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TESTING THE ENVIRONMENTAL APPRAISAL INVENTORY

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HUMAN DISPOSITION TOWARD HAZARDS:

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By

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ABSTRACT

HUMAN DISPOSITION TOWARD HAZARDS: TESTING THE ENVIRONMENTAL APPRAISAL INVENTORY

By

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This study investigates the person-environment interface between the appraisal of risk and the commitment to a quality environment, as well as the behavior necessary to maintain a quality environment. Using an expanded version of the Environmental Appraisal Inventory—EAI (Schmidt and Gifford 1989), a sample of Michigan residents were tested to determine the relationship between their perception of risk and their subsequent behavior. Michigan residents, like residents of all 50 states, are faced with the proliferation of small quantities of hazardous materials (less than 200 pounds per month) being discharged into the environment. These wastes are not regulated; therefore, "best practices" must be voluntary. Some of the complications for educators are citizens' (1) lack of awareness of the problem, (2) uncertainty regarding the risks involved, (3) lack of knowledge about "best practices," and (4) lack of opportunity to act on knowledge. The educational assumption is that appropriate information from a credible source and a legitimate opportunity to act will result in action. The goal of this research was to determine the relationship between disposition toward environmental threat or hazard and an expressed commitment to, or action taken to, protect the environment from contamination. The expanded and retested version of the EAI (Schmidt and Gifford 1989) was used to measure the disposition toward environmental risk to self and to the ambient environment. The EAI was

also used to measure the control (confidence) individuals feel in being able to mitigate environmental hazards and the level of personal responsibility individuals feel for the existence of those environmental hazards. The objectives of this research study were to expand the work done by Schmidt and Gifford (1989), confirm the validity and reliability of the EAI in a new context, and explore the relationship between people's disposition toward environmental hazards and their commitment to protecting the environment. A secondary objective was to explore the relationship between people's disposition toward environmental hazards and their demographic characteristics as well as experience with environmental pollution. These findings are then presented in support of environmental education program planning.

ACKNOWLEDGMENTS

The completion of a dissertation causes one to reflect on the process and the milestones along the way. For some it is a relatively organized and predictable path and for others, such as myself, it is unpredictable and plagued by many starts, stops, and delays. Although the path has been challenging for me, it has been challenging also for those who have supported me over the years. I will never forget them nor cease to be grateful.

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RESEARCH PROBLEM AND PURPOSE

PROBLEM

The continuing proliferation of chemicals on the market and the increased incidents of adverse health effects and environmental damage resulting from unsafe toxic management practices have heightened community concerns regarding exposure to hazardous materials. Excluding pesticides, more than 1,000 new chemicals are introduced into the marketplace each year and well over 60,000 are already on the market (Rassbach, 1988). Consumers, often unaware that over-the-counter household products may contain toxic chemicals, have often disposed of such products in a potentially unsafe manner. When the products are no longer wanted by the purchaser, they become a waste.

Other problems with hazardous materials are the use and storage of these materials. Containers, stored over a long period of time, may begin to leak and pose a fire hazard or a contact hazard for humans or animals. Some chemicals if mixed together can cause an explosion or a toxic gas emission that can affect human health.

Small quantities of hazardous waste materials are generated by individual householders, farmers, and small business owners and managers. This type of

hazardous waste is described as "...discarded material that creates, by itself or in conjunction with other materials, a verifiable level of toxicity that adversely affects health or the environment" (Cassel and Ehrenfeld, 1988 p. 4). In terms of actual volume, household hazardous waste (HHW) would not appear to be so critical. A Los Angeles study (Kinman and Nutini, 1988) found only 2.69 pounds of HHW per ton of garbage. However, it is not volume that determines impact in the case of toxic materials. A small amount of toxic residue leaching into an aquifer under a landfill can contaminate a town's drinking water. Confusing messages are being disseminated in the popular press about the impact of small quantities of toxic materials in the environment, thereby causing citizens to make decisions about their behavior under conditions of uncertainty.

Citizens who generate very small quantities of hazardous substances are not regulated under the Resource Conservation and Recovery Act (RCRA); they are designated as conditionally exempt generators. The United States Environmental Protection Agency (EPA) has stated that it would be virtually impossible to regulate all the small quantity generators in the country. Instead, EPA is looking for education and assistance programs to gain voluntary compliance with best practices. This compliance will have to be voluntary and long term. Citizens are being asked to appraise the magnitude of the threat to themselves and their environment and to take positive action. State and federal agencies and educational institutions are implementing education and assistance programs to aid citizens in their decisions about the purchase, use, and disposal of small quantities of hazardous materials. If these programs are to be effective, educators

must better understand what variables are involved in the decision to respond to environmental problems as they relate to threat situations.

CONCEPTUAL FRAMEWORK

This research is based in large part on the work done by Faye N. Schmidt and Robert Gifford at the University of Victoria, British Columbia in 1989. Schmidt and Gifford's work focuses on the physical environment. They developed the EAI to investigate how people evaluate or appraise environmental hazards. People's reactions, emotional or behavioral, to perceived threats are based in important ways upon how they perceive the potential threat. The work of Schmidt and Gifford, through the development of the EAI, explores the nature of the perceptual response to threats due to environmental hazards. One of the common responses to perceived threat is stress. Stress may be seen as being comprised of three components: (a) the stimulus; (b) the individual's appraisal of the situation and (c) some form of response to the stimulus (Lazarus, 1966). Paterson and Neufeld point out the importance of the mix of characteristics present in each person environment interaction (1987). Some characteristics of the interaction between the person and the environment in hazard situations is how serious is the threat, can the threat be mitigated with available resources, is there a personal relationship to the threat situation. Schmidt and Gifford build on these observations by conceptualizing. . ." the cognitive features arising from the situation, such as perceived control and the predictability of the stimulus" (1989,57). This conceptual relationship becomes the basis for future research. Recognizing that the decision making process is highly complex and situational this research study

expands the conceptual framework of Schmidt and Gifford's study to include the role of responsibility for environmental hazards. Although there are many variables involved in a person's rational decision to respond, this additional variable creates a more expansive framework for study of the relationship between appraisal of threat and the human response to that threat. Figure I illustrates the conceptual framework used in this study.

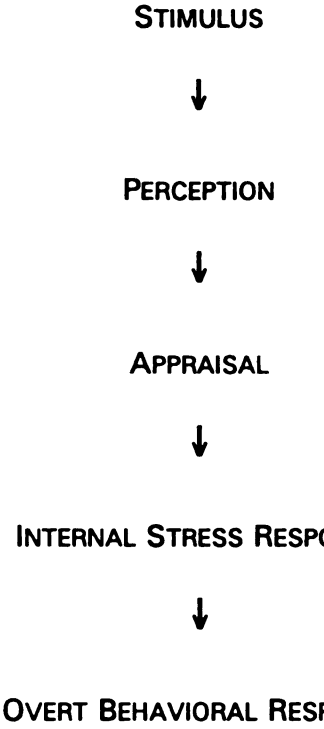

Figure I: Conceptual Framework for study

RESEARCH PURPOSE

The specific purpose of this research is to determine the relationship between disposition toward environmental threat and commitment, or action taken to protect the environment. Educators have traditionally assumed that given appropriate information from a credible source and a feasible way to act,

individuals in fact, will "do the right thing." However, some individuals will utilize the information and some will not. The purpose of this study is to better understand the variables that affect people's appraisal of and subsequent behavioral response to elements of environmental threat or hazard. Threat is defined as something indicating harm or loss and hazard is defined as something indicating danger, peril, risk or difficulty, (Random House, 1973). For the purpose of this research, the term threat is preferred but in the literature the two are often used interchangeably. Two other important elements affecting decisions about personal behavior are assessment of control (how much difference a single behavior will make) and responsibility (what is the citizen's obligation to solve the problem).

Based on the literature in the field of Environmental Psychology, two main sets of variables are used in this study to represent the factors affecting the decision to act responsibly toward information about the management of hazardous materials. The first set is an attitudinal construct and falls into four dispositions toward environmental threat. The categories, as used by Schmidt and Gifford (1989), are:

1. The appraisal of risk to self from environmental hazards or technology.
2. The appraisal of risk to the environment from a variety of hazards or technologies.
3. The confidence that one's actions will make a difference.

4. The level of personal responsibility one feels about the existence of the threat caused by the hazards.

The second set of variables include such demographic variables as gender, age, income, and education. In addition, experience can play an important role in the decision to take action or not. "Action" in this study is the ultimate behavioral response; but given that the opportunity for action may be limited for the population in this study, another measure of behavioral response was included. This second measure was a "commitment to act" or a "perceived intent to act." Figure II illustrates the major relationships investigated in this study.

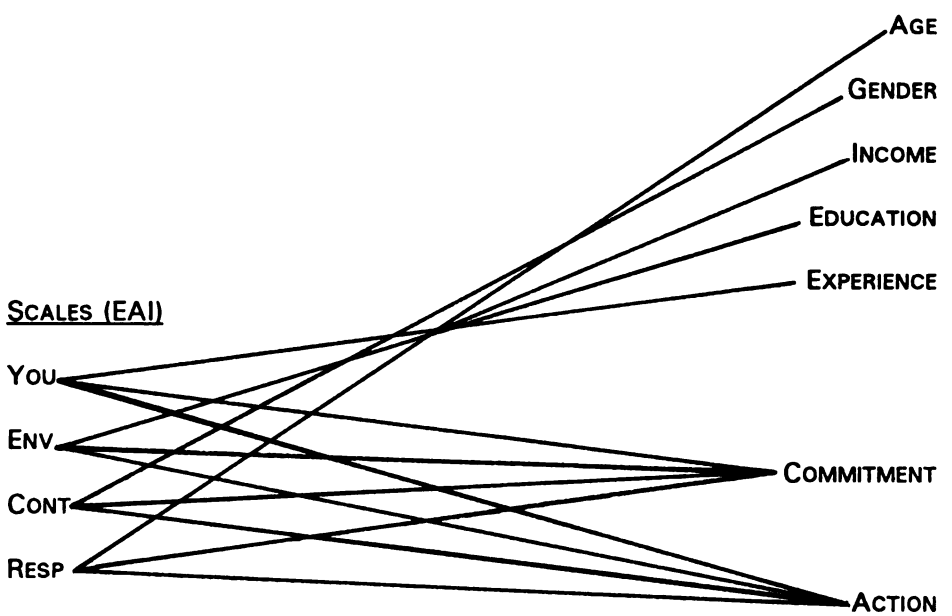

Figure II: Variable Relationships in study

RESEARCH OBJECTIVES

The research objectives for this study include:

1. An extension of the work begun by Schmidt and Gifford to include (a) an application of their scales to a different test population, (b) the modification of their scales for application to an additional environmental problem area, i.e. the threat of small quantities of nonregulated hazardous materials, and (c) the development of an additional scale, the RESPONSIBILITY Scale, used to assess individuals' perceptions of their personal responsibility for various environmental hazards.
2. Exploration of the relationship between environmental disposition scales and people's commitment and action taken to safeguard the environment.
3. Exploration of the relationship between the respondents appraisal of environmental threat and their demographic characteristics, experience with pollution, commitment to the environment and overt action.

PROGRAM RESPONSE

It is hoped that the findings of this research study will contribute to decisions about educational program design. The following are a set of researchable questions and what the answers could mean to program designers.

1. *What role does the appraisal of environmental threat play in action or attitude change?* This question deals with the issue of appraised threat both to self and to the environment, which may be parallel to short-term versus long-term threat. People who view the threat as a personal health hazard may take a positive environmental action based primarily on concern for personal well-being. This does not eliminate concern for the environment as a motivator of action toward environmental threat. In fact, the concern for the environment is closely linked to concern for self due,in part, to evidence (e.g. Times Beach, Love Canal, etc.) that many human health problems may stem from environmental pollutants. The answer to this question could help an environmental education program designer determine that a greater portion of resources should be directed to documentation and dissemination of factual information that indicates risk levels and risk comparisons.

2. *What role does assessment of control over environmental threats play in response behavior?* This question deals with the perception of control, or more specifically confidence, that an individual has the ability to affect environmental threats. This assessment of control could stem from having access to adequate services that support amelioration of environmental threats, or it could stem from confidence in government programs that are responsible for monitoring and correcting environmental degradation. If people feel confident that they can make a difference through their actions, then perhaps a greater portion of resources should be spent on local community service and assistance programs.

3. *What role does perceived personal responsibility for environmental hazards play in response behavior?* Not all listed environmental hazards in this research study have been generated by individuals, many are generated by the cumulative

behavior of individuals. Some are acts of nature and are not caused by people at all. If however people do in fact feel responsible for the existence of people generated environmental threats, then perhaps a greater portion of resources should be directed to awareness level programming which links the threat to personal behavior.

4. *What role does past experience play in response to environmental hazards?* This question deals with the impact that life experiences may have in setting an environmental ethic. Youth experiences, family values, and the like may have a great impact on one's response to environmental threats. The answer to this question might suggest that more resources should be directed to youth programs and elementary teacher training programs, as well as parent/child environmental education programs.

5. *What role do current socio-economic circumstances play in environmental response?* This question deals with the demographics that have often been used to set a profile of the responsible environmental decision maker. Based on Maslow's Hierarchy, individuals would be expected to place the first priority on basic survival (Rokeach, 1981). Once basic needs are satisfied people move on to higher levels of need. It is at these higher levels that individuals turn their discretionary resources to responsible environmental activities. Does this dictate a more focused educational effort aimed at that segment of the population that will ultimately be able to contribute resources and time to environmental protection?

