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Analysis of Factors Contributing to Environmental Activism: A Case Study of Beach Clean-Up Participants

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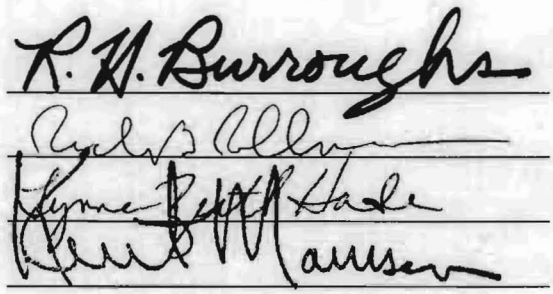

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ANALYSIS OF FACTORS CONTRIBUTING TO ENVIRONMENTAL ACTIVISM: A CASE STUDY OF BEACH CLEAN-UP PARTICIPANTS

BY

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Abstract

This study was initiated to investigate factors which contribute to environmental activism. Towards this end, three hypotheses were investigated. First, it was hypothesized that beach clean-up participants would harbor pro-environmental attitudes. Second, it was hypothesized that participants would be relatively young, politically liberal, well-educated, and wealthy. Finally, it was hypothesized that particular types of social structure would influence a person's decision to participate in a beach clean-up. Specifically, it was hypothesized that participants at each clean-up location would be clique members and/or would be structurally equivalent.

Surprisingly, it was revealed that there was virtually no difference in attitude between the clean-up participants and individuals who did not participate. Generally, the clean-up participants were more verbally- and actually committed, more knowledgeable, better educated, and older than a sample of the general population from the same geographic region. Except for age, all of these findings were consistent with the work of other researchers. A derived multiple regression revealed that age, education, and verbal commitment, in combination, explained 47.7% of the variance in expressed actual commitment. It was concluded that the existence of cliques and structural equivalency among a population enhanced the probability that members of that population would be inclined to act in a similar manner.

Cliques and structural equivalency were not the only models of social structure to impact behavior, however. At each clean-up location there were a number of participants who knew few, if any, of the other participants. With only two exceptions these individuals were present because of the encouragement of family or friends. Thus, it is clear that the behavior of individuals is influenced by the desires of their social affiliates.

The pattern of social structure at each beach was found to be associated with information source. At beaches where people learned of the clean-up through group membership, there was a greater degree of cohesion than at beaches where people learned about the clean-up through public media. Regardless of what the primary source of information was, secondary sources of information proved to be two and two-thirds times more effective at informing participants about the clean-up.

The objective behind identifying factors associated with environmental activism was to learn how best to encourage environmentally-responsible behavior. A two stage approach should be adopted in any campaign designed to facilitate social change. Prior to an event, publicity should be planned. The primary objective should be to target a receptive audience of middle-aged, well-educated, verbally-committed individuals who have the support of their social comparitors. Pre-existing organizations with established communication mechanisms should be targeted. If resources permit, the publicity should be expanded to reach as many people as possible. The second phase of the campaign involves education. Clean-up participants were both more knowledgeable and better educated than non-participants. In order to encourage people to become environmentally active, managers, administrators and community organizers should seek to increase factual knowledge.

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• 1 •

Introduction

This study was initiated to investigate the motivating factors behind environmental activism. Environmental activism refers to any action, physical or political, taken by an individual to improve or protect the natural world. A local extension of an international beach clean-up was chosen as a case study for this research. The International Coastal Clean-up encourages citizens from 35 U.S. states and territories, as well as from at least 12 foreign countries, to donate their time to remove debris from the shore.

The research was directed at determining what factors contributed to decisions by individuals to collect trash from local beaches on a rainy, raw September morning. The intent was to identify factors associated with environmental activism so that measures could be designed to encourage environmentally-responsible behavior. According to Maloney and Ward (1973, p. 583), "the ecological crisis is a crisis of maladaptive behavior. . . . Ultimately, the solution lies with the sciences that deal with changing human behavior". However, before change can be facilitated, it is necessary to understand what motivates people to behave in a particular manner.

A number of different tactics have been used to investigate personal motivations. Associations have been sought between behavior and attitudes; behavior and knowledge; behavior and socio-demographic attributes; and between behavior and social structure. Each of these areas of study are considered in this investigation. The work of Fishbein and Ajzen (1974), Weigel and Newman (1976), Shuman and Johnson (1976), and Shrigley (1990), exemplifies attitude-behavior studies. For this study, the definition of attitude proposed by Rokeach (1975) was used. He defined attitudes as relatively enduring organizations of beliefs about objects or situations. The researchers named

above all found correlations between attitudes and behavior. It seems as though attitudes do *influence* behavior. However, attitudinal inclinations alone do not *account for* behavior (Wicker 1969, Shuman and Johnson 1976).

The first hypothesis was developed to test the correlation between attitudes and behavior. The participants clearly demonstrated environmentally-positive behavior. The question was whether or not they also held pro-environmental attitudes. Therefore, it was hypothesized that clean-up participants harbored pro-environmental attitudes.

The association with behavior was further tested with a comprehensive behavioral index (CBI). A comprehensive behavioral index is simply a survey instrument designed to measure the likelihood that the respondent will be involved with particular types of activities as opposed to determining what specific activities he or she will be involved with. For example, a CBI will reveal whether or not a person is likely to be environmentally active but not whether or not that individual will write a letter to Congress supporting clean water legislation.

In addition to seeking correlations between attitude and behavior, associations between knowledge, socio-demographic factors and behavior were also investigated. In order to satisfy the goal of identifying the elemental motivating factors behind environmental activism it was necessary to characterize the attributes associated with environmentally-responsible behavior. Attribute studies, such as those typified by the work of Fortner and Teates (1980), Van Liere and Dunlap (1980), Soden (1989), Christianson and Arcury (1992), Howell and Laska (1992), and Jones and Dunlap (1992), explore the associations between knowledge, socio-demographic factors and attitudes concerning the environment. The results of these studies indicate that people who hold positive attitudes toward the environment tend to share certain socio-demographic characteristics. Therefore, it was hypothesized that clean-up participants would be relatively young, politically liberal, well-educated, and wealthy. This component of the study was designed to further characterize environmentally-active people.

Because attitudes are not the sole determinants of behavior (Wicker 1969, Shuman and Johnson 1976), other researchers have investigated alternative forces that may be responsible for the behavior of individuals. The field of social network analysis is concerned with the study of how behavior is influenced by social structure. Social structure refers to the web of personal relations within which every individual is embedded. These social contacts act as persuasive forces on individual behavior. For example, people who have the approval of their friends and family may be more likely to become involved with environmentally-positive activities. A multitude of classification systems can be applied to social structure. Only cliques and structural equivalence were considered, however. Cliques are subgroups of the larger population (population size is determined by the researcher) composed of individuals who are more closely associated with each other than with the remainder of the population. Structurally equivalent actors are tied to the same people by the same types of relationships. For example, office workers who all take directions from the same supervisors could be considered structurally equivalent.

Cliques and structural equivalency were investigated because these network configurations are likely to be conducive to the creation or reinforcement of similar attitudes. Cliques provide a supportive social environment and structural equivalency evokes social comparisons (Erickson 1988). Social comparison refers to the tendency of people to modify their attitudes based on comparisons to other individuals whom they consider to be similar to themselves.

A final hypothesis was developed to test the reported association between social structure and behavior. It was hypothesized that participants at each clean-up location would be clique members and/or would be structurally equivalent. The intent was to document how people's behavior is influenced by their social associates.

A secondary reason for studying social networks was to identify information flows. Social networks may serve as communication channels for information about

environmentally-associated events. Once public education material and/or publicity is distributed through the mass media, the information may be further dispersed between friends, family, colleagues, and associates.

The objectives of this project were to characterize environmentally active persons as well as to identify those social ties which exert influence and act as communication channels to motivate people to participate in beach clean-ups. The combination of data concerning socio-demographic attributes and social networks permits the relationship between attitudes and behavior to be studied with consideration for social influences. The findings can aid community organizers and public educators in the development and execution of their environmentally-oriented strategies.

