	7.6%
Q58	Batteries	rechargable	126	41.7%	disposable	144	47.7%	32	10.6%
Q59	Light bulbs	standard	105	34.8%	energy-save	170	56.3%	27	8.9%
Q60	Water faucets	water save	171	56.6%	free-flow	110	36.4%	21	7.0%

3.4 Which activities are you currently involved in?

		YES		NO	
Q61	reusing, saving (bottles, packages, etc.)	270	89.4%	32	10.6%
Q62	composting	147	48.7%	155	51.3%
Q63	the blue box program	291	96.4%	11	3.6%
Q64	newspaper recycling	283	93.7%	19	6.3%
Q65	ride sharing	59	19.5%	243	80.5%
Q66	public transit	61	20.2%	241	79.8%
Q67	water conservation	241	79.8%	61	20.2%
Q68	turning off unused lights	291	96.4%	11	3.6%

3.5 For each recreational activity, indicate how many members of your household enjoy and take part in the activity, at least 5 times each year.

Total persons = 893

		Number of persons	
Q69	hiking	291	32.6%
Q70	canoeing/kyaking	90	10.1%
Q71	snow mobiling/ATV	27	3.0%
Q72	motercycling	28	3.1%
Q73	boating	153	17.1%
Q74	skiing	152	17.0%
Q75	recreational shopping	524	58.7%
Q76	gardening	542	60.7%
Q77	heavy partying	116	13.1%
Q78	reading for pleasure	639	71.6%

4.1 If given the chance to purchase a new house, which features would you regard as being absolutely essential, useful, or as having no value or interest to you?

		Essential		Useful		No value		Nonresponse	
Q79	south or east facing exposure	55	18.2%	160	53.0%	75	24.8%	12	4.0%
Q80	insulated walls and ceilings	265	87.7%	27	8.9%	3	1.0%	7	2.3%
Q81	central air conditioning/ climatic controlled environment	107	35.4%	141	46.7%	44	14.6%	10	3.3%
Q82	two-car heated garage	14	4.6%	64	21.2%	216	71.5%	8	2.6%
Q83	solar-heated hot water system	26	8.6%	210	69.5%	57	18.9%	9	3.0%
Q84	high energy efficient central heating system	197	65.2%	88	29.1%	10	3.3%	7	2.3%
Q85	few windows	10	3.3%	75	24.8%	203	67.2%	14	4.6%
Q86	minimal care household lot	39	12.9%	152	50.3%	100	33.1%	11	3.6%
Q87	well-landscaped lot with weed-free lawns	51	16.9%	159	52.6%	81	26.8%	11	3.6%
Q88	fully electric kitchen	65	21.5%	142	47.0%	83	27.5%	12	4.0%
Q89	trunk sewer	117	38.7%	85	28.1%	60	19.9%	40	13.2%
Q90	City water-supply	217	71.9%	62	20.5%	15	5.0%	8	2.6%

4.2 Which of the following do you think could help to solve environmental problems? How much confidence do you have that they will actually do something?

		My confidence that this group will help is...							
		none		little		medium		great	
Q91	environmental groups	13	4.3%	37	12.3%	132	43.7%	120	39.7%
Q92	legislators/politicians	69	22.8%	126	41.7%	77	25.5%	30	9.9%
Q93	business/industrial people	61	20.2%	119	39.4%	60	19.9%	62	20.5%
Q94	scientists and technologists	19	6.3%	34	11.3%	135	44.7%	114	37.7%
Q95	lawyers	170	56.3%	101	33.4%	27	8.9%	4	1.3%
Q96	educators	20	6.6%	56	18.5%	118	39.1%	108	35.8%
Q97	individuals/households	10	3.3%	57	18.9%	123	40.7%	112	37.1%

	4.3 Which of the following initiatives would you support? When?	I would support the initiative: Never at all		In the future		Right away		No Response	
Q98	accept more environmental taxes/fees	105	34.8%	103	34.1%	81	26.8%	13	4.3%
Q99	make private contributions for environmental improvement	55	18.2%	147	48.7%	90	29.8%	10	3.3%
Q100	support legislation to reduce environmental damage	12	4.0%	33	10.9%	246	81.5%	11	3.6%
Q101	support land-use restrictions	8	2.6%	41	13.6%	240	79.5%	13	4.3%
Q102	exploit more resources for a high growth economy	175	57.9%	56	18.5%	46	15.2%	25	8.3%
Q103	increase price of gas to discourage use of cars	166	55.0%	78	25.8%	43	14.2%	15	5.0%
Q104	increase consumer confidence and spending	49	16.2%	60	19.9%	160	53.0%	33	10.9%
Q105	encourage development of current waste management practices	15	5.0%	42	13.9%	229	75.8%	16	5.3%
Q106	expand recycling program	4	1.3%	31	10.3%	261	86.4%	6	2.0%

	5.1 Are any members of your household involved in these organizations?	Number of persons		Total persons = 893
Q107	Boy Scouts	17	1.9%	
Q108	Girl Guides	26	2.9%	
Q109	London Co-op Store	7	0.8%	
Q110	Conservation authorities	13	1.5%	
Q111	School Board/Committees	35	3.9%	
Q112	Urban League	10	1.1%	
Q113	Chamber of Commerce	7	0.8%	
Q114	A church, synogogue, mosque	132	14.8%	
Q115	Service clubs	51	5.7%	

	5.2 How long have you lived in this area?	Number of years
Q116	In London	mean=24.9
Q117	at this address?	mean=11.8

5.3 Age group of family members.

Please show number of persons in each age group.

Q118	Q119	Q120	Q121	Q122
279 31.2%	207 23.2%	210 23.5%	124 13.9%	73 8.2%
under 21	21 - 35	36 - 50	51 - 65	66 and over

Total persons = 893

5.4 Different education levels of members of household.

Please show number of persons at each level.

Q123	Q124	Q125	Q126
178 19.9%	215 24.1%	158 17.7%	237 26.5%
primary	secondary	technical or college	university

Total persons = 893

105 ...8%
unidentified

5.5 Primary occupations of members of the household.

Please show number of persons in each occupation.

Total persons = 893

Q127	professional	165	18.5%
Q128	commerce and business	108	12.1%
Q129	skilled worker/trades	117	13.1%
Q130	home maker	81	9.1%
Q131	public administrator	13	1.5%
Q132	student	232	26.0%
Q133	unemployed	12	1.3%
Q134	retired	64	7.2%
Q135	others? QUESTION DROPPED		
	unidentified	101	11.3%

Combined income of entire household.

Q136	under $25,000	30	9.9%
	$25,000 to $49,999	85	28.1%
	$50,000 to $74,999	6	25.2%
	$75,000 to $99,999	39	12.9%
	$100,000 or over	27	8.9%
	No Response	45	14.9%

NOTE: DUE TO ROUNDING, PERCENTAGES DO NOT ALWAYS ADD TO EXACTLY 100%.

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