This study will attempt to profile the individuals who access the Hazardous Materials Information line and to determine if those who took positive environmental action and/or indicated strong environmental commitment have a

different profile than those who did not take action. The Hazardous Materials Information (HMI) hotline is a service instituted through the Michigan State University Cooperative Extension Service, supported by the Groundwater Education in Michigan (GEM) program to serve Michigan citizens as they make decisions about the purchase, use, storage and disposal of small quantities of hazardous materials. The time frame of this study is November 1, 1989 to July 31, 1990.

CHAPTER II

LITERATURE REVIEW

The precedent literature for this study will be discussed in Chapter II. The review is organized in seven main categories representing the following concepts:

1. Appraisal of risk
2. Response to risk and threat
3. The dispositional approach
4. Appraisal of risk and threat under uncertainty
5. Risk and threat vs benefits
6. The relationship between commitment and action
7. Environmental decision making

RISK APPRAISAL

A major focus of this study is the examination of the relationship between the appraisal of environmental threat and behavior, incorporating two intervening variables into the study: (1) perception of control over the threat and (2) perceived moral responsibility for the presence of the risk. In using this theoretical construct it should be made clear that the concept of risk and the concept of threat are being used interchangeably.

In an extensive review of risk appraisal, Mary Douglas (1985) addresses risk acceptability as a social issue and explores the role that culture plays in determining risk perception. Her expansive treatment of the subject includes an analysis of the cognitive construct that determines decision making. The work of Douglas expands our understanding of the underlying factors in the relationship between social influences and risk perception.

Douglas believes that:

1. " Education of the public must narrow the disagreement" (Douglas 1985, 21). Although all decisions are made under some uncertainty, there is a better chance of reduced conflict and more efficient implementation of societal needs if uncertainty is reduced.
2. " The new subdiscipline of risk perception emerges in response to...important concerns. It is constituted of three different disciplines: 1) there is the engineering approach, extended from the analysis of risk to the analysis of perception; 2) there is the ecological approach; 3) there is the cognitive science approach. Theoretically sophisticated, but naive in social thought, each discipline transferred only a small part of its traditional methods to the new field (Douglas 1985, 22)." The eclectic and interdisciplinary approach to risk appraisal is essential if we are going to understand the complex response to threat and deal with it through social and political policy development. The issue of citizen participation in decision making has a history of ebb and flow in the United States

and when participation is being reduced by federal policy, citizens respond negatively to the uncertainty they feel and demand more opportunities for participation.

Most current studies related to understanding risk appraisal address the perception of the public as they evaluate the risk of technologies that have been presented as options (Hatfield 1989; Thomas 1981; Zeckhauser and Viscusi 1990). Some examples of these are nuclear power, leaded gasoline, seatbelts, etc. For the most part, the technologies listed are not under the control of the general public. It then becomes a matter of assessing the social acceptability of the inherent risks as they are presented. One of the issues that Douglas emphasizes is the distributive impact of involuntary risk. The observation that we as a nation export the externalities of public goods to the poor is well documented in the literature (Douglas 1985; Fischoff 1980). "In some professional analyses the existing allocation of risks is taken to imply an accepted norm of distributive justice sustaining the moral fabric of society" (Douglas 1985, 6). Another method of distributive justice that is addressed in the literature is that of intergenerational responsibility. Golding (1972) points out that it is the immediate future generation that has the most influence on the decision to mortgage future generations. It is difficult for individuals to deter selfish decisions if the intergenerational obligation is too distant. Therefore, there is need to relate impacts to the immediate living family rather than unborn generations.

The concept of moral responsibility is treated in some detail by Van Liere and Dunlap (1978) as they address the issue of awareness of consequences and

ascription of responsibility. They bring to light the understanding that the appraisal of threat to the environment, which was once the elitist perspective and supported the birth of such organizations as the Sierra Club, has expanded to include threat to humans as a primary motivator of changed behavior. It is this perception of unacceptability that creates a state of cognitive dissonance. It is important to determine whether cognitive dissonance is reached more rapidly if the threat is perceived as more detrimental to self or to the environment. Cognitive dissonance is defined as disagreement or incongruity within the self (Random House 1973). Since this incongruity has the effect of reducing the quality of life, people will want to reduce it through action. The question then becomes, what prompts the action?

The relationship between cognitive dissonance and action is clearly part of the morality question and the intergenerational responsibility issue. Van Liere and Dunlap (1978) state, "Of course, individuals may often be aware that they are faced with a moral choice, but because of other considerations, e.g. personal costs of time, money, or psychological well-being, may not comply with the expected behavior. Expected behavior in this case is that which corrects the immoral or socially unacceptable behavior (p. 176)." The relationship between cognitive dissonance and social norms has been interpreted by Heberlein (1975) and Schwartz (1970), who point out two mechanisms for negating social norms; one is re-interpretation or denial of the normative expectation or through a disassociation of responsibility. If the social norm or expectation in the ambient environment for a certain behavior is interpreted to satisfy the self then dissonance can be reduced without any change in behavior. The other mechanism of disassociation is a denial process as well, and more clearly relates to personal

protection or fear of social censure. In this case the individual simply reduces or negates his or her role as a contributor to environmental degradation.

The responsibility concept has not been explored to any great degree in the literature, probably due to the concern for the accuracy of self-reported perceptions on personal morals. Heberlein (1975) has tested a normative model of effects on environmental behavior. His work focuses primarily on emerging environmental norms and the need for specific information on consequences and responsibility as norms are being formed. This formative or emerging model becomes particularly important as new information becomes available as to the long-term consequences of negative environmental behavior. As outlined by Schmidt and Gifford (1989), " the . . . appraisal process is dependent on characteristics of the situation, the individual, and interactions between individuals and situations" (p. 57). The appraisal of risk and the appropriate behavioral response is indeed a complex construct. Other elements that enter into the equation, as outlined by Starr (1969), are risk acceptability (when trade-offs seem to be advantageous to the individual), natural hazards (out of individual control), voluntariness (the ability to select or refuse the risk situation), and chronic risks (those that people have gotten used to because they are always around).

The risk associated with an industry that is the primary employer in a community is often perceived as less than that of an industry in an adjacent community which does not employ the townspeople, even though ambient air pollution may be equally attributable to both industries. Appraisal is clearly a situational variable and there are limits of acceptability within a range.

Natural catastrophes are often perceived as less of a risk primarily because the level of control is low. There is an almost fatalistic response to such risks as earthquakes, hurricanes, tornadoes, and volcanic eruptions. The understanding that the individual has very little control over these threats is clear. In fact, there is evidence that the cognitive denial process is particularly strong where natural disasters are concerned. Historical examples include the New Jersey coastline where families rebuild homes after every hurricane, or the outer banks of North Carolina where families have lived for generations in spite of the need to evacuate nearly every year due to threats from the weather. Inhabitants on the west coast are no better, as they build expensive homes on earthquake faults and unstable hillsides in order to get a view of the Pacific Ocean. Another important aspect of these decisions are that they constitute a voluntary exposure to risks, unlike the exposure to nuclear power or smoke stack emissions which is involuntary. People choose to live in these locations and cope with the risks, whereas power facilities may locate after residency takes place or necessary public service infrastructure may pollute.

THREAT RESPONSE

The response to environmental threat can be exhibited as direct action or as some form of declaratory response. Threat response can be the result of a number of stimuli or it can be prompted by one stimulus that has a profound affect on an individual. First, an individual must perceive enough positive or negative stimulus from the environmental threat to be aware of the need to respond. Second, the threat must pose enough of a problem to warrant the complex

response behavior. Third, the individual must perceive the response as an effective action to mediate the threat situation. Fourth, the individual must feel some sense of responsibility for or obligatory relationship to the threat situation (Paterson and Neufeld 1987).

Accepting a risk/threat requires that the acceptor has entered the relevant data and computed a personal cost benefit analysis which is sometimes referred to as a "personal risk budget." The grounded theory for this process tells us that a risk (R) is the product of the probability (P) that some type of harm (H) will occur, R = PXH (Campbell 1980). As tradeoffs are conceptualized, the cost/benefit model emerges. The perceiver decides that the probability of some harmful event happening is offset by the potential benefit one may gain. "A thoroughly logical person presumably compares the benefits with the related risks, accounts for the economic or other costs, if any, and makes a decision (Campbell 1980, 2468).

The historical work on the riskiness of gambles was done by Von Neumann and Morgenstern (1953). They found that the relationship between gambling and appraisal of personal loss is related to probabilities. Specifically that the risk taken should probably result in a "gain" and not a loss. Probabilities in this case refer to the perceived utility of accepting certain types of risk. If the risk or threat to the individual indicates the possible gain of extensive rewards, then the risk may be worth it to some people. For example, the risk of siting a landfill near one's home may be reduced by the economic gain of an increased tax base or even the monetary gain one enjoys through the sale of land to a waste management company. However, the disdain of one's neighbors for "selling out" to the waste management company may alter the marginal utility and make the risk

unacceptable to the landowner, causing him or her not to sell. This example of assessment exemplifies the complexity of the risk appraisal process, in that it points out the situational setting within which many risk-related decisions are made.

The perception of risk is often altered by some past experience that affects one's judgement. Two individuals appraising the same risk are individually affected by a past experience that one had which resulted in a loss of health or reputation or some other more concrete asset. This relationship between threat and utility comes out of the Pareto-Optimal theory of economic studies and is clearly developed in the Schmid and Samuel's book Law and Economics: An Institutional Perspective (1981).

THE DISPOSITIONAL APPROACH

Kerry Thomas (1981) describes the results of a survey of beliefs and attitudes toward various energy-generating facilities. Thomas explains that perception and eventual action is not only guided by information but by feelings as well--in other words, a dispositional measurement of risk perception. "By describing risk perception in terms of beliefs (the information base), feelings, and attentional phenomena, all of which are seen as underlying action...points to a substantial convergence with attitude theory" (Thomas 1981, 37). The attitude is what so often determines behavior.

The work that has most influenced this research is that of Faye N. Schmidt and Robert Gifford done at the University of Victoria, Canada. Their work in developing the Environmental Appraisal Inventory (EAI), which attempts to

measure the relationship between the person and the "risky" environment within which they live, is landmark. Using McKechnie's Environmental Response Inventory (ERI) (McKechnie 1974), which is a personality measure and Rotter's Internal-External Locus of Control (I-E) (Rotter 1966) which is a measure of confidence to cope with the environment in a social sense, Schmidt and Gifford developed a three-scale inventory of risk events that could be used to determine disposition toward risk. Several variations of hazard categories were listed: those that pertain to natural and technological hazards, those that are at the global and local scale, and long- and short-term hazards.

Several important findings resulted from the Schmidt and Gifford study: (1) " ...the pattern of intercorrelations among the three EAI scales suggests that the perception of threat from hazards and perceived control over them are separate constructs(pg.64); (2) ...the appraisal of threat to oneself and to the environment are related(pg.65); and (3) ...a significant difference was found between the self and Environment "means" with hazards in general appraised as more threatening to the environment than to the self (66)." (Schmidt and Gifford 1989)

APPRAISAL OF THREAT UNDER UNCERTAINTY

Behavioral decision theorists such as Slovic, Fischhoff, and Lichtenstein (1983) have put the response to environmental threat into a rational decision making model and attempted to contrast documented behavior with rational behavior based on best possible information about the threat. This cost benefit model is often implemented under conditions of uncertainty. The condition of uncertainty arises as a result of incomplete information or lack of confidence in the

source of information, or perhaps as a result of variable background situations that create inconsistent feedback such as a negative experience with environmental stressors[1] in one situation and no significant impact of stressors in others.

Gallagher and Smith (1985) address the issue of Measuring Values for Environmental Resources under Uncertainty by comparing certain outcomes with uncertain outcomes. They use as an example the regulations affecting disposal practices related to hazardous wastes. "Given our knowledge of the residence time in the ambient environment and properties of landfill disposal technologies, no regulation governing the land-based disposal of these substances will guarantee that households living near the facility will have no risk of exposure to the substances" (Gallagher and Smith 1985, 132). This lack of assurance that current hazardous waste landfill design can protect human health corresponds to the uncertainty in information about the impact of small quantities of hazardous materials on environmental quality. Some experts have stated that the 2.5% of the waste stream that contains hazardous materials presents no threat to the environment, that in fact the volumes of other waste materials in landfills actually absorb these chemicals effectively, and that it is a better method of amelioration than isolating this component (Kinman and Nutini, 1988). Other experts, however, have documented the contamination of an entire aquifer (no longer potable) due to a small infusion of waste oil.

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[1] The action on a body of any system of balanced forces whereby strain or deformation results.

RISKS VS BENEFITS

A number of authors have explored the concept of risk and benefit perceptions (Gallagher and Smith, 1985; Keller et al., 1986; Lopes, 1984; Slovic et al., 1983; Wartofsky, 1983). Much of the research and analysis is focused on the relationship of resources to risk perception. The assessment of risk appears to be based on such concepts as risk understanding, credibility of the source of information, method of information dissemination, need of the receiver, and other situational variables related to demographics. Wartofsky states, " For humans ... risk is defined in relation to perceived values; and these in turn are possible only for a self-conscious creature who is capable of estimating present actions either in the light of norms or general principles, or of future outcomes"(Wartofsky 1983, 131). As Fischhoff, Svenson, and Slovic point out in their extensive treatment of the subject "...people seldom just accept money in return for an increased chance to die but they might accept money and risk as part of a job promising fulfillment, advancement, and the like (1987, 1109)."

RELATIONSHIP BETWEEN COMMITMENT AND ACTION

The appraisal/action paradigm is explored by Johnson in his development of a causal model of evacuation decision making during a nuclear reactor emergency. "The model is premised on the proposition that evacuation planning must be based on the behavioral intentions of the group that perceives itself at risk (Johnson Jr. 1985, 405)."