• 2 •

Literature Review

The literature reviewed in this section supports the rationale presented in Chapter 1. First, attitude-behavior studies are presented in order to reveal what associations other investigators have found between attitudes and behavior. Next, studies focusing on the relations between knowledge, socio-demographic factors, and attitudes are reviewed. Finally, studies in which social network analysis was used to investigate the influence of interpersonal processes on decision-making are summarized.

Attitude-Behavior Studies

Numerous studies have been conducted to investigate associations between attitudes and behavior (Wicker 1969, Fishbein and Ajzen 1974, Weigel and Newman 1976, Shuman and Johnson 1976, Shrigley 1990, Sundeen 1992). Interest in environmentally-related psychological and behavioral studies was quite keen during the 1970s. However, interest declined steadily through the 1980s as research funding and political interest dissolved (Stern 1992, Dwyer et al. 1993). Conservation behavior research has only recently regained its momentum (see De Young 1993 as an example).

In a frequently cited study, Wicker (1969) found that "it is considerably more likely that attitudes will be unrelated or only slightly related to overt behavior than that attitudes will be closely related to actions". However, by refining attitudinal measures such that attitudes toward engaging in a particular sort of behavior, rather than attitudes toward an object or act, were measured, Fishbein and Ajzen (1974) determined that attitudes can be predictive of behavior. They reported that "correlations between the attitudes toward an object and multiple-act criteria were consistently high, while no

systematic relationship was found with respect to single-act criteria" (Fishbein and Ajzen 1974, p. 71). That is, Fishbein and Ajzen found that attitudes were correlated with the performance of a category of behavior (e.g., environmentally-positive behavior) but not with particular actions (e.g., recycling).

Building on the work of Fishbein and Ajzen, Weigel and Newman (1976, pp. 800-801) concluded that "a high-quality attitude measure focusing on a general or comprehensive attitude-object can make strong predictions of behavioral variation when that behavioral variation is sought in the context of patterned sets of actions rather than a single act". The "attitude measure" referred to by Weigel and Newman is a survey instrument designed to measure the respondents' attitudes toward a general theme (e.g., the environment) as opposed to attitudes toward a particular aspect of the larger theme (e.g., ozone depletion). Thus, by making both the attitudinal and behavioral measures more inclusive, Weigel and Newman found that attitudes can be used to forecast types of behavior.

In a review of attitude-behavior (A-B) studies, Shuman and Johnson (1976) concluded that most A-B studies yielded positive results. They reported that "[t]he correlations that do occur are large enough to indicate that important causal forces are involved. . . [however], they are rarely large enough to suggest that attitudinal responses can serve as mechanical substitutes for behavior measures" (Shuman and Johnson 1976, p. 199). Their research revealed that, although attitudes influenced behavior, they were not the sole determinants. Nonetheless, Shrigley (1990, p. 109), in a thorough review of A-B studies, found evidence to suggest that "science attitude scores can be expected to correlate moderately, at least, with the behavior of teachers and students in the science classroom". Furthermore, in a study of personal goals and attitudes among volunteers, Sundeen (1992, pp. 285-6) confirmed that "certain attitudes and values related to charitable behavior do make a difference in predicting volunteer behavior". Reference to the above citations indicates that attitude accounts, in part, for behavior.

Factors Influencing Attitudes

Given that attitudes may account for some portion of an individual's behavior, factors which influence attitudes have been investigated. Soden (1989), Fortner and Teates (1980), and Borden and Schettino (1979) conducted studies of the influence of knowledge on behavior. In his 1989 study of the impact of knowledge levels on individual attitudes about the protection of marine resources, Soden found that more knowledgeable persons were more likely to support marine resource protection programs. Similarly, Fortner and Teates (1980) found a significant positive relationship between knowledge and attitudes.

Borden and Schettino (1979) investigated how attitudes and knowledge, in combination, influence behavior. They administered the Maloney et al. (1975) Revised Scale for the Measurement of Ecological Attitudes and Knowledge to a group of undergraduate students at Purdue University. They found that factual knowledge about, and affection for, the environment may be gained through independent channels. According to Borden and Schettino, "the cognitive component of an attitude involves the ideas, thoughts, or knowledge that an individual has about the attitude object. The affective component of the attitude is the feeling or emotionality associated with the attitude object. The cognitive component refers to actions or behavioral tendencies of an individual regarding the object" (Borden and Schettino, 1979, p. 35). From the results of the Maloney et al. survey, they concluded that,

> The lack of interaction of affect and knowledge may be of considerable importance for several reasons. First, it shows individuals who are high in affect and high in knowledge are not disproportionately committed to solving environmental problems. Furthermore, the lack of interaction suggests that factual ecological knowledge is not a necessary condition for the occurrence of individual environmental action. And finally, the additive nature of these effects suggest that environmental affect and knowledge may be substitutable. For example, in the present case individuals who were high in affect but low in knowledge were about as committed as were individuals low in affect but high in knowledge. Seemingly, then, intermediate levels of environmentally responsible

> behavior may be associated with either of these determinants (Borden and Schettino 1979, p. 38).

In other words, affect (attitude) and knowledge seem to influence behavior but in no consistent manner.

Socio-demographic variables have also been studied in relation to attitudes. Van Liere and Dunlap (1980), Jones and Dunlap (1992), Howell and Laska (1992), and Christianson and Arcury (1992) have all characterized environmentally-conscious people. Their methods and findings are typical of the field. In their review of studies correlating social and demographic variables with environmental concern, Van Liere and Dunlap (1980, p. 192) found that "[a]ge, education, and political ideology are consistently (albeit moderately) associated with environmental concern". That is, younger, better educated and politically liberal persons tend to be more concerned about environmental matters. It should be recognized that environmental concern is by no means restricted to such persons, however. Despite this disclaimer, the social bases of environmental concern remained remarkably stable over the eighteen year period from 1973 to 1990. Using data obtained from the National Opinion Research Center's General Social Surveys (1973-1990), Jones and Dunlap (1992) found that younger, well-educated, politically liberal, urban Democrats employed outside of primary industries were consistently more supportive of government spending on behalf of the environment than were people who did not fit this description. Howell and Laska (1992) reported that by 1988, the best predictors of opinion on the environment were level of education, liberal political ideals, and urban residence. They found that support for the environment was no longer a function of age due to the aging of the population and the media's exposure of environmental issues. They commented that there should be no surprise that education is the best predictor of environmental attitudes. Afterall, "the media information is more likely to reach and be retained by the educated. These issues can be very complex; the evidence on both sides of an environmental issues frequently addresses a very complex

etiology of causes comprehended more easily by the better educated" (Howell and Laska 1992, p. 141).

Howell and Laska's findings were corroborated by Christianson and Arcury (1992). In a study of regional diversity in environmental attitudes, knowledge, and policy with regard to water management in the Kentucky River drainage basin, they found that individuals with low education and low income were more likely to oppose water conservation measures and less likely to support water management strategies. Additionally, they found that more urban residents had a more positive environmental attitude.

Despite the associations identified above, attitudes, knowledge, and socio-demographic attributes, in isolation, cannot be relied upon to forecast behavior. Each of these factors may contribute to an individual's decision to behave in a certain manner. However, each attribute is only a disparate bit of information. Social structure may be the catalyst which helps to transform inclinations into environmental action.

Social Network Studies

The development of social network analysis began with investigations of group dynamics during the 1930s. Also during the 1930s, a group of researchers at Harvard University investigated the interdependence of social systems. Their research revealed the importance of informal, interpersonal relations in all social systems. Despite these early findings, a well-developed methodology was not established until the 1960s when Harrison White of Harvard University expanded his investigations of the mathematical basis of social structure. His research provided the basis for a coherent framework of social network analysis (Scott 1991, pp. 7-8). For a more detailed review of the development of social network analysis, see Scott (1991).