Although Johnson's research explores the response to a crisis situation (as perceived by the affected population) involving a technology over which the

general public has minimal control, it presents some of the same interrelationships addressed in this study. Johnson calls for acknowledgment of intended behavior as a basis for hazard planning. "The theory of reasoned action posits that intended behavior is the best indicator of actual behavior if the intention does not change before an individual has the opportunity to act. This is the key to understanding the interface between deliberate action and stated commitment. Applications of this theory show the proposition to be valid for a range of social behaviors" (Johnson 1985, 405).

DECISION MAKING

The framework for deliberative thought affecting decisions is situation-neutral, although studies using this framework have shown that the time and investment individuals are willing to commit to a desired outcome does affect the decision making process. The general framework for decision making is taken from Fischhoff, Svenson, and Slovic (1987) as follows:

1. Identify all possible courses of action (including, perhaps, inaction)
2. Evaluate the attractiveness and/or aversiveness of the consequences that may arise if each course of action is adopted
3. Assess the likelihood of each consequence actually being realized (should each possible course of action be adopted)
4. Integrate these evaluations and assessments in order to select the best course of action

It is this framework that underlies the design of most education for behavioral change programs. The dissemination of the best and most current information is directed at step one. This awareness-level information dissemination is necessary to expand people's options but is not adequate for decision making. Step two begins the process of assimilating the information into one's cognitive structure. In order to evaluate the attractiveness or aversiveness of the consequences of a decision, people bring their own set of beliefs and attitudes to the perception of viability.

As mentioned earlier, in the case of risk-related information, studies (Edwards 1954; Johnson Jr. 1985; Lopes 1984) have relied heavily on the theory of rational decision making and address a relatively new concept, the "personal risk budget." This concept begins to pull together the situational and conceptual variables involved in the decision to accept or reject risk. Situational variables as outlined by Hance (1988) are (1) the credibility of the disseminator,(2) the method of dissemination, and (3) the need of the receiver. It is the need factor that is most dependent on the conceptual variables that drive the rational decision making model.

The rational decision maker weighs each decision as described above for its utility to her/him at the point in time at which the decision must be made. This utility maximization theory is grounded in historical philosophy and economics. Jeremy Bentham and later James Mill held that the goal of human action is to seek pleasure and avoid pain. As Edwards clearly describes, "Every object or action may be considered from the point of view of pleasure- or pain-giving properties. These properties are called the utility of the object; pleasure is given by positive

utility and pain by negative utility. The goal of action, then, is to seek the maximum positive utility" (Edwards 1954, 382).

If it is indeed maximum utility that drives individuals to assess the tradeoffs and make the decision to act (or not act) toward a certain stimulus, then we need to understand more about the underlying cognitive structure of individuals (their dispositions) as they process information about risk and threats to themselves and their environment. We also need to understand the contextual framework within which individuals perceive themselves making a difference by their action, since it is this perception that is also reflective of a satisfactory and pleasure-giving outcome. And of course it also becomes essential to understand the relationship between a sense of moral responsibility and the considered action, since the no-action option could cause a great deal of negative utility if a deep sense of responsibility felt. Because cognitive dissonance is often the turning point at which individuals change a course of action, it is essential to understand what brings individuals to a high enough degree of dissonance that they change their behavior rather than experience negative utility.

The urgency of exploring individual action decisions as related to environmental issues becomes evident when we realize that the ambient environment is a common good. Individuals have a direct impact on this common good both negatively and positively depending on their perception of their role at a point in time. The personal risk budget is determined by many factors. Some of these factors have been explored--socio-economic levels, demographics, liberalism vs conservatism, etc. However, the integrated study of the individual's appraisal of these decisions has been hampered by the absence of instruments that

could adequately measure perception of risk, as well as the conceptual variables related to (1) control or confidence to make a difference and (2) a sense of personal responsibility. This study attempts to contribute to the work of others, most explicitly Schmidt and Gifford (1989).

CHAPTER III

METHODS

This chapter outlines the procedures, instruments and variables developed and used in the study. First, the general procedures of the study are discussed. Second, the survey procedures are explained, the research variables are defined and operationalized, and the scales developed and used in the study are delineated, Finally, the statistical analyses used in the study are discussed.

RESEARCH SETTING

In March of 1989 the Kellogg Foundation through the Groundwater Education in Michigan Project (GEM) funded a proposal titled: Improving Water Quality through the Control of Unregulated Hazardous Wastes. As a result of this funding, a three year program was implemented. Recognizing that small quantities of hazardous materials are not monitored nor is the disposal of them regulated, a state wide assistance and education program was initiated to aid Michigan citizens to better manage small quantities of hazardous materials. The primary goal of the program was to provide a convenient, non-threatening, low-cost contact for Michigan citizens to gain information about hazardous materials and to gain assistance in the proper disposal of these materials. Household members, farmers,

and operators of small business enterprises were the target audiences. These citizens purchase or dispose of small quantities of pesticides, herbicides, solvents, oils, and paints on a regular basis. In addition to appropriate disposal information citizens need current information about best consumer behavior, safe use practices and how to organize their community to address the pervasive problem of managing small quantities of hazardous materials.

As a result of the funding and with assistance from the Michigan State University Cooperative Extension Service, four full-time professionals were hired as District Hazardous Materials Management Agents. These agents were located in L'anse (Baraga County), Cheboygan (Cheboygan County), Pontiac (Oakland County) and Lansing (Ingham County). An 800 information line was installed in each location. An Information Management Program (IMP) was developed. The IMP computer software enabled the four HMM agents to provide Michigan citizens with current information about the disposal of hazardous materials. In this way the agents could respond quickly to requests for information from callers. In addition, the contact with the caller gave the agent the opportunity to offer educational materials and to alert the caller of upcoming workshops on hazardous waste control. In this way both passive and active education was provided. At the conclusion of the conversation, callers were asked if they would be willing to participate in a longer survey at a later date. Approximately 80% percent of those asked said yes. Their names and addresses were then entered into a database management file.

Public service announcements, newspaper articles, and presentations to local clubs and organizations brought the assistance program to the attention of

a wide range of potential clients and increased their awareness of the hazardous materials issue. Citizen questions focused on four issues: 1) The desire to purchase the least toxic product to clean or care for something (6%). 2) Understanding and interpreting directions on labels (9%). 3) Discarding or disposing of a product no longer needed (78%). 4) Setting up a community collection day or holding an educational workshop (7%). At the time of the study over 3000 of Michigan's citizens had accessed the Hazardous Materials Information Line (HMIL). This research describes the characteristics, perceptions, and environmental profile of a sample of Michigan citizens who used the HMIL service and tests their appraisal of a variety of environmental threats.

SURVEY PROCEDURES

The Sample

(1) The study population consisted of 482 callers who contacted the service between November 1, 1989 and July 31, 1990. (2) All users of the HMIL during that period were included in the study and were mailed questionnaires. (3) A total of 288 usable surveys were returned and could be included in the analysis. The time range for sampling callers eliminated the early months of the HMIL service (April 1989 to November 1989, since the Pontiac office was not staffed until August 1, 1989) to assure consistency. Service in the early months of HMIL was inconsistent due to set-up problems and lack of experience on the part of the MSU Cooperative Extension District Hazardous Waste Agents. The months just prior to the mailing of the survey were eliminated in order to give respondents adequate

time to have acted on the information received. The research area was all of Michigan as calls were received via 800 lines from all parts of the state.

Mailing Procedures

The first mailing of the questionnaire was done on November 15,1990. People were asked to return the questionnaire within two weeks. Potential respondents were offered an incentive in the form of a book, THE GUIDE TO HAZARDOUS PRODUCTS AROUND THE HOME (1989), if they returned the questionnaire. A follow-up first class letter was mailed three weeks after the questionnaire was sent, this letter encouraged their participation and reminded those who had not returned the questionnaire that their book was still waiting, and if they did not return the questionnaire within ten days, their name would be removed from the list and they would not be approached again. These non-respondents were also told that if their questionnaire had been lost or in some way made unusable, they could call a telephone number and leave their name and a new questionnaire would be sent to them immediately (see appendix D).

RESEARCH INSTRUMENT--THE QUESTIONNAIRE

The eight page questionnaire contained four parts. The first part consisted of four scales. These four scales represented an expanded Environmental Appraisal Inventory. The second part consisted of social welfare questions such as "How far are you willing to drive to dispose of hazardous materials?" The third part consisted of demographic and personal background questions, and the fourth

part consisted of environmental experience, commitment and action questions. Table 3.1 is a listing of the variables and scales.

TABLE 3.1: Questionnaire components

SECTION	VARIABLE OR ITEM	NAME	# OF ELEMENTS
Part 1	Threat to YOU scale	YOU	28 items
	Threat to ENVIRONMENT	ENVIRONMENT	28 items
	CONTROL of env. threat	CONTROL	28 items
	RESPONSIBILITY for env. threat	RESPONSIBILITY	28 items
Part 2	Social welfare	Willingness to act	4 items
Part 3	Demographics	Age	1 item
		Gender	1 item
		Income	1 item
		Education	1 item
Part 4	Environmental Commitment	Commitment	8 items
	Environmental Action	Action	1 item
	Environmental Experience	Experience	3 items

Note: Items appearing in the questionnaire (see Appendix A) and not listed here were not included in the analysis.

The first four pages of the questionnaire consisted of the four scales of 28 items each. The specific items were identical across scales but with a different lead-in question for each scale. The remainder of the questionnaire contained 28 single item questions resulting in a total of 140 responses per questionnaire. It is estimated that the questionnaire took approximately 30 to 40 minutes to complete. A cover letter explaining how the respondents were selected was included in the mailing. Assurance of confidentiality was made and printed on the inside cover of

each survey instrument. A self-addressed, stamped envelope was enclosed for use by respondents.

Scales

Three of the four scales used in this study were based upon the work of Schmidt and Gifford (1989). These three scales in their original form were developed to make up the Environmental Appraisal Inventory (EAI). The fourth scale (Responsibility) was developed for this research. Although the items and response format are duplicated across scales, they are differentiated by the lead-in questions. These lead-in questions were:

1. Please rate how threatening the following problems are TO YOU by marking the response that best describes your position. (YOU scale)
2. Please rate how threatening the following problems are TO THE PHYSICAL ENVIRONMENT by marking the response that best describes your position. (ENVIRONMENT scale)
3. Please rate how much CONTROL you could personally exercise against each problem if it became a serious threat to you. (CONTROL scale)
4. Please rate how much PERSONAL RESPONSIBILITY you feel for the existence of this hazard. (RESPONSIBILITY scale)

The responsibility scale was added with this research to expand the model and explore the idea of conscience as a motivator of positive environmental action and commitment to environmental quality. In addition, four items were added to

the original scales of 24 items to localize and personalize hazard experience. These added items were:

25. Groundwater pollution from landfill seepage
26. Air pollution from waste to energy incinerators
27. Surface water contamination from discarded motor oil
28. Ocean pollution from dumping municipal solid waste

The resultant four scales contain 28 items each, and collectively comprise the expanded environmental appraisal inventory. The format was seven point Likert type scales. In each case the low score was "no threat" or "no control" or "no responsibility". The high score was "extreme threat" or "extreme control" or "extreme responsibility".

Example

Please rate how threatening the following problems are to YOU by marking the response that best describes your position.

	No Threat	Minimal	Mild	Moderate	Strong	Very Strong	Extreme
1. Water Pollution.....	O	O	O	O	O	O	O

Commitment

Commitment in this research is a measure of cognitive obligation. It is the act of pledging or engaging oneself in an idea. In this case it is a self reported measurement of intentions.

A measure of commitment was based upon the mean score of the following items:

Do you contribute money to environmental causes?

(1 = no to 7 = substantial amount)

Will you make different consumer decisions as a result of the information you received from the Hazardous Materials Information Line?

(1 = no to 7 = yes)

How would you rate your personal commitment to preventing environmental pollution?

(1 = low to 7 = high)

Would you be willing to drive miles to dispose of ...?

(1 = 5 miles to 7 = 30 + miles)

Would you be willing to wait minutes to dispose of ...?

(1 = 10 minutes to 7 = 70 or more minutes)

Would you be willing to spend dollars to dispose of ...?

(1 = 1 dollar to 7 = 30 or more dollars)

Would you be willing to make phone calls to dispose of...?

(1 = 1 call to 7 = 7 or more)

Action

A single question was used to indicate " action". Respondents were asked to report if they had acted on the information they had received from the HMIL. An open ended follow-up question was asked to determine what type of action was taken. The answers were used to clarify the yes/no action response.

Environmental Experience

Experiences were measured by asking the respondents: "Have you or anyone in your family been affected by environmental pollution?" Responses to this question were recorded on a seven point Likert type scale.

Demographic Variables

Personal background information was included in the study for the following demographic variables: age, income, education. A variety of options were given for each demographic variable. Although information on a wider variety of demographic variables was collected not all this information was used in this study but instead will be held for future study on this population.

STATISTICAL ANALYSIS:

The data were analyzed several different ways. Response rates were reported and discussed. A probability level of $<.05$ was considered significant. Descriptive statistics were used to provide an overall profile of the sample obtained. In addition, statistical tests were used to compare the demographic profile of the respondents in the sample with data for Michigan based on the 1990

U.S. census. Validity and reliability of the scales were assessed using descriptive and test statistics along with data reduction techniques such as factor analyses. Finally, the hypotheses were tested using MANOVA and regression analyses.

CHAPTER IV

RESULTS

This chapter reports the results of instrument development and hypotheses testing. A total of 482 surveys were mailed to the selected population. The population was all Michigan citizens who had contacted the Hazardous Materials Information Line within a predetermined period of time. Only those who agreed, during the telephone conversation, to participate in the study were included. As indicated on the survey cover; a reward was offered for participation. Of the surveys mailed out, 11 could not be delivered, yielding a total of 471 surveys being placed in the hands of potential respondents. After a follow-up letter to nonrespondents and the removal of one invalid return questionnaire the study sample consisted of 288 useable questionnaires. The response rate was 61.2 percent of surveys delivered, (Table 4.1).

TABLE 4.1: Survey Delivery and Response Rates

	NUMBER	PERCENT	
Total Surveys Mailed	482	100	
Delivered Surveys	471	97.7	
Returned Non-Deliverable	11	2.3	
Returned Surveys	289	61.4	of Delivered
Useable Surveys	288	61.2	of Delivered

REVIEWING CHARACTERISTICS OF THE SAMPLE

Respondents were almost evenly divided between males and females (49.5 percent females, 50,5 percent males); the age of the respondents was similar to Michigan's population; residents under 18 were not sampled. After aggregating age categories to best parallel 1990 census categories, the largest percentage of respondents was (51.6 percent) in the 18-44 year category, as are Michigan residents with 44.8 percent in the 17-44 year category. The sample population had a higher percentage of people in the 45-65 age category than does the Michigan population, and slightly more in the 65+ age category than does Michigan (see subtotals and 65+ rows respectively).

TABLE 4.2: Sample Age Distribution Compared to Michigan Population

AGE	SAMPLE
18-25	3.2%
24-35	18.3%
35-44	30.1%
subtotal 18-44	51.6%
45-55	15.4%
55-65	15.8%
subtotal 45-65	31.2%
65 +	17.2%

AGE	MI
16 or less	24.7%
17-21	7.9%
22-44	36.9%
subtotal 17-44	44.8%
45-64	18.6%
subtotal 45-65	18.6%
65 +	11.8%

Note: The study sample size equals 288 respondents.

Source: 1990 Michigan census estimates by CACI, a marketing consulting firm, Arlington, VA.

With respect to income, respondents represented a cross section of income categories. Only 6.5 percent reported incomes of $10,000 or less. The largest percentage of respondents reported having incomes between $20,000 and $30,000 (24.5 percent). Comparing incomes of the study sample with Michigan's population, it is clear that respondents in the study sample had higher incomes. Sixty-six percent of the sample reported incomes under $50,000, while 78 percent of Michigan residents report having incomes under $50,000 ($t = 4.5$; $df = 1000286$; $p < .000$). Thirty-three percent of the sample reported incomes over $50,000; in contrast, only 21.2 percent of Michigan respondents reported having incomes as high ($t = 4.4$; $df = 1000286$; $p < .000$).

In the case of education, 96.4 percent of the respondents had a high school education or higher. Indeed, slightly over half reported having completed college or some graduate or professional schooling beyond high school(51.5 percent). No parallel data were available for Michigan residents as a whole, but these respondents appear to have higher educational achievement than the population as a whole.

TABLE 4.3: Demographic Profile--Respondents vs Michigan Residents Income

INCOME	SAMPLE 1990	INCOME	MI 1990
< $10,000	6.5%	< $15,000	24.1%
$10,000-$20,000	10.5%	$15,000-$25,000	17.1%
$20,000-$30,000	24.5%	$25,000-$35,000	17.6%
$30,000-$40,000	13.7%	$35,000-$50,000	20.0%
$40,000-$50,000	11.2%		
subtotal under $50,000	66.4%	subtotal under $50,000	78.8%
$50,000-$60,000	16.2%	$50,000-$75,000	14.7%
$60,000-$70,000	7.6%	over $75,000	6.5%
over $70,000	9.7%		
subtotal over $50,000	33.5%	subtotal over $50,000	21.2%

Note: Sample size equals 288 respondents.

Source: 1990 Michigan census, CACI, a marketing consulting firm, Arlington, VA.

VALIDITY

Schmidt and Gifford supported construct validity for the original Environmental Appraisal Inventory (EAI) using Campbell and Fisk's multitrait-multimethod test (Campbell and Fiske, 1959). In this study strong correlations were found between the EAI and selected scales from McKechnie's (1974) Environmental Response Inventory (ERI) and with Rotter's (1966) Internal-External Locus of Control (E-I).

Because the EAI was expanded in this study by adding a fourth scale and four additional items to each scale, it was treated as a new instrument and re-evaluated for validity and reliability.

A principal component factor analysis, using a varimax rotation, was performed on each scale of 28 items to assess construct validity. This statistical technique was used to determine whether or not the items held together as a single construct. The factor analysis suggested that the addition of the four items did not reduce the internal validity of the scale and in all cases a single dominant factor emerged. For each scale, the first factor explained 43 percent or more of the variance (Table 4.4). This level of variance accounted for by the four scales was high enough to consider the scales as valid representations of the constructs as described. Additional factors contributed small amounts of variance, with no single factor contributing enough variance to warrant additional factors being included in the study. No single additional factor contributed more than nine percent of the total variance explained.

TABLE 4.4: Summary of Factor Analysis for the four scales

Scale	Eigenvalue for factor 1	% of Variance for factor 1	Total # Factors	Cumulative %
YOU	12.51	44.7	3	57.4
ENVIRONMENT	12.15	43.4	5	68.8
CONTROL	13.50	48.2	4	65.1
RESPONSIBILITY	14.54	51.9	4	67.5

Evidence of content validity was obtained by pretesting the instrument with 13 experts in the field of environmental protection. Twelve pretest surveys were returned and none of the respondents indicated that they had difficulty understanding the scales or questions as presented. Informal telephone interviews with the twelve experts confirmed that the items represented the constructs as conceptualized. All indicated that the questionnaire was understandable and "made sense."

Concurrent validity was established through a comparison between the Schmidt and Gifford study and the present study. Schmidt and Gifford sampled a mixed population of 126 college students and general public. The results of the current study are based on a respondent sample of 288 usable surveys. As can be seen in Table 4.5, the descriptive statistics for the two groups are very similar for each scale and presented a similar pattern across scales.

TABLE 4.5: Comparison of Scale Characteristics Across Studies

SCALE	PRESENT STUDY	SCHMIDT & GIFFORD
YOU		
$\bar{x}$	3.7	3.41
SD	1.14	0.96
ENVIRONMENT		
$\bar{x}$	4.4	4.3
SD	1.12	0.93
CONTROL		
$\bar{x}$	2.9	2.9
SD	1.16	1.07

RELIABILITY

Schmidt and Gifford assessed the reliability of the EAI through an examination of the internal consistency of each scale. In the Schmidt and Gifford study, as in this study, internal consistency was assessed using the Cronback Alpha. In Table 4.6, it can be seen that the Alpha scores for each of the three scales used in this study are high all above .9; alpha scores at this level are considered adequate for scaling purposes. The observed Alpha scores in this study are higher than the internal consistency measures observed in the original study completed by Schmidt and Gifford (1989). The Alpha value for the new scale (RESPONSIBILITY) is similar to that of the other three scales.

TABLE 4.6: Alpha Reliability Coefficients of the Four EAI Scales

Original Study	(EAI)	Expanded Study	(EAI)
SCALE	ALPHA		ALPHA
YOU	.93	YOU	.95
ENVIRONMENT	.92	ENVIRONMENT	.95
CONTROL	.95	CONTROL	.96
RESPONSIBILITY	N/A	RESPONSIBILITY	.96

MULTICOLLINEARITY

Schmidt and Gifford reported high correlations among the scale scores. In this study, Pearson Correlation coefficients on the expanded EAI scales also show significant positive correlations between scales. This is an important matter to consider when choosing appropriate statistical analyses. The correlations among the scales are reported in Table 4.7.

TABLE 4.7: Correlation Matrix for the Four EAI Scales

	YOU	ENVIRONMENT	CONTROL
YOU			
ENVIRONMENT	.67**		
CONTROL	.36**	.29**	
RESPONSIBILITY	.27**	.19**	.31**

** Significantly different from zero; $p < .05$

Since the correlations were statistically significant and moderately large in size, multicollinearity was a legitimate concern. Therefore, hypothesis testing was done using a repeated measures MANOVA technique which would control for multicollinearity.

ENVIRONMENTAL APPRAISAL INVENTORY SCALES

The four scales making up the Environmental Appraisal Inventory were the dependent variables tested in this study. The results of the repeated measures MANOVA, t-tests along with the means and standard deviations for the four scales can be seen in Table 4.8. Means for the scales ranged from a high of 4.40 for the ENVIRONMENT scale to 2.10 for the RESPONSIBILITY scale. Standard deviations were similar for all four scales. To investigate differences between the scales, the repeated measures MANOVA mentioned previously was conducted on the four scales. The results of the analysis were significant suggesting that the hypothesis of equal scale means was rejected. Given the significance of the MANOVA, the next step was to determine which scale means were different from each other. To determine difference between individual scales, a dependent pairs t-test was conducted on each pair of scales (Table 4.8). These results indicate that each scale is significantly different from each of the other scales.

TABLE 4.8: MANOVA for Environmental Threat Appraisal Scales

	SCALES			
	YOU	ENVIRONMENT	CONTROL	RESPONSIBILITY
Mean	3.73	4.40	2.90	2.10
SD	1.14	1.12	1.16	0.99
N	269	269	269	269

Note: $F = 4624.64$; $df = 1,268$; $p < .0001$.

Paired t-tests:

You & Environment	- t(obs) = -11.91, df = 270, p < .0001
You & Control	- t(obs) = 10.29, df = 270, p < .0001
You & Responsibility	- t(obs) = 20.75, df = 284, p < .0001
Control & Environment	- t(obs) = -17.94, df = 269, p < .0001
Control & Responsibility	- t(obs) = 11.30, df = 269, p < .0001
Responsibility & Environment	- t(obs) = -28.02, df = 269, p < .0001

HYPOTHESES

H1: Users of the HMIL will respond differently to environmental threats that affect them personally compared to threats which affect the environment.

Significant differences between the scale means support the first hypothesis and suggest that respondents felt that most of the perceived threat was focused upon the environment and less on themselves.

Respondents felt that there was a moderate level of threat posed by the various items contained within the two scales. The highest level of threat was reported for the ENVIRONMENT scale ($\bar{x} = 4.40$). The mean for the YOU scale was lower at 3.73 (Table 4.8).

H2: Users of the HMIL will appraise their control over environmental threats differently than they will appraise their responsibility for the existence of environmental threats.

Based upon the means for the CONTROL and RESPONSIBILITY scales, as seen in Table 4.8, respondents indicated a greater sense of control over environmental threats as compared to their assessment of their responsibility for environmental threats.

The mean for the RESPONSIBILITY scale was 2.10; and in the case of the CONTROL scale, the mean was higher at 2.90. The t-tests revealed that there was a significant difference between the CONTROL and RESPONSIBILITY scales. Respondents felt that they had little responsibility for the existence of the threats compared to a stronger sense of control over the threats. This finding supports the second hypothesis.

H3: There will be a significant positive relationship between respondents' appraisal of environmental threats and their commitment to environmental quality

For the scales to be useful, it is important that they be related to other key environmental variables such as pro-environmental action, commitment to environmental quality, or other types of environmental concern. In the original work of Schmidt and Gifford (1989), the scales were found to be related to other environmentally sensitive scales and indices. One of the goals of this current study was to investigate the relationship between the scales and more direct measures of environmental concern. One way to indicate whether the scales can contribute

to a better understanding of environmental concern and action is to test the relationship between the scales and self-reported environmental commitment. This was done using the repeated measures MANOVA.

The results of the repeated measures MANOVA can be seen in Table 4.9. As shown, the main effect of commitment has an F value of 37.27 and is significant at $p < .0001$. There is no interaction between commitment and the scales within the subjects ($p<.521$), so the effect of commitment can be interpreted directly. These results suggest that there is a different pattern of mean scores for the scales depending on the level of commitment expressed by the respondents. Those respondents who have high commitment scores also have higher scale scores on each scale respectively.

TABLE 4.9: MANOVA Using Commitment as an Independent Variable

	APPROX. F	SIGNIF. OF F
Between-Subjects		
Constant	5205.58	.000
Commitment	37.27	.000
Between and Within	.11	.953
Interaction (Hotellings) Between and Within	.75	.521
Repeated Effect (Hotellings)	333.63	.000
Within-Subject		
Scales	333.63	.000
Commitment by scales	.82	.482

Note: Total sample size = 269, 20 cases were not included in the analysis due to missing data.

The commitment index was transformed into an ordinal measurement by dividing the range of scores at the mean -- 4.3. The group means, standard

deviations, and mean differences between the high and low commitment groups by scale are presented in Table 4.10. In this table the pattern of the relationship between commitment and the scales can be seen. Indeed, in the case of each scale, as commitment increases, the average scale score increases as well. The third hypothesis was supported.

TABLE 4.10: Scale Scores for Different Levels of Environmental Commitment

Scale	Commt. Group	Mean	Standard Deviation	N	Mean Difference (High-Low)	t
YOU	Low	3.40	1.122	143	4.0-3.4=.6	-5.29*
YOU	High	4.03	1.08	146		
ENVIRONMENT	Low	4.09	1.12	131	4.1-4.7=.6	-4.44*
ENVIRONMENT	High	4.68	1.06	140		
CONTROL	Low	2.59	.98	131	3.2-2.6=.8	-4.37*
CONTROL	High	3.19	1.24	140		
RESPONSIBILITY	Low	1.89	.69	139	2.3-1.9=.4	-3.59*
RESPONSIBILITY	High	2.32	1.17	146		

* Significant, p = <.05.