Although social network analysis is still not widely utilized, it is an accepted methodology that is growing in popularity. Erickson (1988), Johnson (1986), Kilduff (1990), Ward and Reingen (1990), Granovetter (1973, 1974), Weimann (1983), and Brown and Reingen (1987) and have all used network analysis to look at communication patterns within groups and the associated effects on opinion formation, behavioral changes, and decision making. Erickson (1988) argued that people's attitudes are made, maintained, and modified primarily through interpersonal processes. It is for this reason that attributes explain only a small proportion of differences in attitudes among people. Erickson asserted that since

> similarity with respect to an attribute facilitates social comparison . . .then people alike on the attribute will tend to be alike on the compared attitude. Hence attributes and attitudes will be correlated. However, these correlations within a network are likely to be muted because persons of similar salient attributes may not be available. In addition, because the definition of saliency is social and varies from one network to another, attribute-attitude correlations will be weaker and more variable when aggregated over multiple networks. Thus, although attributes do play a part in attitude similarity, their role is limited and structurally constrained (Erickson 1988, pp. 104-105).

In her study of social comparison, Erickson relied on three different models of network structure to argue that interpersonal processes vary with the kind of larger structural unit within which individual ties are embedded (Erickson 1988, p. 100). Social comparison studies are concerned with how people's attitudes are modified based on comparison, generally through conversation, with the attitudes of other individuals. The three models of network structure Erickson used were clique, structural equivalence, and spatial models. Cliques are small groups of closely tied individuals within larger networks. Structural equivalence is a measure of the extent to which people occupy similar places in the network as a whole. Spatial models arrange members of a network in space such that spatial closeness corresponds to closeness of relationship. That is, two dots representing a married couple would be position closer together on a page than would two dots representing nodding acquaintances.

One purpose of Erickson's study was to identify different kinds of subunits and to suggest how they affect social comparisons and, therefore, attitude similarity within subunits (Erickson 1988, p. 105). Erickson cited Festinger, Schachter, and Back (1950) and Homans (1950) to argue that the greater the density, the greater the similarity in attitudes. Density is a measure of the strength of cliques. If all individuals are linked to each other, then density is equal to 1.0. Because structurally equivalent individuals "have approximately similar sets of social comparitors", Erickson contended that, "[t]hey are likely to agree with these comparitors, and hence to agree with each other, because they agree with the same or similar third parties" (Erickson 1988, pp. 110-111). Finally, Erickson suggested that spatial models may be useful for identifying individuals who share similar attitudes. Spatial models represent people as dots and the strength of relationships as distance. The closer two dots in a model are to each other, the more strongly tied are the individuals they represent. Thus, the smaller the spatial distance between two points, the greater the likelihood that the people share similar attitudes.

Whereas Erickson investigated the associations between social structure and attitudes, Johnson (1986) researched the link between social structure and behavior. He studied the gear adoption patterns of fishermen in order to investigate the assertion that "an actor will quickly adopt an innovation after actors he perceives to be structurally equivalent to him have adopted it" (Burt 1982, p. 209). Although admitting that the study is far from conclusive or exhaustive, Johnson concluded that "there seems to be some conceptual and empirical support for the proposition that structurally equivalent actors will adopt at the same time" (Johnson 1986, p. 362). Kilduff (1990) studied the effect of opinions and behaviors of peers on the behavior of individuals. His study was concerned with which organizations a group of MBA students would seek interviews with. He found that "pairs of individuals who were either friends or who perceived each other as similar tended to make similar organizational choices, even if they had different academic concentrations and different job preferences" (Kilduff 1990, p. 283). In a related study of group decision making among consumers, Ward and Reingen (1990, p. 260) concluded that thought processes are "strongly affected by the structural systems of social interaction".

Social structure also has implication for communication. Granovetter (1973) studied the importance of weak ties to the flow of information between social groups. In an investigation of the role that interpersonal ties play in the search for employment, he related interpersonal ties to information diffusion, social mobility, political organization, and social cohesion in general. He argued that "it is through these networks that small-scale interaction becomes translated into large-scale patterns, and that these, in turn, feed back into small groups" (Granovetter 1973, p.1360). Weimann (1983) confirmed the "strength of weak ties" claim in his study of the flow of information and influence through a kibbutz community. He found weak ties to be the crucial path between groups. Weak ties allowed for the "transmission of information *between* subgroups, enabling the diffusion of news, ideas, fashions, innovations, gossip, and rumors to every segment of

the social system" (Weimann 1983, p. 264). Influence was found to flow mainly through strong ties within subgroups. In a study of referral behavior, Brown and Reingen (1987) also found evidence to suggest that weak ties often form communication bridges between social groups and that strong ties are more crucial to the flow of influence.

Based on the literature reviewed above, it is apparent that a study of the motivational forces behind environmental activism should, at the very least, investigate the influence of attitudes, knowledge, socio-demographic factors, and social structure on behavior. Such is the approach that was chosen for this thesis. The methods used to compile and analyze the data are described in subsequent chapters. Literature addressing the appropriateness of the chosen techniques is presented in Chapter 3.

• 3 •

Methods

Sample

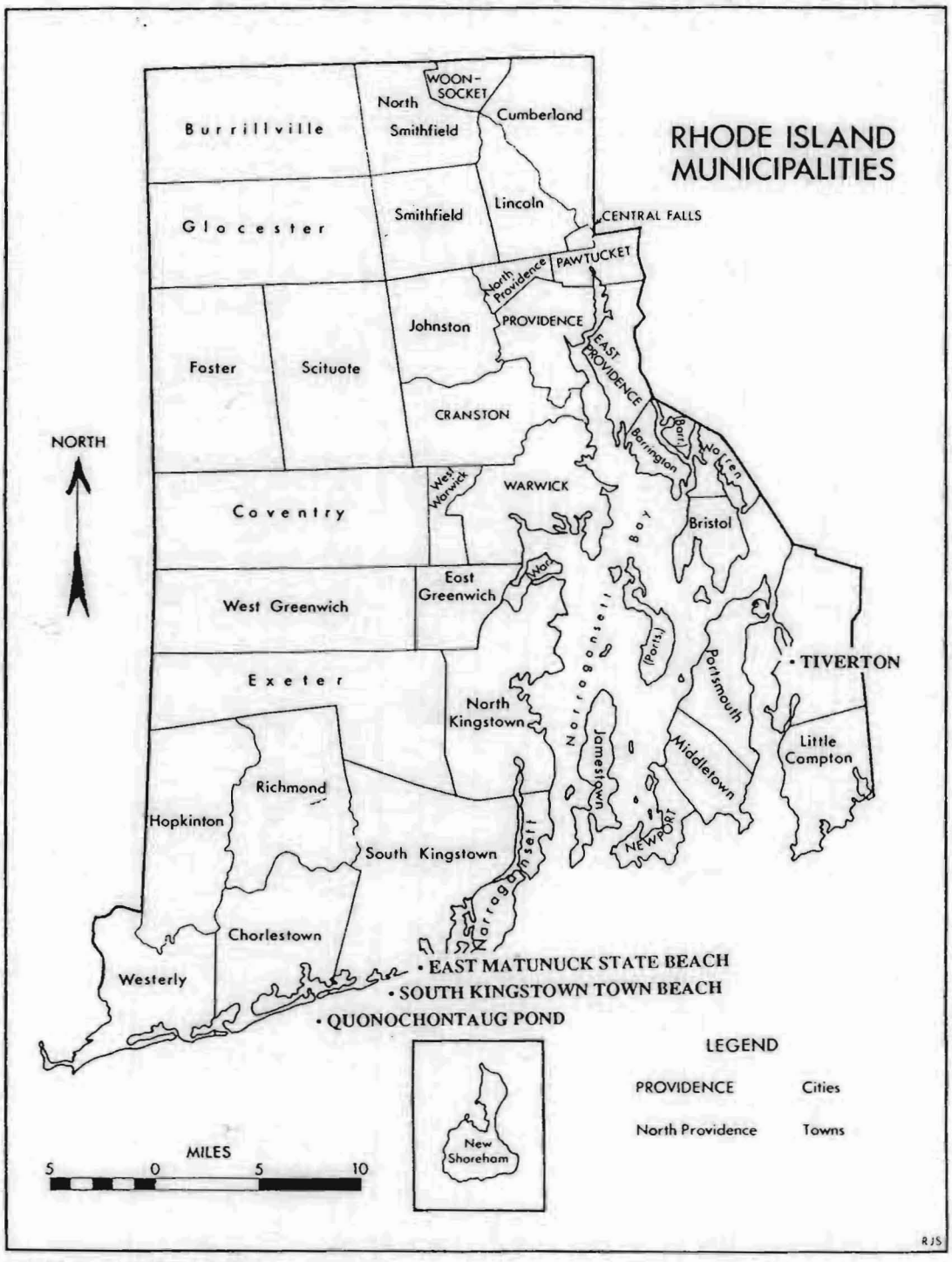
On Saturday, September 19, 1992 participants in the Rhode Island Coastweeks Beach Clean-up were interviewed. The clean-up was part of the annual International Coastal Clean-up coordinated by the Washington, D.C.-based Center for Marine Conservation. The clean-up was organized in Rhode Island by Eugenia Marks of the Audubon Society of Rhode Island with support from the Rhode Island Department of Environmental Management and Hospital Trust National Bank. This particular clean-up was chosen for study because of its remarkable success and well-structured organization. During the 1991 clean-up, 145,000 volunteers in 35 U.S. states and territories and 12 foreign countries donated their time to collect trash from the shore.