As indicated in the literature review, people do have a concern that their individual behavior will have little impact on environmental threats (Paterson and Neufeld 1987). Therefore, special attention was given to the relationship between control and commitment. The decision was made to test the relationship between the control variable, levels of commitment, and the remaining three scales. Means

were compared and tested using ANOVAs for high and low commitment groups within the remaining three scales, while holding CONTROL constant. In the case of the YOU scale, CONTROL was found to be a significant covariate ($F = 41.07$; $df = 1,268$; $p < .0001$). Yet it was observed that there was a significant difference between the YOU scale scores for groups with different levels of commitment, while controlling for CONTROL ($F = 12.41$; $df = 1,268$; $p < .0001$). In the case of the ENVIRONMENT scale, CONTROL was found to be a significant covariate ($F = 25.62$; $df = 1,267$; $p < .000$). It was also observed that there were significant differences for the ENVIRONMENT scale between groups with different levels of commitment, while holding constant scores on the CONTROL scale,($F = 11.53$; $df = 1,267$; $p < .001$). In the case of the RESPONSIBILITY scale, CONTROL was found to be a significant covariate ($F = 29.63$; $df = 1,267$; $p < .000$). Yet here again, it was observed that there was a significant difference in the scale scores between levels of commitment while controlling for CONTROL ($F = 5.24$; $df = 1,267$; $p < .023$).

The set of means within each scale by commitment (low, high) were significantly different for the other three scales (YOU, ENVIRONMENT and RESPONSIBILITY). The variable CONTROL was found to be a significant covariate in each case, yet even though statistically holding constant the effects of control, commitment is related to the appraisal of threat.

H4: There will be a significant positive relationship between respondents' appraisal of environmental threats and their reported action to protect the environment.

The most important focus of these analyses was environmental action. This is the goal of much modern environmental research -- trying to identify variables that are directly related to taking positive environmental action, (Fischoff, Svenson, and Slovic 1987). In this study the relationship being investigated is between the appraisal of threats as portrayed in the Envirionmental appraisal inventory and action taken in regard to the information received as a result of the phone call made to the HMIL. As indicated in the literature review, past research has been mixed in terms of success in identifying variables that predict or are consistently related to environmental action. Descriptive data presented in Table 4.11 indicate how similar the scale scores are for those taking environmental action and those taking no environmental action.

TABLE 4.11: Scale Scores for Different Levels of Environmental Action

SCALE	ACTION GROUP	MEAN	STANDARD DEVIATION	N
YOU	no	3.69	1.14	83
YOU	yes	3.72	1.14	177
ENVIRONMENT	no	4.34	1.15	83
ENVIRONMENT	yes	4.40	1.12	177
CONTROL	no	2.90	1.11	83
CONTROL	yes	2.88	1.18	177
RESPONSIBILITY	no	2.08	1.02	83
RESPONSIBILITY	yes	2.12	.99	177

To test this relationship between environmental action and the scales, a repeated measures MANOVA was conducted using the four scales as dependent variables and environmental action as the independent variable with two levels (Action/No Action). The results of the analysis can be seen in Table 4.12. There was no interaction between action and the scales within subjects, so the effect of action can be interpreted without concern for interaction effects. As can be seen in Table 4.12, the action effect was not significant, therefore this hypothesis could not be supported.

TABLE 4.12: Repeated Measures MANOVA - Test of the Relationship between Environmental Action and Scale Scores

	APPROX. F	SIGNIF. OF F
Between-Subjects		
Constant	3799.83	p<.0001
Action	.07	.787
Interaction (Hotellings) Between and Within	.11	.953
Repeated Effect (Hotellings)	213.30	p<.0001
Within-Subject		
Scales	276.24	p<.0001
Action by scales	.12	.949

H5: There will be a significant relationship between appraisal of environmental threat and respondents' age, income, education, gender, action taken, and environmental commitment.

The final hypothesis refers to a further investigation of how well these newly developed scales relate to other key variables. To assess these potential relationships, a linear regression was performed for each of the scales, with the scale being the dependent variable. In this survey, respondents were asked to provide data on several other variables that should be related to scales focusing on environmental concern and perceived environmental threats to self and the environment. These included past experiences with environmental pollution, environmental action, and commitment. The repeated measures MANOVAs discussed above have already shed light on these relationships. The regression provides another look at these relationships, taking into account demographics, personal experience, and commitment, along with more recent environmental action.

TABLE 4.13: Correlation Matrix -- Scales and selected Variables

	YOU	ENV	CON	RESP	COM	ACT	EXP	AGE	ED	GEN	INC
You											
Env	.67										
Con	.36	.29									
Resp	.26	.19	.31								
Com	.25	.20	.23	.25							
Act	.02	.03	.01	.03	.23						
Exp	.30	.24	.23	-.25	.29	.07					
Age	-.24	-.25	-.25	-.24	-.19	-.01	-.25				
Ed	.00	.04	.12	.03	.07	.05	**.16**	**-.18**			
Gen	.08	**.18**	.03	.03	.22	.08	.01	**-.18**	-.09		
Inc	.04	-.06	.04	.03	.00	-.08	-.03	-.10	.37	.05	

1 tailed significance .01, bolded -.001, underlined Minimum pairwise N of cases: 257

The relationships displayed in the correlation matrix (Table 4.13) point out the pattern of interrelationships that exists between scales, and demographic and environmental variables. Correlations larger than .21 with the sample sizes approaching 250 were significantly different from zero at the .001 level. These correlations suggest that demographic and environmental variables could be useful predictors of scale scores.

Four separate regression analyses were conducted, one for each scale with the scale being the dependent variable. The independent variables in each analysis were action, commitment, gender, age, education, and experience. The variables gender and action were treated as dummy variables and were coded as 1 = Female, 0 = Male; 1 = Action, 0 = No Action.

RESULTS OF REGRESSION ANALYSES FOR THE YOU SCALE

The regression analysis for the YOU scale was significant, with an F value of 21.08, $p<.0001$. The R2 is the percentage of variance accounted for in the dependent variable by all the independent variables in the equation. In the regression for the YOU scale, 21 percent of the variance in YOU was accounted for by experience, commitment, and age (Table 4.14). Each variable contributes to this variance. The standardized beta weights take into account the other variables in the equation and provide another comparison of how the independent variables contribute, relative to each other. There is consistency in the order of the contribution of each variable in the prediction.

TABLE 4.14: Regression Analyses for the YOU Scale

INDEPENDENT VARIABLES	STANDARDIZED BETA WEIGHT	SIMPLE r^2	ß2
EXPERIENCE	.25	.09	.06
COMMITMENT	.20	.06	.04
AGE	-.19	.06	.04
$F= 13.12$; df 7,261; $p<.0001$; $R^2 = .15$			

Experience contributes the most, commitment and age are similar in their contributions. It can be seen in Table 4.14 that Age had an inverse relationship with the YOU scale. In this test, based upon the square of the beta weights, the experience variable contributed approximately 1.5 times as much of the variance as the other two variables. Yet it should be remembered that in total, only 21 percent of the variance was explained.

RESULTS OF REGRESSION ANALYSIS FOR THE ENVIRONMENT SCALE

The regression analysis for the ENVIRONMENT scale was also significant (Table 4.15). In this analysis, three independent variables again entered the equation and accounted for 15 percent of the variance in the ENVIRONMENT scale. The variables to enter the equation were experience, age and gender, in that order.

TABLE 4.15: Regression Analyses for the ENVIRONMENT Scale

INDEPENDENT VARIABLES	STANDARDIZED BETA WEIGHT	SIMPLE r^2	ß2
EXPERIENCE	.25	.08	.06
AGE	-.13	.07	.03
GENDER	.33	.04	.02
F= 13.12, df 7,261; p < .0001; R^2 = .15 R2=15			

Note: The equation for predicting ENVIRONMENT scores would be:

Envirn = 4.36 + .16 * (Exp) -.13 * (Age) + .33 * (Gender)

In this regression, like that of the previous one, experience is the largest relative contributor to the equation, explaining over two times the variance in the dependent variable compared to the other variables entering the equation. It is important to note that age again showed as an inverse relationship. Gender entered the equation providing the smallest contribution to the variance.

RESULTS OF THE REGRESSION ANALYSIS FOR THE CONTROL SCALE

Regression equations for the CONTROL scale included only two of the independent variables - age and commitment. The significant contributing variables accounted for 11% of the variance explained (Table 4.16).

TABLE 4.16: Regression Analyses for the CONTROL Scale

INDEPENDENT VARIABLES	STANDARDIZED BETA WEIGHT	SIMPLE r^2	ß2
AGE	-.23	.05	.05
COMMITMENT	.21	.06	.04
F= 14.45, df 7,261; p < .0001, R^2=.11			

Note: The equation for predicting CONTROL scores would be:

CONTROL = 2.63+ -.16 * (Age) + .22 * (Commitment)

Commitment again becomes a significant variable in this regression equation contributing meaningfully to the variance explained in the CONTROL scale. Yet, age was the recurring variable accounting for the most variance explained. The equation and regression analysis affirms the persistent inverse relationship between the scale scores and the age of the respondent.

RESULTS OF THE REGRESSION ANALYSIS FOR THE RESPONSIBILITY SCALE

In the regression analysis for the RESPONSIBILITY scale, only two independent variables entered into the equation - age and experience. The regression was significant, with these two variables accounting for 11 percent of the variance in the dependent variable.

TABLE 4.17: Regression Analyses for the RESPONSIBILITY Scale

INDEPENDENT VARIABLES	STANDARDIZED BETA WEIGHT	SIMPLE r^2	ß2
AGE	-.22	.07	.05
EXPERIENCE	.20	.06	.04
F= 14.79, df 7,261; p < .0001, R^2=.11			

Note: The equation for predicting RESPONSIBILITY scores would be:

RESPONSIBILITY = 2.37 + -.15 * (Age) + .11 * (Experience)

Age and experience were the strongest variables for this equation as they were in the other regressions. Age is found to be inversely related for this scale; experience is positively related.

Looking across the regression analyses, several variables were contributors, but in no equation were correlations of determinations (R^2) larger than .21. The equations, while significant, yielded only slight explanatory power.

More information can be drawn from the pattern of the variables that entered into the regression equations. In Table 4.18, it can be seen that age was a variable that contributed some explanatory information in all four equations. Experience and commitment entered equations in two of the four cases. What is just as interesting are the variables that did not enter into the equations. Action and several demographic items such as education and income did not enter into the regression equations.

TABLE 4.18: Summary of Regression Analyses

	YOU	ENVIRONMENT	CONTROL	RESPONSIBILITY
R2	.21	.15	.11	.11
Var. entered	3	3	2	2
Entered first*	Exp.	Exp.	Age	Age
Entered				
Age	yes	yes	yes	yes
Commitment	yes	no	yes	no
Experience	yes	yes	no	yes
Gender	no	yes	no	no
Education	no	no	no	no
Income	no	no	no	no
Action	no	no	no	no

* Computer-generated step-wise regression procedures.

These regression analyses do indicate that the scales are related to variables such as experience, commitment, gender and age, but not in a consistent manner across each of the scales.

The relatively small amounts of total variances determined in each of the equations indicate that many other factors and variables are needed or should be included in order to fully explain the variation in the scales. Eighty percent or more of the variance associated with the scales was not accounted for. This provides a substantial opportunity for future research.

SUMMARY

In this study the Environmental Appraisal Inventory was expanded by four scale items. In addition, a fourth scale was added to appraise respondents' feeling

of responsibility for the existence of environmental threats. Using a different population and a larger sample, this research supported the findings of the Schmidt and Gifford study (1989) that the EAI is an internally consistent and valid instrument. Three of the five hypothesis were supported. The fourth hypothesis, that there is a positive relationship between appraisal of threat and action to protect the environment, was not supported. The fifth hypothesis, stating that a relationship existed between demographic and socio-economic variables, was supported in part. Experience with environmental threats, age, and commitment to positive environmental behavior entered the regression analysis most often; gender only entered the regression analysis for the ENVIRONMENT scale. Also, like Schmidt and Gifford, this study found that the highest level of threat was appraised for the ENVIRONMENT scale, and the strongest relationship between the scales was between the YOU scale and the ENVIRONMENT scale.

The relationship between environmental threat, as stated in the EAI, and commitment was explored. In each case, as the level of commitment increased the average scale scare increased. Even controlling for the CONTROL variable revealed a significant difference in scale scores.

CHAPTER V

DISCUSSION

This chapter contains a brief overview of the research objectives, procedures, and results that have been detailed in previous chapters. Following the overview is a discussion of the research findings and implications for future research. In addition the research findings are applied to programming considerations as presented in Chapter I.

SUMMARY

The primary contributions of this research are (1) the expansion and testing of a methodology for evaluating a person's appraisal of environmental threat, (2) documentation of the relationship between appraisal of threat and action, (3) the identification of intervening variables in the threat appraisal process. A secondary contribution of this research is to link the cognitive structure called commitment to action since intended action is often the best predictor of action itself (i.e. behavior). Commitment is defined as a pledge or, more specifically a personal obligation to follow a code of behavior or planned action.

Research Question

The general question in this research has been: Is an individual's appraisal of environmental threats related to a commitment to protect the environment? When there are no regulations mandating precise behavior, the need exists to be sure that programs are designed and information disseminated in such a way as to reach the internal cognitive structure of individuals, called beliefs, and that programs interface with those beliefs to activate positive behavior.

Research Objectives

The specific purpose of this research has been to determine the relationship between disposition toward environmental threat and commitment or action taken to protect the environment. This research also profiled the individuals who called the Hazardous Materials Information Line (HMIL) to determine if those who took environmental action and/or indicated strong environmental commitment had a different profile than those who did not take action or indicate commitment.

Sample Population

The sample population was identified as a result of calls made to the HMIL. After questions were answered by the Hazardous Materials Management Agent, the callers were asked if they would be willing to participate in a survey. Those who said yes were added to the list of persons to receive the research questionnaire. A response rate of 61.2 percent was obtained. Although a higher response rate was desired, this rate was considered adequate and acceptable. Babbie (1989, 241) cites as a typical model a case study done by the University

of Hawaii in which a 40 percent return rate was realized on the first mailing, an additional 20 percent on the second mailing, and an additional 10 percent return on a third follow up. In this study, 61.2 percent falls into the "Good" category (Babbie 1989, 242). Time and money did not permit additional mailings to gain additional returns. Another factor which limited further efforts to solicit additional responses was the content of the letter sent to non-respondents as a second mailing. The letter stated that if the survey was not returned by a certain date, the name of the potential respondent would be removed from the coded list; consequently, the University Committee on Research of Human Subjects (UCRHS) would not allow a third mailing. As always, the disadvantage of not getting a higher return rate means that there is no information about 38.8 percent of the sample group.

Demographic Profile

The demographic profile of respondents compared to Michigan residents illustrates that the respondents in this study were above the norm in Michigan in terms of income and education. While the problem of hazardous waste is not a new problem, the issues surrounding the management of small quantities, especially the waste management problems of small businesses and households, has only recently received national and statewide attention. Media discussions of the problem are pervasive and the HMIL 800-information line is current and well publicized. It would be expected that callers to the 800 line would probably be what communication researchers call "early adopters" (Rogers and Schumacher, 1971). The socio-economic profile of early adopters is usually higher than the

population as a whole. People in this category usually read more, travel more, and are considered community leaders. In light of previous research, it seems reasonable that early adopters would be the type of citizen who would access the HMIL and would adopt behaviors that protect the environment. Results of other environmental attitude studies also indicate that the socio-economic profile of people sensitive to the environment is higher than for those who have less sensitivity to the environment (Dunlap 1981).

Methodological Contributions

This research was based on the work of Schmidt and Gifford (1989). Their work"... develops and describes the Environmental Appraisal Inventory (EAI), which was designed to measure three dimensions of environmental appraisal: (a) threat to self, (b) threat to the environment posed by environmental hazards, and (c) perceived control over environmental hazards" (Schmidt and Gifford, 1989, 57). The EAI, as tested by Schmidt and Gifford, had "...good psychometric properties, represents a previously untapped aspect of person-environment relations, and should prove useful as a mediating variable in several areas of environmental psychology" (Schmidt and Gifford, 1989, 57). As a result of an extensive literature review, it was apparent that the part of the person-environment interface that was not explored in the Schmidt and Gifford study was the concept of responsibility. Schmidt and Gifford clearly indicate that..."the importance of a range of contextual variables that mediate the reciprocal relationship between the person and the physical environment" (Schmidt and Gifford, 1989 57), but they do not address the internal value structure of the individual that may contribute to

reciprocity and, ultimately, changed behavior. Although perceived threat to self and environment was tested using a 24-item scale and perceived control was also explored based on Rotter's Locus of Control paradigm (Rotter, 1966), the ability of the scales to more explicitly explore the internal cognitive structure called "conscience" was not part of the original study. As pointed out in the literature review, since each individual is attempting to maximize pleasure in life and minimize pain, it becomes essential to understand the relationship between individuals' personal responsibility for environmental externalities as they exist and their own personal behavior. In other words, it becomes necessary to understand the relationship between a sense of moral responsibility and a considered action, since the no-action option could cause a great deal of negative utility if a deep sense of guilt is felt. That is the reason for the addition of the fourth scale to the EAI, titled RESPONSIBILITY, that explores a person's feeling of responsibility for the existence of the environmental threat.

The original three scales were 24 items in length; four additional items that depicted current human-generated pollution concerns were added to these original 24 items. The purpose of adding these four items was to expand the conceptual framework of threat. Since the program being considered was one where individuals should have been concerned about human-generated pollution, it was necessary to provide an opportunity for the respondents to react to pollution-related items. The addition of the four new items changed the scales so that in this study, the EAI was treated as a new instrument and re-evaluated for validity and reliability. The expanded instrument held up under testing. Based upon the factor analysis the instrument maintained construct validity. The fourth construct

of personal responsibility was found to be a strong single construct. In a comparison of scale means and standard deviations between the new instrument and the Schmidt and Gifford scales, evidence of concurrent validity was obtained. The strongest concern focused on the problem of multicollinearity. Since high interscale correlations were observed, it was possible that the scales were accounting for similar portions of variance. On the other hand, the results of a dependent pairs t-test indicated that the scale means were significantly different from each other, again reflecting evidence of each being a unique construct. The final test of instrument integrity, reliability, was assessed using CronBach's Alpha; values were all above .95 indicating that the individual scales displayed strong internal consistency.

As Schmidt and Gifford point out, there is a significant need to develop and use standardized tools that can assess the person- environment interface. The results of this study expand the EAI as a research instrument. Evidence of reliability and validity was observed. The expansion of the instrument to the realm of threats from pollution increases the utility of the instrument in a broader arena of environmental studies. In addition, the preliminary work to extend the conceptual framework of the instrument to include the moral issue of responsibility for environmental quality expands the usefulness of the EAI.

DISCUSSION OF RESULTS RELATED TO THE HYPOTHESES

H1: Users of the HMIL will respond differently to environmental threats which affect them personally compared to threats which affect the environment.

This hypotheses was supported. The respondents viewed items as listed in the expanded EAI as greater threats to the environment than to themselves, personally. Current popular literature does highlight environmental degradation more than personal health deterioration as a result of environmental pollution. The EAI is really assessing threat perception responses in three areas: natural disasters, person-generated hazards, and technological hazards. These are the topics that are most often covered as disasters in the popular media (magazines, newspapers, and television). It would appear that respondents to this survey are less likely to be exposed to the threats listed since they are predominantly middle class and have adequate resources to avoid them. The people that are characterized in the press as being affected by many of these threats are often limited-resource populations. Our respondents simply don't relate; they may feel that it happens to somebody else. In addition, many of these threats are natural disasters, such as earthquakes or technological disasters, such as nuclear energy plant spills; such disasters are clearly damaging to an extensive environmental area but seldom result in large death tolls. When they do cause many deaths, it is most often in developing countries where systems for survival are not as sophisticated as in the United States. Therefore, the respondents to this survey may have examples of environmental disasters in mind that rightly or wrongly, make them feel that the threat will not influence them personally. Although there was a high correlation between the YOU scale and the ENVIRONMENT scale, the differences between the

means for the ENVIRONMENT scale and the YOU scale were significant. This finding indicates a perception on the part of the respondents that they are immune to the effects of threats to the environment.

H2: Users of the HMIL will appraise their control over environmental threats differently than they will appraise their responsibility for the existence of environmental threats.

The second hypothesis was supported. The results of the t-test indicates that there was a significant difference between the CONTROL and RESPONSIBILITY scales. The respondents indicated more control over the 28 threats as stated than they indicated responsibility for the existence of those threats. This finding could be attributed in part to the fact that some of the items contained in the scale are beyond the power of human intervention (e.g., storms, earthquakes, tidal waves, etc.). Yet, it is interesting that individual respondents did not see themselves more centrally involved in the development, creation, and use of products and practices that do cause environmental problems. Of the 28 items listed in the threat scales 15 of them are clearly human-generated threats, seven are natural disasters (only forest fires could be both), and six are a result of technologies that few people have any control over. With this preponderance of human-generated threats in the scales, the measure of personal responsibility for the existence of environmental threats could have been higher.

These results may reflect a disassociation with the impact of humans on the environment. As pointed out in the literature review, the work of Swartz (1970) and Heberlein (1975) supports this finding. They explain that re-interpretation or

denial of the normative expectation and disassociation of responsibility are mechanisms used to reduce cognitive dissonance without changing behavior. The respondents in this study have indicated a very low level of responsibility for the existence of threat in spite of the fact that over 50 percent of the threats fall into the human-generated category.

Taking into account all four scales, the respondents scored much higher on the threat to ENVIRONMENT and threat to YOU scales than on the CONTROL to ameliorate or RESPONSIBILITY for existence scales. This same pattern of mean scale scores was obtained by Schmidt and Gifford (1989). They found means higher for the ENVIRONMENT and YOU scales than for the CONTROL scale. The comparable means and variations for the two studies provide some evidence that these response patterns may be present in the population at large. These results might indicate a sense of "powerlessness" and a lack of responsibility among the sample group. To the extent that these perceptions might generalize to the larger population, it represents a significant problem for a consumer-oriented, democratic society. Ultimately, it is each individual in concert with millions of other individuals who have to ameliorate environmental problems and who must recognize that they are truly, as a community of individuals, ultimately responsible for the development and existence of present and emerging environmental problems.

H:3 There will be a significant positive relationship between respondents' appraisal of environmental threats and their commitment to environmental quality.

This hypothesis was supported. Respondents with higher levels of environmental commitment also had significantly higher scores on each of the four scales. In all cases the more committed respondents had higher scale scores. Respondents scoring higher on the four scales were more likely to have a stronger desire or willingness to properly dispose of hazardous waste, contribute to environmental causes, or alter consumer decisions to protect the environment. While those with high commitment felt that environmental threats were more serious, they also felt they had more control over these threats and were willing to report that they felt a stronger degree of responsibility for the existence of these threats.

H4: There will be a significant positive relationship between respondents' appraisal of environmental threats and their reported action to protect the environment.

The action effect was not significant; therefore, this hypothesis was not supported. Action in response to information received from the HMIL was depicted as a dichotomous variable. If people said they acted on the information they received from the hazardous materials management agent, they were considered to have acted. However, if people said they did not act, they were considered to not have acted. In some cases people said they did not act when in fact they secured the hazardous material and stored it properly. The challenges researchers

have had over the years in trying to determine what constitutes action surfaced in this research as well. People define action in many different ways. A strong recommendation for future research in this area is that a clear definition for action be formulated and that several acceptable actions that are clearly related to the object be established and linked. In this research, it could be argued that the phone call itself constituted action. If the test results are interpreted as they appear without concern for methodological problems, then we must conclude that there is no relationship between appraisal of threat and overt action. If action is not determined by an interpretation of a situation, it must be determined by something else or by a combination of input to the cognitive process that is not reflected in this study. In their extensive treatment of the subject of decision theory, Fischhoff, Svenson, and Slovic (1987) describe a pattern of decision making prior to action that utilizes the Subjective Expected Utility (SEU) model. The SEU model helps us understand how people make the decision to act or not to act. The SEU..."designates probabilities as being subjective and consequences as being evaluated in terms of utility, a generalized measure of desirability (Fischhoff, et al. 1987, 1123). Appraising the impact an environmental threat has on one and deciding what to do about it require a very complex set of evaluations that include both subjective or objective probabilities (will my neighbors find out that I dumped my trash illegally and if so will they turn me in to the police and what will the cost be?) and consequences (if all this happens will I lose my job?). People are really interested in the cumulative impact of a decision on their life style.

The respondents in this research were asked whether they responded to the recommendations they received from the HMM agent. However, their responses

could not be related statistically to their appraisal of threat as measured by the EAI. This failure of the EAI to predict behavior is related to the complexity of the behavior response. The appraisal of threat to self and environment, as well as the feeling of control over the threat and the responsibility for it, are only some of the variables involved in the decision to act. In addition, knowledge of consequences must be explored, cost for action or no action must be considered, and opportunity for action must be assessed.

To return to the example of residents living in a floodplain: although residents of a floodplain continue to rebuild in spite of what they know might happen, they are not buying the federally subsidized floodplain insurance and the question is why not. The probability of a flood affecting them was great and the consequences could be disastrous, and yet they did not respond to the opportunity to take action and purchase flood insurance (Kunreuther, 1978). An extensive survey of residents in floodplain areas determined that the primary reasons for their decision to act or not act on the opportunity to purchase flood insurance was whether their neighbors purchased it and whether they trusted the agent (which most did not).

The use of a tool that measures people's appraisal of risk may be a preliminary step in determining how people view risk and what their commitment is to environmental quality, but it may not be a consistent predictor of action.

H5: There will be significant relationships between appraisal of environmental threat and respondents' age, income, education, gender, action taken, and environmental commitment.

To assess and define all relationships between these variables, a regression analysis was used. Stepwise linear regression was used with variables entered first by levels of significance. A regression was performed for each scale, with the scale being the dependent variable. The results of the YOU scale regression indicated that experience contributed the most variance to the equation, with commitment second. Age was third with an inverse relationship. The strong appraisal of the scale items as posing a personal threat to self is logical if one has had personal experience with environmental problems. The R2 was .09 and accounted for 9 percent of the variance. In contrast, people have a tendency to underestimate personal risk if they have had no experience. This dichotomy could be providing inflated measurements for those who have had some experience. For example, "Drivers who have never had a (serious) accident may not realize how large a sample of experience is needed to estimate such low probability events accurately" (Fischoff,et al. 1987, 26). Just one experience with an accident can sensitize a driver to risks on the highway, in general, and perhaps to other experiences based on personal performance. This response to a single personal experience can be explained through a construct first presented by Tversky and Kahneman (1971) called "belief in the law of small numbers". Indeed experience may prove to be a valuable tool in value education if it can be simulated in such a way as to provide cognitive impact that is lasting in a manner similar to personal experience. Commitment and age contributed about equally to explaining the

variance. Commitment to environmental quality as measured by intended behavior (willingness questions) would indeed be contributing to the variance of appraised threat to the individual, since it is personal and related to one's quality of life. The inverse relationship of age to the scale scores is discussed in more detail below. It is sufficient to say here that people who have lived longer, and experienced more, are less likely to appraise threat the same as younger people might.