Two different data collection instruments were used. First, a personal interview was conducted to elicit individual reasons for participating and to determine if and how participants were linked to each other socially. Interviews lasted no more than five minutes each and were based on examples provided by Jeff Johnson of East Carolina University (see Appendix A, *Interview Guide and Record Sheet*). The second data collection instrument was a written survey designed to gather information about attitudes, knowledge, commitment to environmental concerns, and socio-demographic information (see Appendix B, *Survey Instrument*). The written survey was modeled on the Maloney et al. (1975) Revised Scale for the Measurement of Ecological Attitudes and Knowledge. Both instruments were informally pre-tested on September 12, 1992 at a class reunion and at the Waterfront Festival in Providence, RI.

Every participant over 18 years of age at four different clean-up sites was interviewed. Because of University rules, no minors could be interviewed. However, as the majority of participants were adults, this restriction did not significantly alter the study. Three of the beaches, East Matunuck State Beach, South Kingstown Town Beach, and Quonochontaug Pond are located in Washington County Rhode Island (known locally as "South County"; refer to Figure 1, Map of Rhode Island). The fourth group of participants was distributed between three beaches in Tiverton, on Rhode Island's northern shore. The number of interviewers sent to each beach was based on the number of participants at each site during previous clean-ups. It was intended that each interviewer would conduct about 10 interviews. However, because of inclement weather on the day of the clean-up, there were fewer participants than was anticipated The morning of September 19, 1992 was gray, wet, and cool. Despite the weather, the investigator was able to interview 15 people at East Matunuck State Beach. Vinton Valentine, Clark Evans, Evilyn McKenna, and Karen Ellis conducted 9 interviews at South Kingstown Town Beach. Cynthia Suchman and George Yatrakis interviewed 9 people at Quonochontaug Pond and Abigail Friedman and Jennifer McCann conducted 16 interviews in Tiverton. A total of 49 people were interviewed. In order to standardize interviewing procedures, the interviewers were trained in interviewing techniques on Thursday October 17, 1992.

Forty-two individuals returned the written survey. In order to compare the clean-up participants' responses to the responses of a cross-section of the general public, the same survey was administered to forty-two adults (age 18 years or older) waiting in line at the Rhode Island Department of Motor Vehicles (DMV) in Wakefield, Rhode Island. This location was chosen because the geographic area represented by persons present at the DMV was roughly equivalent to the area from which the clean-up participants were drawn. A second reason why the DMV was chosen for the survey site was the ease of locating willing participants. Most people waiting in line amicably agreed to fill out the

Figure 1. Map of Rhode Island. Clean-up participants were interviewed at Quonochontaug Pond, South Kingstown Town Beach, East Matunuck State Beach, and several locations in Tiverton.



Source: White and Sullivan, 1982.

survey. Only three people declined to take the survey. None of the people surveyed at the DMV had participated in the 1992 clean-up.

Instruments

Personal Interview

The personal interview was designed to elicit information about why participants had chosen to become involved in the clean-up and whom they knew at the clean-up location (refer to Appendix A, *Interview Guide and Record Sheet*). This information was essential for the network analysis component of the study. The interview format was in conformance with standard social network interviewing techniques in which respondents are asked to name people with whom they interact and to categorize those relationships (e.g., spouse, sibling, co-worker, friend, etc.; see Johnson 1986). Sampling methods designed to identify "whole" networks (Granovetter 1976, Morgan and Rytina 1977, McCallister and Fischer 1978, and Erickson 1981) were not appropriate for this study. These latter methods help the researcher represent a network in which all of the significant relationships of network members are considered. A study of that proportion was beyond the scope of this thesis. The fact that the network data collected for this study was concerned purely with relationships *among* clean-up participants has implications for interpretation. The findings reported herein cannot be extended unquestionably to the greater social networks of participants. In other words, although three clean-up participants might be identified as members of the same clique in this study, they would not necessarily be identified as members of a clique if the boundaries of the network were expanded to include people who were not at the clean-up.

To develop the networks at each beach, every participant was first asked for his or her first name and the first and last initial of his or her last name. Last names were not

asked in order to protect the anonymity of the respondents and to encourage more candid responses. Subsequent questions pertained to whether or not the respondent had participated in beach clean-ups before, why he or she had chosen to volunteer for this particular clean-up, how he or she had first learned about the clean-up, whether he or she had discussed the clean-up with other people, whether that person(s) was present at the clean-up, and the names (first name and first and last initial of the last name) and relations of all other participants whom the respondent knew.

Written Survey

The written survey was developed to gather information about attitudes, behavior, knowledge, and socio-demographic attributes. The Maloney et al. (1975) Revised Scale for the Measurement of Ecological Attitudes and Knowledge was chosen over similar models, such as Weigel and Weigel's 1978 measure of environmental concern and Dunlap and Van Liere's measure of the New Environmental Paradigm (1978) because it measures both knowledge and attitude, whereas the others measure only attitude. Williams and McCrorie (1990) used a revised version of the Maloney et al. questionnaire in their study of ecological attitudes of children from urban and rural areas of Northern Ireland. They chose this model because it has been used extensively, has three subscales of intuitive integrity, and included questions suitable for their study population.

Following the format of the Maloney et al. Revised Scale for the Measurement of Ecological Attitudes and Knowledge, the survey was designed to elicit information regarding verbal commitment (VERBCOM), actual commitment (ACTCOM), affect (AFFECT), and knowledge (KNOW). These variables are defined as follows:

VERBCOM is the total number of affirmative responses to eight statements regarding what a person is willing to do in regard to environmental issues (see Appendix C, *Statements on Verbal Commitment Scale*).

AFFECT is the total number of affirmative responses to eight statements regarding an individual's emotionality related to environmental issues. AFFECT is a measure of attitude (see Appendix D, *Statements on Affect Scale*).

ACTCOM is the total number of affirmative responses to seven statements regarding what a person actually does in relation to environmental issues (see Appendix E, *Statements on Actual Commitment Scale*).

KNOW is the total number of correct responses to eight multiple choice questions regarding the respondent's specific factual knowledge about the marine environment and marine pollution (see Appendix F, *Multiple Choice Questions Testing Knowledge*).