In the regression analysis for the ENVIRONMENT scale, three independent variables entered into the equation at a significant level. These variables were experience, age, and gender in that order. Again age had an inverse relationship with the dependent variable. Gender made the smallest variance contribution, with females perceiving more threat to the environment than men. Like the YOU scale results, if a person has had personal experience with environmental degradation --- whether it was a result of human- generated pollution or a natural hazard like an earth quake--- their belief that the environment is indestructible has been shaken; the belief in the law of small numbers takes over and a heightened awareness causes people to respond strongly and exaggerate the informativeness of small data sets (Fischoff, et al. 1987). Age contributed 7 percent of the variance.

In the regression analysis for the CONTROL scale, only two independent variables entered the equation accounting for 11 percent of the variance. They were age and commitment. Again an inverse relationship between age and the scale scores was observed. Commitment, as measured by social welfare intentions (willingness to drive, wait, spend), clearly has provided much of the explanatory power of the regression analysis. As opposed to fear of the negative consequences of an environmental threat, commitment indicates a positive belief

that one can impact environmental problems positively. Since the CONTROL scale is a measure of a person's confidence that a threat could be ameliorated by him or herself it is not surprising that this regression indicates a strong relationship between the independent and the dependent variables of commitment and control. This relationship might be explored further, but this research at least indicates that in order to feel confidence to tackle an environmental problem, one must first be committed to using one's resources (i.e., energy, money, time, etc.) to work on a problem.

In the regression analysis for the RESPONSIBILITY scale we see two of the independent variables that we have seen before---age and experience. Again age was related in an inverse manner. The consistent presence of age as a contributing variable and always in an inverse relationship may appear to be in opposition to a common perception of middle-to advanced-age populations as more knowledgeable and more focused on social issues, with more resources to contribute, and, therefore, more responsive to environmental threats. These older people might respond with a higher appraisal score on the YOU and ENVIRONMENT scales since they have seen more. Older people might feel more confidence to solve environmental problems since they have more resources and more experience. They might also feel more responsibility for the existence of environmental threats since they have been on this earth longer and may recall some poor decisions in their youth that contributed to environmental pollution. However, what may be overriding here is the experience of more senior members of society who have "seen it all". Older citizens with more experience might be less willing to endorse the perception that many of these scale items pose a

serious threat to the ultimate fate of the environment. In this case their experience coupled with their advanced age tells them that most declarations of environmental crises are overdone and that in fact these so-called crises are just one more event on the life continuum. In other words, as people age they are less sensitive to threats of any kind and responded to the scales accordingly.

SCALE SUMMARY

The respondents' scores for the ENVIRONMENT scales were the highest. They indicated that the scale items were more threatening to the environment than to them personally. This response could be the result, as mentioned earlier, of a feeling of personal immunity to threat as compared to the more vulnerable environment, although the strong correlation between the YOU and ENVIRONMENT scales indicates an understanding on the part of the respondents to the relationship between humans and the environment. Respondents did indicate a low level of control over environmental hazards. There are a number of reasons for the perception of a low level of control. The most obvious is that some of the items in the scale were acts of nature and clearly out of the control of individuals. Another reason may have been because some of the items were technology-based and the method of control was unknown. The strong relationship between the commitment index and the scale scores does show that if indicated action is a measure of overt action under certain circumstances, then the relationship between the scales and action could be explored in new ways.

Probably the most disappointing result of this study was the lack of an observed relationship between the scale scores and the action variable. It should

be noted that the one item YES/NO response to the action variable does not allow the subtlety of the concept of action to be expressed. For example is it action if the citizen who contacted the hazardous materials information line took the information (e.g., a collection day was being held 20 miles away) and did not act on the specific recommendation but instead carefully wrapped and labeled the hazardous material and stored it under lock and key in a dry location? Action is situation-specific and is defined by the individual implementing it. Action to one person may be non-action to another. At least action should be quantified as an index. An attempt was made to expand the action concept to an index in this research. Unfortunately, the pattern of response was such that the additional items used in the proposed index did nothing to clarify the action variable. The only response used was YES I took action or NO I did not take action. The variations on action explored further in the questionnaire were time (how quickly) and resources spent (how much). This was indeed a measure of commitment, but not action.

PROGRAM DESIGN RESPONSE

The results of this study have ramifications for a number of programming-related issues. As community educators design new curricula and modify existing education materials, their decisions about program structure and content should be based on research findings. There is a need to better understand how people view environmental problems, how committed they are to environmental quality, and what action they are willing to take to protect the environment. The Environmental Appraisal Inventory (EAI) was developed by Schmidt and Gifford for

the purpose of exploring the contextual variables of the person-environment relationship. These contextual variables are response to threat, control over threat, and other variables that should influence personal behavior.

This research has utilized the EAI as a tool to better understand the relationship between perceived threat and other contextual variables such as experience with threat, intentions toward environmental threat, and socio-economic situations. Results of this research can be focused on the following program design questions:

1. What role does the appraisal of environmental threat play in action or attitude change?

Individuals perceive threat to the environment as greater than threat to self. This finding indicates that some members of society do not see themselves as integral to the environment. This observation is in keeping with the notion that many people see themselves as "dominators" of nature and therefore above the threats that impact the environment. It is also observed that since many sites of environmental pollution are abandoned by residents due to their concern for personal health and the health of their families they are able to make a change to protect themselves. This perceived mobility may give people more confidence that they can ameliorate the threat situation for themselves but not for the environment. This finding supports the use of factual data on water quality, soil viability, and air quality as a base for human habitation.

Residents need to know the impact that human habitation has on the environment as well as what impact environmental pollution has on human health.

It may also support the use of references to intergenerational responsibility as a motivator of behavioral change. Since factual data on environmental pollution often is based on longitudinal studies indicating long term impacts, the description of impacts on family futures as part of program context is reasonable.

2. What role does assessment of control over environmental threats play in response behavior?

The mean scale score for CONTROL was low. Although the respondents indicated more control over environmental threats than they indicated responsibility for them, both mean scale scores were low. Since the measure of control was defined as confidence to ameliorate environmental problems, we are equating control with confidence. People in this study seem to feel a sense of powerlessness when dealing with environmental problems. This finding could support the use of more program development resources being used to establish contact points for citizens to gain information and support. It might also support more resources being allocated to environmental leadership development programs. Educational efforts that build confidence in the general population would be advisable based on these findings.

3. What role does perceived personal responsibility for environmental hazards play in response behavior?

Since the lowest scale mean was that obtained for RESPONSIBILITY, it is clear that the respondents did not feel responsible for the deterioration of the environment. This finding might support the use of relational data being used in

program curricula. This relational data might include, for example, what the minimum quantity of oil for aquifer contamination might be, or how much waste can be diverted from a landfill if everyone recycles just one pound per day. The extent to which small increments of hazardous materials cumulatively affect the environment should be included in program text. Although not all listed environmental threat in this research study has been generated by individuals, but instead much is generated by individuals collectively and the realities of this cumulative effect should be clearly represented in program materials. Before it is effective to provide information about the effects of personal behavior on the environment people need to understand the relationship of their behavior to impacts. It is not effective to call on conscience if people do not see the relationships.

4. What role does past life experiences play in responding to environmental hazards?

More than any other variable in this research, life experiences emerged as one of the most powerful contributors to environmental awareness and to people's appraisal of threat. Respondents to the survey who had personal experiences related to the items in the EAI scales, scored higher on all scales. Although we cannot provide environmental crisis experiences for people on demand, it may be possible to simulate these experiences and provide individuals with a feeling for the experience. This finding provides strong support for experiential learning. Programs that take citizens into the community to participate in environmental clean-up and involve citizens in hazardous waste collection programs and habitat rehabilitation

efforts are all examples of planned experiential learning. This finding is also strong support for parent-child programs that allow children to observe their parents contributions to environmental quality. Problem solving at the local level that involves young people is another possible program response. It is clear that this finding may prove to be one of the most important, but one of the most difficult to respond to, since this type of community activity is time consuming and can be costly.

5. What role do current socio-economic circumstances play in environmental response?

Based upon the data from this study, socio-economic variables were weak explanatory variables. Except for the variable age, most were found to be only moderately related to key constructs in the study. Very little explanation was contributed by education, income, and other variables. Age was the strongest contributor to understanding and that was an inverse relationship. Gender (female) contributed minimally to the concern for environment. In site of the fact that the socio-demographic profile of the sample population is the upper range other research has indicated, the trickle-down (Morrison 1988) of environmental problems has eliminated the class distinctions between those who care and those who don't care about the environment. In the past, environmental concerns for forest preservation and wildlife habitat have been the purview of the affluent who had the resources to pursue their concerns. Current environmental concerns are focused primarily on environmental pollution, the depletion of the ozone layer, acid rain, and other problems that intimately affect the population as a whole.

Therefore, it would not appear useful or wise to focus environmental programs on any particular population but to focus them on the population in general. It is not expected that all populations will respond in kind, but all levels of society are impacted.

In general the findings in this research are in line with other research in the field. However, the use of the EAI as a tool to determine threat appraisal enhances our ability to develop environmental program materials with additional confidence. Schmidt and Gifford (1989,57) base their research on the work of Lazarus and the stress-response relationship. "Stress may be seen as being comprised of three components: (a) the stimulus, (b) the individual's appraisal of the situation, and (c) some form of response to the stimulus" (Lazarus, 1984, 17). The desired outcome of environmental programs is a pro-environment attitude. That response should be heightened awareness, increased knowledge, and positive practice change. What stimulates that response is better understood because of the research done on disposition to hazard appraisal. A direct relationship between citizens' appraisal of situational variables and their response must be established if educators are to be effective.

RESEARCH LIMITATIONS

As in any investigation, foreseen and unforeseen limitations were encountered. Limitations associated with this study are listed below.

1. The non-random selection technique limits the generalizability of the study conclusions. Although some general recommendations have

been drawn about program implications of this study, anyone wishing to follow those recommendations should be aware that implementation of this study in another state or country could yield different findings. The users of the HMIL represent a unique, small sub-population of concerned Michigan citizens.

2. The return rate of 62 percent may mean that non-response bias could exist. Due to study methods and procedures, the extent of non-response bias could not be assessed.

3. The depiction of the action variable as a yes/no response is probably the most troublesome limitation of this study. Had the action variable been a multi-item continuous variable, results from the study might have been more definitive. Other information was collected on other aspects of action but it was difficult to interpret. It was used primarily to determine if the yes or no was reality based. In some cases, for example, people said they did not act, when in fact they secured the material and stored it properly.

RECOMMENDATIONS FOR FUTURE RESEARCH

Now that the EAI has been tested for validity and reliability and holds up as a conceptually consistent instrument with good psychometric properties, it should be used in future research, in other applications, and with other samples. It is suggested that sub-scales be developed (i.e., natural hazards, technological hazards, individual person-generated hazards, and indoor workplace-related hazards). Additional research could expand the sample population to a random

selection across states or across cultures. In this way the EAI could be used to compare perception of environmental hazards between groups with known differences. Longitudinal studies, as well as pre and post crisis studies could be conducted using the EAI.

The use of the EAI as a measurement instrument has great potential as a method for understanding the cognitive/relational interface between people and the environment. It has the potential to help both government and industry, as well as non-profit institutions and organizations, gain insights into that which motivates people to respond to environmental crises and bring that knowledge to the decision process. The EAI could be compared to other environmental attitude measurements to determine effectiveness and to further refine the instrument. The comparative elements of the survey could be expanded especially as related to the action variable. The EAI could be tested on a random sample of the general population in Michigan.

APPENDIX

GUIDE TO HAZARDOUS PRODUCTS AROUND THE HOME SURVEY

FOR BEING ENVIRONMENTALLY AWARE

Dear Survey Participant:

Within the last 18 months you have contacted one of the Hazardous Materials Information Services, either in Baraga, Cheboygan, Oakland, or Ingham counties. As a result of your responsible behavior, some aspect of the environment is better protected.

In an effort to improve the quality of our service, we need to better understand you and your response to the issue of environmental problems.

In return for your time and effort, we would like to send you a copy of the book, *Guide to Hazardous Products Around the Home*, shown above.

We would appreciate your return of this questionnaire by November 15, 1990. Thank you.

Cynthia Fridgen
Waste Management Specialist

Instructions

LIST YOUR ZIP CODE HERE _____

Please read the question at the top of each set of scales carefully. The scale items are identical but the question is different. Respond to every item--even if a certain hazard is not a factor in your life or you have never heard of it, you can choose the response "no threat." Work fairly quickly; do not deliberate long over each hazard.

DO NOT PUT YOUR NAME ON THIS QUESTIONNAIRE! You indicate your voluntary agreement to participate by completing and returning this questionnaire; all responses will be confidential. Your questionnaire is coded for the purpose of documenting its return and prompting us to send you a copy of *A Guide to Hazardous Products around the Home*. At this point the relationship between your name and your questionnaire will be destroyed. Please direct any questions concerning this questionnaire to Cynthia Fridgen (517/355-9578). Thank you for your cooperation. Your support will help us design more responsive environmental education and assistance programs.

Please return this questionnaire to:

Hazardous Materials Management Project
302 Natural Resources Building
Michigan State University
East Lansing MI 48824-1222

PLEASE READ THE FOLLOWING DIRECTIONS:

- Use a soft black (no. 2) pencil only.
- Do not fold, staple, or make stray marks on the form.
- Circle the answer of your choice.
- Erase cleanly when you want to change an answer.

I. Please rate how threatening the following problems are TO YOU by marking the response that best describes your position.

	No Threat	Minimal	Mild	Moderate	Strong	Very Strong	Extreme
1. Water pollution	1	2	3	4	5	6	7
2. Storms—lightning, hurricanes, tornados, snow, etc	1	2	3	4	5	6	7
3. Pollution from cars, factories, and burning trash	1	2	3	4	5	6	7
4. Smoking in public buildings	1	2	3	4	5	6	7
5. Acid rain	1	2	3	4	5	6	7
6. Pollution from office equipment, e.g., ozone from photocopiers	1	2	3	4	5	6	7
7. Number of people—crowding, increasing population	1	2	3	4	5	6	7
8. Fluorescent lighting	1	2	3	4	5	6	7
9. Water shortage, e.g., drought, water depletion	1	2	3	4	5	6	7
10. Noise pollution	1	2	3	4	5	6	7
11. Visual pollution—billboards, litter, etc	1	2	3	4	5	6	7
12. Radioactivity in building materials, e.g., radon gas	1	2	3	4	5	6	7
13. Change to the ozone caused by pollution	1	2	3	4	5	6	7
14. Earthquakes	1	2	3	4	5	6	7
15. Soil erosion	1	2	3	4	5	6	7
16. Impure drinking water	1	2	3	4	5	6	7
17. Forest fires	1	2	3	4	5	6	7
18. Floods or tidal waves	1	2	3	4	5	6	7
19. Germs or micro-organisms	1	2	3	4	5	6	7
20. Radioactive fallout	1	2	3	4	5	6	7
21. Fumes or fibers from synthetic materials—asbestos, carpets, plastics, etc	1	2	3	4	5	6	7
22. Chemical dumps	1	2	3	4	5	6	7
23. Video screen emissions	1	2	3	4	5	6	7
24. Pesticides and herbicides	1	2	3	4	5	6	7
25. Groundwater pollution from landfill seepage	1	2	3	4	5	6	7

	No Threat	Minimal	Mild	Moderate	Strong	Very Strong	Extreme
26. Air pollution from waste to energy incinerators . .	1	2	3	4	5	6	7
27. Surface water contamination from discarded . . .	1	2	3	4	5	6	7
28. Ocean pollution from dumping municipal solid waste	1	2	3	4	5	6	7

II. Please rate how threatening the following problems are TO THE PHYSICAL ENVIRONMENT by marking the response that best describes your position:

	No Threat	Minimal	Mild	Moderate	Strong	Very Strong	Extreme
1. Water pollution	1	2	3	4	5	6	7
2. Storms—lightning, hurricanes, tornados, snow, etc	1	2	3	4	5	6	7
3. Pollution from cars, factories, and burning trash	1	2	3	4	5	6	7
4. Smoking in public buildings	1	2	3	4	5	6	7
5. Acid rain	1	2	3	4	5	6	7
6. Pollution from office equipment, e.g., ozone from photocopiers	1	2	3	4	5	6	7
7. Number of people—crowding, increasing population	1	2	3	4	5	6	7
8. Fluorescent lighting . . .	1	2	3	4	5	6	7
9. Water shortage, e.g., drought, water depletion	1	2	3	4	5	6	7
10. Noise pollution	1	2	3	4	5	6	7
11. Visual pollution—billboards, litter, etc . . .	1	2	3	4	5	6	7
12. Radioactivity in building materials, e.g., radon gas	1	2	3	4	5	6	7
13. Change to the ozone caused by pollution . . .	1	2	3	4	5	6	7
14. Earthquakes	1	2	3	4	5	6	7
15. Soil erosion	1	2	3	4	5	6	7
16. Impure drinking water . .	1	2	3	4	5	6	7
17. Forest fires	1	2	3	4	5	6	7
18. Floods or tidal waves . .	1	2	3	4	5	6	7
19. Germs or micro-organisms	1	2	3	4	5	6	7
20. Radioactive fallout	1	2	3	4	5	6	7

	No Threat	Minimal	Mild	Moderate	Strong	Very Strong	Extreme
21. Fumes or fibers from synthetic materials—asbestos, carpets, plastics, etc	1	2	3	4	5	6	7
22. Chemical dumps	1	2	3	4	5	6	7
23. Video screen emissions	1	2	3	4	5	6	7
24. Pesticides and herbicides	1	2	3	4	5	6	7
25. Groundwater pollution from landfill seepage	1	2	3	4	5	6	7
26. Air pollution from waste to energy incinerators	1	2	3	4	5	6	7
27. Surface water contamination from discarded motor oil	1	2	3	4	5	6	7
28. Ocean pollution from dumping municipal solid waste	1	2	3	4	5	6	7

III. Please rate how much CONTROL you could personally exercise against each problem if it became a serious threat to you (mark one response).

	No Control	Minimal	Mild	Moderate	Strong	Very Strong	Extreme
1. Water pollution	1	2	3	4	5	6	7
2. Storms—lightning, hurricanes, tornados, snow, etc	1	2	3	4	5	6	7
3. Pollution from cars, factories, and burning trash	1	2	3	4	5	6	7
4. Smoking in public buildings	1	2	3	4	5	6	7
5. Acid rain	1	2	3	4	5	6	7
6. Pollution from office equipment, e.g., ozone from photocopiers	1	2	3	4	5	6	7
7. Number of people—crowding, increasing population	1	2	3	4	5	6	7
8. Fluorescent lighting	1	2	3	4	5	6	7
9. Water shortage, e.g., drought, water depletion	1	2	3	4	5	6	7
10. Noise pollution	1	2	3	4	5	6	7
11. Visual pollution—billboards, litter, etc	1	2	3	4	5	6	7
12. Radioactivity in building materials, e.g., radon gas	1	2	3	4	5	6	7

	No Control	Minimal	Mild	Moderate	Strong	Very Strong	Extreme
13. Change to the ozone caused by pollution . . .	1	2	3	4	5	6	7
14. Earthquakes	1	2	3	4	5	6	7
15. Soil erosion	1	2	3	4	5	6	7
16. Impure drinking water . .	1	2	3	4	5	6	7
17. Forest fires	1	2	3	4	5	6	7
18. Floods or tidal waves . .	1	2	3	4	5	6	7
19. Germs or micro-organisms	1	2	3	4	5	6	7
20. Radioactive fallout	1	2	3	4	5	6	7
21. Fumes or fibers from syn-thetic materials—asbestos, carpets, plastics, etc . .	1	2	3	4	5	6	7
22. Chemical dumps	1	2	3	4	5	6	7
23. Video screen emissions .	1	2	3	4	5	6	7
24. Pesticides and herbicides	1	2	3	4	5	6	7
25. Groundwater pollution from landfill seepage . .	1	2	3	4	5	6	7
26. Air pollution from waste to energy incinerators . .	1	2	3	4	5	6	7
27. Surface water contamin-ation from discarded motor oil	1	2	3	4	5	6	7
28. Ocean pollution from dumping municipal solid waste	1	2	3	4	5	6	

IV. Please rate how much PERSONAL RESPONSIBILITY you feel for the existence of this hazard (mark one response).

	No Respon-sibility	Minimal	Mild	Moderate	Strong	Very Strong	Extreme
1. Water pollution	1	2	3	4	5	6	7
2. Storms—lightning, hurri-canes, tornados, snow, etc	1	2	3	4	5	6	7
3. Pollution from cars, factories, and burning trash	1	2	3	4	5	6	7
4. Smoking in public buildings	1	2	3	4	5	6	7
5. Acid rain	1	2	3	4	5	6	7
6. Pollution from office equipment, e.g., ozone from photocopiers	1	2	3	4	5	6	7

	No Responsibility	Minimal	Mild	Moderate	Strong	Very Strong	Extreme
7. Number of people—crowding, increasing population	1	2	3	4	5	6	7
8. Fluorescent lighting . . .	1	2	3	4	5	6	7
9. Water shortage, e.g., drought, water depletion	1	2	3	4	5	6	7
10. Noise pollution	1	2	3	4	5	6	7
11. Visual pollution—billboards, litter, etc . . .	1	2	3	4	5	6	7
12. Radioactivity in building materials, e.g., radon gas	1	2	3	4	5	6	7
13. Change to the ozone caused by pollution . . .	1	2	3	4	5	6	7
14. Earthquakes	1	2	3	4	5	6	7
15. Soil erosion	1	2	3	4	5	6	7
16. Impure drinking water . .	1	2	3	4	5	6	7
17. Forest fires	1	2	3	4	5	6	7
18. Floods or tidal waves . .	1	2	3	4	5	6	7
19. Germs or micro-organisms	1	2	3	4	5	6	7
20. Radioactive fallout	1	2	3	4	5	6	7
21. Fumes or fibers from synthetic materials—asbestos, carpets, plastics, etc	1	2	3	4	5	6	7
22. Chemical dumps	1	2	3	4	5	6	7
23. Video screen emissions .	1	2	3	4	5	6	7
24. Pesticides and herbicides	1	2	3	4	5	6	7
25. Groundwater pollution from landfill seepage . .	1	2	3	4	5	6	7
26. Air pollution from waste to energy incinerators . .	1	2	3	4	5	6	7
27. Surface water contamination from discarded motor oil	1	2	3	4	5	6	7
28. Ocean pollution from dumping municipal solid waste	1	2	3	4	5	6	7

1. Was your contact with the Hazardous Waste Materials information line related to (mark one)--

[ ] Home [ ] Farm [ ] Business

MILES

2. Would you be willing to drive (mark one) [1 5 10 15 20 25 30 farther] to dispose of a hazardous material?

MINUTES

3. Would you be willing to wait (mark one) [10 20 30 40 50 60 70 longer] to dispose of a hazardous material?

DOLLARS

4. Would you be willing to spend (mark one) [1 5 10 15 20 25 30 more] to dispose of one gallon of toxic material?

EFFORT

5. Would you be willing to make (mark one) [1 2 3 4 5 6 7 more phone calls] to find out the best possible option for disposing of an unwanted hazardous material?

6. Which of the following agencies/service units would you be most willing to contact for information about the disposal of an unwanted hazardous material? (Please check three in rank order with one being first choice.)

___ State of Michigan/Department of Environmental Health
___ County health department
___ Michigan Department of Natural Resources
___ Local community college
___ Michigan State University/Cooperative Extension Service
___ Local hospital
___ University of Michigan
___ United States Environmental Protection Agency (EPA)
___ Wayne State University
___ Other, please specify _____

BACKGROUND INFORMATION: In order to find out how different people feel about various issues, a demographic section is included below. Your answers to these questions are confidential.

Demographics: (Mark one)
- [ ] Female
- [ ] Male

AGE:
- [ ] 18-25
- [ ] 25-35
- [ ] 35-45
- [ ] 45-55
- [ ] 55-65
- [ ] 65+

INCOME: (Total taxable household income)
- [ ] Less than $10,000
- [ ] $10,000 to $19,999
- [ ] $20,000 to $29,000
- [ ] $30,000 to $39,999
- [ ] $40,000 to $49,999
- [ ] $50,000 to $59,999
- [ ] $60,000 to $69,999
- [ ] $70,000 or over

EDUCATION: (Level of education completed?)
- [ ] Less than high school
- [ ] High school graduate
- [ ] Some college
- [ ] Associate's or technical degree
- [ ] College graduate
- [ ] Graduate or professional degree

MARITAL STATUS:
- [ ] Single/separated/divorced
- [ ] Married/permanent relationship
- [ ] Widowed

FAMILY STATUS: (Mark all that apply)
- [ ] No children
- [ ] Preschool children
- [ ] Children K-12
- [ ] Grown children

YOUTH ENVIRONMENT: (Where did you spend most of your youth?
- [ ] Urban
- [ ] Suburban
- [ ] Rural farm
- [ ] Rural nonfarm

Number of brothers/sisters:
- [ ] Only child
- [ ] 1 sibling
- [ ] 2 siblings
- [ ] 3 siblings
- [ ] 4 siblings
- [ ] 5 siblings
- [ ] 6 siblings
- [ ] 6 or more siblings

Your place in the family:
- [ ] Only
- [ ] Oldest
- [ ] Second oldest
- [ ] Specify _____

Please fill in the appropriate answer space.

EXPERIENCES:

1. Were your parents or grandparents involved in pro-environmental causes?
   Not involved 1 2 3 4 5 6 7 Very involved
   Don't know ____

2. Do you contribute money to environmental causes?
   None 1 2 3 4 5 6 7 Substantial amount

3. Have you or anyone in your family been affected by environmental pollution?
   Not affected 1 2 3 4 5 6 7 Seriously affected

ACTION:

1. Have you acted on the information you received from the Hazardous Materials Information line?
   [ ] Yes [ ] No

Describe briefly _____

_____

2. If yes, did you act on the information within:
   [ ] 1 day [ ] 1 month
   [ ] 2 days [ ] 2 months
   [ ] 3 days [ ] more
   [ ] 1-2 weeks

3. If no, was it because of:
   [ ] Lack of opportunity
   [ ] Cost
   [ ] Inconvenience
   [ ] Other (explain if you like)

_____

_____

4. Do you feel your action made a difference in the quality of your environment?
   [ ] Yes
   [ ] No

5. If yes, rate this difference.
   Little difference 1 2 3 4 5 6 7 Big difference

6. Will you make different consumer decisions as a result of the information you received from the Hazardous Materials Information line?
   [ ] Yes
   [ ] No

Give one brief example _____

_____

7. If yes, will these decisions cost more or less?
   Less 1 2 3 4 5 6 7 More

8. Have you (mark all that apply):
   [ ] spent more
   [ ] traveled farther
   [ ] waited longer
   [ ] made more phone calls

   to dispose of hazardous materials than before you called the Hazardous Materials Information line?

9. How would you rate your personal commitment to preventing environmental pollution?
   Low 1 2 3 4 5 6 7 High

10. What changes have you made as a result of your contact with the agent responding to questions on the Hazardous Materials Information Line?

Thank you for your time and effort. Please return the questionnaire in the self-addressed, stamped envelope provided and we will send you a copy of the 220-page Guide to Hazardous Products Around the Home.

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