The scores for each subscale (VERBCOM, AFFECT, ACTCOM and KNOW) are the sum of affirmative responses to seven or eight questions. The scores were aggregated in this manner because "attitude scores reflecting broadly focused concerns about environmental quality will be highly correlated with scores on [a] comprehensive behavior index but not with performance of or nonperformance of each of the separate behaviors from which the index was derived" (Weigel and Newman 1976). That is, a general or comprehensive model is better at predicting a pattern of behavior than at predicting a single act. Therefore, each subscale was designed to be a comprehensive measure. For example, ACTCOM elicited information about what a person claimed to do in regard to environmental issues. A high score on the ACTCOM subscale indicated that the individual expressed actual commitment to environmental matters. However, the score did not reveal which particular activities the respondent claimed to perform. Nonetheless, if it was revealed that any of the subscales were positively correlated with ACTCOM (as was the case), then patterns of behavior could be predicted.

The scales proposed by Maloney et al. were altered in four primary ways. First, they needed to be shortened in order to fit on one sheet of paper printed on both sides in a clear and uncluttered manner. Second, some of the questions needed to be altered to make them more appropriate for the target group. For example, smog is not a phenomenon typical of coastal Rhode Island. Therefore, questions regarding the effects of smog on the respondent's mental state were not appropriate.

Third, the original Revised Scale for the Measurement of Ecological Attitudes and Knowledge had an equated true-false format. However, for the present study, the

questions for VERBCOM, AFFECT, and ACTCOM were all worded such that a check mark indicated an environmentally-positive response. This approach made the data susceptible to systematic response biases. Systematic response bias refers to the practice of answering all questions in a like manner. For example, upon perceiving that a check mark indicated an environmentally-positive response for the first few questions, respondents may have been inclined to simply place a check mark in front of every question without carefully reading the text. As will be discussed below, however, systematic response bias does not appear to be a matter for concern.

Fourth, the KNOW questions were designed specifically to test knowledge about coastal processes, pollution, and activities. Schahn and Holzer (1990) utilized a revised version of the Maloney et al. (1975) scale for their study of individual environmental concern. They felt that the results of past studies which indicated low correlations between knowledge and behavior were, in part, due to the abstract nature of questions in the knowledge scales. For example, in the Maloney et al. (1975) Revised Scale, one of the questions is, "Ecology is best described as . . .?". While the question does relate to environmental knowledge, it does not reveal what the respondent knows about ecological systems. To eliminate this problem, Schahn and Holzer designed questions to address "concrete knowledge". They proposed that specific questions, such as "Which of the listed products is least harmful for the environment?", are more useful measures of practical environmental knowledge. Based on Schahn and Holzer's recommendations, the knowledge questions for this study were developed to test knowledge relevant to coastal conservation. Four of the KNOW questions should have been relatively simple for coastal dwellers to answer correctly (refer to Appendix F, *Multiple Choice Questions Testing Knowledge*). The other four questions required a higher degree of issue-specific knowledge.

In addition to questions pertaining to verbal and actual commitment, affect, and knowledge, respondents were asked about their sex, age, level of education, town of

residence, characterization of their neighborhood (rural, suburban, or urban), their political ideology (liberal, middle-of-the-road, or conservative), their occupation, their spouse's occupation, their annual household income, and what they considered to be the most important aspects of the beach clean-up.

• 4 •

Analysis:
Attitude, Commitment, Knowledge, and Socio-demographic Variables

A two-pronged approach was taken to data analysis. First, the data collected with the written surveys were analyzed with standard statistical procedures (Wilkinson and Hill, 1992). The goal was to determine whether participants shared common attitudes concerning the environment and whether their attitudes differed from those held by society in general. Next, correlations were sought between attitude, knowledge, socio-demographic factors, and behavior. This portion of the study was designed to allow the researcher to characterize environmentally-active persons. Finally, regression analysis was conducted in order to determine which factors had the most influence on behavior.

The second stage of analysis involved interpretation of information gathered through the personal interviews. The purpose was to learn whether beach clean-up participants formed pre-existing cliques and/or if they were structurally equivalent. The UCINET (Borgatti et al. 1992) social network analysis package was used to expose network patterns and affiliations. The network analysis component of this study was intended to reveal how behavior is influenced by social structure. Findings are presented and discussed in Chapter 5.

Analysis of Mean Responses: Student T-test

The middle section on the first page of the written survey measured affect (recall that affect is a measure of attitude; refer to Appendix B, *Survey Instrument*). The mean score for the affect component of the surveys completed by the clean-up participants was

Table 1. Comparison of Mean Scores on Affect, Commitment, and Socio-demographic Attributes. A student t-test revealed that there was no significant difference in affect (attitude) between the two study populations. However, there were significant differences in verbal and actual commitment, knowledge, age and education.

Variable	Beach	DMV	Pooled Variences T	Probability
Significant Differences				
Actual Commitmen	4.262	2.881	3.968	<0.010
Verbal Commitmen	4.738	3.952	2.014	0.047
Knowledge	4.341	3.075	3.908	<0.010
Education	3.756	2.641	3.314	0.001
Age	47.103	36.538	3.367	0.001
No Significant Differences				
Affect	6.310	6.238	0.172	0.864
Politic	1.838	1.943	-0.693	0.491
Neighbor	1.711	1.743	-0.235	0.815
Income	3.289	3.324	-0.079	0.937
Sex	1.610	1.590	0.180	0.857

6.3 (see Table 1). The highest possible score was 8. The high overall score indicates that the clean-up participants did indeed harbor pro-environmental attitudes.

In order to determine whether or not the environmental activists held attitudes that were at variance with those held by the general population, a student t-test was used to compare the mean affect scores of the clean-up and DMV groups. Factors measuring behavior, knowledge, and socio-demographic characteristics were also compared in this manner (see Table 1). Brief definitions of these factors are listed below. Their location on the survey form is indicated in parenthesis (refer to Appendix B, *Survey Instrument*).

Actual Commitment. Expression of performance of action. (page 1, bottom section)

Verbal Commitment. Expression of willingness to take action. (page 1, top section)

Knowledge. Specific knowledge about the marine environment and marine pollution. (page 2, first section)

Education. Formal education based on academic degrees held by the respondent. (page 2, second section)

Age. Age of the respondent in years. (page 2, second section)

Affect. Emotional link to the environment. Attitude. (page 1, middle section)

Politic. Political ideology of the respondent (liberals were scored as 1s, middle-of-the roaders as 2s, and conservatives as 3s; page 2, second section)

Neighbor. Type of neighborhood the respondent lived in (rural areas were scored as 1s and non-rural areas as 2s[1]; page 2, second section)

Income. An approximation of the annual household income of the respondent based on the scale given in the survey (scores ranged from 0 for annual incomes of less than $5,000 to 7 for annual household incomes of over $95,000; page 2, second section)

Sex. Gender (men were scored as 1s and women as 2s; page 2, second section)

Comparison of the mean attitude scores for the beach and DMV groups revealed virtually no difference in attitude but statistically significant differences in verbal and actual commitment, knowledge, age and education. The similarity in attitudes can be explained by two circumstances. In their 1991 article, Dunlap and Scarce wrote that public support for environmental protection had reached an all-time high. Therefore, one should expect that there would also be wide-spread agreement in attitudes concerning the environment. Support for environmental protection does not necessarily mean that supportive individuals are actually willing to do something to protect the environment themselves, however. As a matter of fact, many of the people interviewed at DMV made comments like, "*They* should keep the beaches cleaner". These people wanted a clean environment but wanted somebody else to be responsible for its care.

The survey instrument itself might have been responsible for the observed similarities in attitude between the two populations. In a study of marine knowledge and attitudes among tenth graders, Fortner and Teates (1980) also obtained overall positive

[1] Respondents were asked to identify their area of residence as being either rural, suburban, or urban. Only 5 of the 84 respondents claimed to be from urban areas. Therefore, in order to prevent a skewing of the statistical output due to outliers, respondents were classified as being from either rural or non-rural areas.

attitudinal responses. To explain their results, they suggested that, "The attitude instrument as a whole, then, probably measured how students view humankind's relationship to the ocean, as opposed to measuring the students' depth of commitment to holding intact the natural systems involved" (Fortner and Teates, 1980, p. 16). A similar explanation may be appropriate for the present study. The attitude scale measured individual's emotional response to "the environment". Because a majority of the public identifies themselves as "environmentalists" (Dunlap and Scarce 1992, p. 656), there is little wonder that most of the respondents expressed environmentally positive attitudes. The existence of a consensus with regard to attitude but a discrepancy with regard to expressed behavior indicates that factors other than attitudes are involved in the motivation of environmental action.

In addition to similarities in affect, the t-test revealed no significant differences in political ideology (middle-of the-road leaning toward liberal), type of neighborhood (suburban, leaning toward rural), household income (ranging from $35,000 to $49,999 per annum), and sex (small majority of women). These results indicate that the two groups were quite similar. The similarities between the two groups in regard to these attributes indicate that a suitable basis for comparison of other variables exists. In other words, differences between the groups in relation to other variables will not be the result of differences in affect, political ideology, income or sex.

There were statistically significant differences between the clean-up participants and the DMV group in verbal commitment, actual commitment, knowledge, education, and age. Generally, the clean-up participants were more verbally- and actually-committed, more knowledgeable, better educated, and older than the people surveyed at the Department of Motor Vehicles. The findings that the environmental activists had a higher degree of knowledge than the DMV group is consistent with the research of Soden, (1989) and Fortner and Teates (1980). Additionally, the fact that the clean-up participants were better educated is consistent with the work of Van Liere and Dunlap

(1980), Jones and Dunlap (1992), Howell and Laska (1992), and Christianson and Arcury (1992). However, the finding that the environmental activists were older than the DMV sample is at odds with the work of Van Liere and Dunlap (1980), Jones and Dunlap (1992) and Howell and Laska (1992). A possible explanation of these findings is offered later in this chapter.

Zero-order Correlations

As the next step in analysis of the survey data, Pearson's product-moment correlation coefficients were calculated for the beach data (Figure 2), for the DMV data (Figure 3) and the two data sets combined (Figure 4). More attention was given to the analysis of the two data sets combined because of the greater reliability of larger samples. Because zero-order correlations expose factors which are typically associated with each other, correlation analysis allowed the researcher to characterize environmentally-active persons. For example, reference to Figure 2 reveals that affect and actual commitment were highly correlated. This correlation means that people who expressed a high degree of actual commitment tended to indicate that they had a strong emotional attachment to the environment.

Beach Data

The correlation matrix developed from the beach data is found in Figure 2. Three factors were significantly correlated with expressed actual behavior; affect, verbal commitment and area of residence (neighbor). The high correlation between actual commitment and affect indicates that behavior is associated with attitude. Whether attitude provokes action cannot be determined, however. Furthermore, the correlation between verbal commitment and actual commitment indicates that there is an association between the two forms of expressed commitment. The findings that people from less rural areas expressed greater actual commitment is consistent with the work of researchers such as Christianson and Arcury (1992), Howell and Laska (1992), and Jones and Dunlap (1992). These researchers found that people from more urban areas tended to be more supportive of environmental causes.

Figure 2. Matrix of Zero-order Correlations of Independent Variables: Beach Data. The zero-order correlation analysis of the beach data revealed that people who expressed greater actual commitment were more emotionally linked to the environment, expressed greater verbal commitment, and lived in less rural areas.

	ActCom	Affect	Age	Educ	Income	Know	Neighbor	Politic	Sex	VerbCom
ActCom	1.000									
Affect	0.526	1.000								
Age	0.172	-0.174	1.000							
Educ	0.082	0.117	**-0.373**	1.000						
Income	0.069	-0.161	0.279	0.420	1.000					
Know	0.105	-0.085	-0.011	-0.044	-0.057	1.000				
Neighbor	**-0.335**	-0.049	-0.167	-0.138	0.038	-0.008	1.000			
Politic	-0.141	-0.310	0.295	0.091	0.492	-0.095	-0.122	1.000		
Sex	0.145	0.295	-0.085	0.038	-0.053	-0.055	-0.005	-0.286	1.000	
VerbCom	0.544	0.500	-0.096	0.036	-0.105	0.166	-0.138	-0.190	0.202	1.000

bold = $p < 0.05$, shaded = $p < 0.01$

DMV Data

Some interesting conclusions about education can be drawn from the analysis of the DMV surveys (see Figure 3). The survey results indicate that better educated members of the general public expressed greater actual commitment and were more knowledgeable about marine environmental issues. Furthermore, verbally committed people tended to be better educated. Conversely, more politically conservative people tended to be less well educated. In general, conservatives do not support environmental initiatives. These results demonstrate the influence of education on environmentally-positive attitudes and expressed behavior and were consistent with Howell and Laska's (1992) finding that education is a powerful predictor of environmental attitudes.

Comparison of Beach and DMV Results

Comparison of the zero-order correlations revealed three similarities between the clean-up participants and the population surveyed at the Department of Motor Vehicles. These findings indicate that:

- People who expressed a high degree of environmental affect expressed greater actual commitment;
- People who were more verbally committed to environmentally responsible behavior expressed greater actual commitment; and
- People who were more verbally committed to environmentally responsible behavior expressed greater emotional attachment to the environment

These results illustrate the degree to which attitude and expressed behavior are intertwined.

The major difference between the two groups was in relation to the age of well educated individuals. At the clean-up, the younger people were better educated whereas at the DMV, the older people were better educated. The discrepancy is most likely due to the age difference between the two groups. The average age at the clean-up was 47.1 years and 35.9 years was the mean at DMV. Many of the clean-up participants were

Figure 3. Matrix of Zero-order Correlations of Independent Variables: DMV Data. The zero-order correlation analysis of the DMV data revealed that people who expressed greater actual commitment were more emotionally linked to the environment, were better educated, and expressed greater verbal commitment.

	ActCom	Affect	Age	Educ	Income	Know	Neighbor	Politic	Sex	VerbCom
ActCom	1.000									
Affect	**0.345**	1.000								
Age	0.236	0.006	1.000							
Educ	**0.372**	0.041	**0.364**	1.000						
Income	-0.150	-0.247	-0.229	-0.028	1.000					
Know	0.143	0.113	0.203	**0.362**	0.097	1.000				
Neighbor	0.216	-0.283	0.200	-0.008	-0.339	-0.198	1.000			
Politic	-0.286	-0.018	-0.024	-0.447	-0.031	-0.192	-0.023	1.000		
Sex	0.039	-0.007	-0.006	-0.071	0.338	-0.027	0.061	**-0.358**	1.000	
VerbCom	0.676	**0.335**	0.002	**0.326**	-0.135	0.099	-0.057	-0.218	-0.052	1.000

bold = $p < 0.05$, shaded = $p < 0.01$

homemakers and retirees (13 out of 42). The younger population at DMV was of a generation that was more likely to have attended college.

Combined Beach and DMV Data

The zero-order correlations of the beach and DMV data combined indicated that better educated, knowledgeable, older people who expressed a high degree of affect and verbal commitment were more likely to express greater actual commitment (refer to Figure 4). No correlations were revealed between political ideology or income and actual commitment. The finding that education was correlated with actual commitment was consistent with the work of Van Liere and Dunlap (1980), Jones and Dunlap (1992), and Howell and Laska (1992). Each of these studies found correlations between education and attitude.

Maloney and Ward (1973) found that knowledge did not correlate significantly with verbal or actual commitment or with affect. The present study revealed a strong correlation between knowledge and actual commitment. This discrepancy may indicate that there has been a general increase in environmental knowledge over the intervening 20 years. A detailed review of all known longitudinal data related to public concern for environmental quality conducted by Dunlap and Scarce (1991) indicated that "public concern for environmental quality has reached an all-time high" (Dunlap and Scarce 1991, p. 657). Because environmental protection has been a persistent concern since at least the late 1960s, it is reasonable to suspect that people, particularly the "attentive public", would become more knowledgeable about environmental issues. A second reason for the appearance of a correlation between knowledge and actual commitment may be related to the survey instrument. As discussed previously in Chapter 3, the multiple choice portion of the survey was designed to test specific knowledge. Thus, the demonstrated correlation between knowledge and behavior may be a result of an increase in knowledge or the refinement of the knowledge measure. The higher degree of

Figure 4. Matrix of Zero-order Correlations of Independent Variables: Beach and DMV Data Combined. The zero-order correlation analysis of the beach data revealed that people who expressed greater actual commitment were older, better educated, more knowledgeable, expressed a greater emotional attachment to the environment, were more verbally committed, and were politically liberal.

	ActCom	Affect	Age	Educ	Income	Know	Neighbor	Politic	Sex	VerbCom
ActCom	1.000									
Affect	0.403	1.000								
Age	0.320	-0.078	1.000							
Educ	0.342	0.070	0.087	1.000						
Income	-0.044	-0.205	0.022	0.191	1.000					
Know	**0.269**	0.021	**0.226**	0.288	0.013	1.000				
Neighbor	-0.095	-0.160	-0.048	-0.087	-0.145	-0.111	1.000			
Politic	-0.227	-0.158	0.116	-0.198	0.209	-0.160	-0.076	1.000		
Sex	0.093	0.139	-0.046	-0.005	0.142	-0.029	0.025	-0.322	1.000	
VerbCom	0.633	0.394	0.034	**0.268**	-0.121	0.198	-0.095	-0.214	0.061	1.000

bold = $p < 0.05$, shaded = $p < 0.01$

education and knowledge among clean-up participants emphasizes the importance of education in encouraging environmentally responsible behavior.

Both Van Liere and Dunlap (1980) and Jones and Dunlap (1992) reported that younger people tended to be more supportive of environmental causes. Howell and Laska (1992) indicated that age was no longer a factor in predicting support for the environment because of the aging of the population and the media's exposure of environmental issues. However, the results reported above clearly reveal a moderate positive correlation between age and expressed actual commitment. It is possible that the aging of the population has caused environmental concern to shift from the younger (Van Liere and Dunlap 1980, Jones and Dunlap 1992) to the older segments of society after passing through a period in which it was not recognized as an influence on environmental concern (Howell and Laska 1992)[2].

As demonstrated in this study by the correlations between actual commitment and affect in every category of data (refer to Figures 2, 3, and 4), expressed behavior is associated with attitude. The correlation of affect with actual commitment is consistent with the work of Fishbein and Ajzen (1974), Shuman and Johnson (1976) and Sundeen (1992).

Maloney and Ward (1973) found that affect correlated moderately high with verbal commitment and that verbal commitment correlated moderately high with actual commitment. The results of the present study are consistent with these findings. The fact that the results of the present study and the Maloney and Ward study are similar suggests that systematic response bias is not a matter of concern. Additionally, reference to Table 1 reveals that while there was virtually no difference in attitude between the beach and DMV groups, there were statistically significant differences between the two groups in terms of verbal commitment and actual commitment. If systematic response bias was skewing the results, then these differences would not exist.

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[2]Howell and Laska used survey data collected in 1988.

Discrepancies with the literature were found with regard to political ideology and income. Much of the published research in this area indicates that politically liberal people tend to be more concerned about environmental matters than political conservatives (see Van Liere and Dunlap 1980, Jones and Dunlap 1992, and Howell and Laska 1992). However, political ideology was not revealed to be at all correlated with affect, verbal commitment, or actual commitment. This lack of association may be due to the "narrowness" of the scale. Respondents were requested to indicate whether they considered themselves to be politically liberal, middle of the road, or conservative. No other options were offered. Therefore, people who had liberal feelings toward some, but not all, issues had to chose between middle of the road and liberal. Possibly, a wider range of choices would have exposed a correlation between political ideology and environmental concern. A wider range of choices might have resulted in the diminution of similarities in political ideology between the two study populations, as well. As it was, however, there were no significant difference in political ideology between the two groups (refer to Table 1). Overall, forty-two people claimed to be middle of the road, 19 indicated that they were liberal, and 11 stated that they were conservative.

The academic literature on the subject suggests that people with higher incomes tend to express greater environmental concern because they have more time and money to devote to "non-necessities" (Christianson and Arcury 1992, Arcury and Johnson 1987, Maloney and Ward, 1973). However, income was not found to be correlated with actual behavior in this study. The fact that representatives of each income bracket were present at the clean-up indicates that participants were driven less by income and more by the availability of resources such as time. Each participant made the decision to donate some of his or her (more or less) limited free time to the clean-up effort. Income was apparently not a factor in the availability of resources. Contrary to expectations, the clean-up participants were not especially wealthy. The mean household income was between $35,000 and $49,000 per year. As mentioned previously, there was no

statistically significant difference between the annual household incomes of the participants and people interviewed at DMV. Furthermore, the means derived in this study were approximately equal to the 1990 median Rhode Island household income of $31,968 (U.S. Bureau of the Census 1992). The conclusion to be reached is that the people surveyed for this study were average citizens who donated their available time based on factors other than the availability of resources commonly associated with wealth.

Regression Analysis

Stepwise multiple regressions were run to determine how well combinations of the independent variables could predict actual commitment (dependent variable). Actual commitment was chosen as the dependent variable because the intent of this research was to discover which variables were the best predictors of behavior. A stepwise multiple regression, when used carefully, reduces the chances that multicollinearity will artificially inflate the multiple correlation and eliminates redundant variables. Stepwise multiple regressions were run for the data collected at the beaches (Table 2), for the data collected at the DMV (Table 4), and for all of the data combined (Table 6).

Following the selection of the independent variables by the stepwise procedure, a multiple regression was conducted using just those variables identified by the step-wise multiple regression procedure. Cases were eliminated from both procedures if any data was missing. The step-wise procedure used only cases for which there was a value for each variable. For example, if a person did not indicate his or her age on the survey, that case was eliminated from the step-wise multiple regression analysis. The derived multiple regression analysis used only those variables identified by the step-wise regression as being the variables with the most influence over the dependent variable. Therefore, fewer cases were eliminated from the derived multiple regression analysis because fewer variables were being considered. To expand on the example given above, if the person who did not state his or her age *did* respond to every other question and *if* age was not one of the variables associated with the dependent variable, then that case would be included in the derived multiple regression analysis.

Beach Data

Because 11 cases were deleted due to missing data, the step-wise regression analysis of the beach data was based on 31 surveys (see Table 2). After selecting

Table 2. Stepwise Multiple Regression Analysis: Beach Data. The stepwise procedure identified affect and verbal commitment as the independent variables with the most influence on actual commitment (dependent variable).

Variable Entered	R	R squared	To Enter Partial	To Enter Probability
VerbCom	0.531	0.282	0.000	0.002
Affect	0.580	0.336	0.274	0.143

Note: 11 cases deleted due to missing data

Table 3. Derived Multiple Regression Analysis: Beach Data. The derived multiple regression analysis indicated that affect and verbal commitment, in combination, explained 35.0% of the variance in actual commitment.

Variable	Standardized Coefficient	T-Value	2-tail Probabilty
Constant	0.000	0.552	0.584
Affect	0.339	2.333	0.025
VerbCom	0.374	2.575	0.014

R=0.618, R squared = 0.382, Adj. R squared =0.350

F=12.062, df=2, $p < 0.01$, N=42

VERBCOM and AFFECT as the independent variables, a multiple regression was conducted using just those variables and all 42 cases. The procedure revealed that affect and verbal commitment explained 35.0% of the variance in actual commitment (see Table 3). Recall that affect and verbal commitment were positively correlated with actual commitment.

DMV Data

The stepwise multiple regression for the DMV surveys was run on 29 cases (see Table 4). Only seven cases were eliminated from the derived multiple regression analysis. The derived multiple regression analysis revealed that neighborhood character (rural or non-rural) and verbal commitment explained 49.1% of variance in actual commitment (see Table 5). People from less rural areas who expressed a high degree of verbal commitment tended to express greater actual commitment.

Combined Beach and DMV Data

The stepwise multiple regression analysis of the combined data was based on 60 out of a total of 84 surveys (see Table 6). The stepwise regression analysis indicated that age, education, and verbal commitment were the best predictors of actual commitment. The number of cases eliminated due to missing data was reduced to 7 in the derived multiple regression analysis (see Table 7). The multiple regression analysis indicated that, in combination, verbal commitment, age, and education explained 47.7% of the variance ($p<0.01$). Thus, it can be concluded that among the survey population of coastal Rhode Islanders, verbally-committed, better educated, older adults tended to express greater actual commitment.

Table 4. Stepwise Multiple Regression Analysis: DMV Data. The stepwise procedure identified neighborhood and verbal commitment as the independent variables with the most influence on actual commitment (dependent variable).

Variable Entered	R	R squared	To Enter Partial	To Enter Probability
VerbCom	0.701	0.491	0.000	<0.010
Neighbor	0.752	0.565	0.381	0.046

Note: 13 cases deleted due to missing data

Table 5. Derived Multiple Regression Analysis: DMV Data. The derived multiple regression analysis indicated that neighborhood character and verbal commitment, in combination, explained 49.1% of the variance in actual commitment.

Variable	Standardized Coefficient	T-Value	2-tail Probabilty
Constant	0.000	-1.103	0.278
Neighbor	0.297	2.413	0.022
VerbCom	0.693	5.626	<0.010

R=0.722, R squared = 0.521, Adj. R squared =0.491
F=17.385, df=2, p < 0.01, N=35

Table 6. Stepwise Multiple Regression Analysis: Beach and DMV Data Combined. The stepwise procedure identified age, education, and verbal commitment as the independent variables with the most influence on actual commitment (dependent variable).

Variable Entered	R	R squared	To Enter Partial	To Enter Probability
VerbCom	0.639	0.408	0.000	<0.01
Age	0.674	0.454	0.279	0.033
Educ	0.703	0.495	0.272	0.039

Note: 24 cases deleted due to missing data

Table 7. Derived Multiple Regression Analysis: Beach and DMV Data Combined. The derived multiple regression analysis indicated that age, education, and verbal commitment, in combination, explained 47.7% of the variance in actual commitment.

Variable	Standardized Coefficient	T-Value	2-tail Probabilty
Constant	0.000	-1.397	0.167
Age	0.278	3.331	0.001
Educ	0.180	2.103	0.039
VerbCom	0.558	6.520	<0.01

R=0.705, R squared = 0.497, Adj. R squared = .477
F=24.071, df=3, p < 0.01, N=73

Summary

The analysis reported in this chapter was designed to answer the first two hypotheses. It was found that clean-up participants did harbor pro-environmental attitudes. However, it was also revealed that there were no significant differences in environmental attitudes between the clean-up participants and members of the public surveyed at DMV (refer to Table 1). In each category of data (participants alone, DMV alone, and participants and DMV combined) affect was found to be correlated with expressed actual behavior, however. These findings indicate that attitudes are associated with behavior although attitudes alone are not sufficient to convert inclination into action.

The correlation and regression analyses were employed as useful methods to characterize environmentally-active individuals. Age, education, and verbal commitment were found to be positively correlated with expressed actual commitment. No correlations were revealed between actual commitment and political ideology or income.

• 5 •

Analysis:
Social Networks

This chapter begins with a brief introduction to social network analysis. The theory is then illustrated with a description of participants and communication links at each beach. Following this introductory material are discussions of component analysis and structural equivalency.

Introduction to Social Network Analysis

The first portion of this study dealt with "attribute data". That is, for purposes of analysis, attitudes and behavior were regarded as properties, qualities, or characteristics of individuals or groups. The focus will now shift to "relational data". Relational data "are the contacts, ties and connections, the group attachments and meetings, which relate one agent to another and so cannot be reduced to the properties of the individual agents themselves. Relations are not the properties of agents, but of systems of agents; these relations connect pairs of agents into larger relational systems" (Scott 1991, p. 3). Network analysis is a method used to qualitatively evaluate the web of interactions through which people interact with one another.

A network is "generally defined as a specific type of relation linking a defined set of persons, objects, or events" (Knoke and Kuklinski 1982, p. 12). Relations between two people are viewed as *dyadic*. If the relationship is discussed from the vantage point of one member of a pair, then that member is the *ego* and the other member is the *alter*. A situation in which multiple types of relations exist between units is described as *multiplex*. The overall configuration of relations in a network describes its *structure*.

Structure partly depends on *density*, the proportion of the potential relations in a network that actually exist. In a network of symmetric relations among N nodes, the number of potential relations is N(N-1)/2.

Network data is most often collected through interviews in which respondents are asked about their relations to other network members. As the analysis will be based on each participant's relationships with other individuals and on a specific network configuration, the boundaries need to be clearly delineated in order not to misrepresent the relevant social structure (Knoke and Kuklinski 1982, Laumann et. al. 1983). For this project, interviewees were asked only about their relations (or lack of) with other clean-up participants. The boundaries imposed by this technique are clearly artificial. The resultant network is, therefore, not a perfect representation of the full network of each clean-up participant. The implications of imposing these restrictive boundaries were addressed in Chapter 3.

Once data is collected, it is usually cast into one of two common forms; a matrix or an ego/alter list. The more common case-by-case matrix representation was used for this thesis (see Figures 5, 6, 7, and 8).

> Network data are usually represented in the form of a square matrix, with a number of rows and columns equal to the number of units involved. [Each individual is listed twice; once along the rows and once along the columns.] Typically, the rows contain the relations of individual egos and the columns those of individuals alters. Thus, the matrix element in the ith row and the jth column refers to the relation from individual i to individual j (usually, as seen or described from the vantage of individual i). In the case of relational data collected by questionnaire, this element will indicate whether individual i claimed a relation of some particular kind to individual j. These elements will be 0s and 1s when relations are coded in binary terms and will fall along some scale of values when relations are coded in terms of intensity. [For example, a weak relationship may be coded as a 0, a moderately strong relationship as a 1, and a strong relationship as a 3.] (Alba 1982, pp. 49-50)

In order to interpret the information contained in matrices, it is necessary to understand the associated conventions. Individual rows are referenced as *i* and individual columns as *j*. The number of rows in a matrix are referred to as *M and* the number of columns as *N*.

Generally, one refers to the rows before the columns when describing the contents of any particular cell. The letter *a* refers to the actual value contained in the cell. For example, the cell at the intersection of row 4 with column 5 is represented as $a(4,5)$.

Undirected networks consider relationships in which only the existence of a relationship is considered and not the direction. That is, if Tom named Kevin as a friend, it would be expected that Kevin would name Tom as a friend. The reciprocity of relationships is not considered because, it can be argued, the mere existence of a relationship creates a channel for two-way communication.

Directed networks consider both the existence and direction of relations. If, in the example given above, Kevin had <u>not</u> named Tom as a friend, then that relationship would be directed from Tom to Kevin and not vice-versa. In a matrix, this relationship would appear as running from Tom in row i to Kevin in column j. The cell value would be 1. The value of the cell at the intersection of the row representing Kevin and the column representing Tom would be 0. For each beach tested, a matrix of relationships was developed (see Figures 5, 6, 7, and 8). From the matrices, undirected network diagrams, or "sociograms" were developed to graphically express the network structure of each beach (see Figures 5 through 12).

Sociograms are produced in accordance with graph theory. Graph theory is a mathematical theory which permits matrix data to be translated into formal concepts and theorems which can be directly related to the substantive features of social networks (Scott 1991, p. 66). The elements (people) in a graph are represented by points and the relations are expressed as lines. It is the pattern of connections that is important and not the actual positioning of the points on the page. While there is no one "correct" way to draw a graph it is conventional to draw all of the lines in a graph diagram the same length, if possible. This convention developed purely for reasons of convenience and aesthetics. The diagrams for this study were developed by placing a number of dots representing the participants at each beach in a circle. Lines were then drawn to portray

Figure 5. Network Data Matrix and Sociogram: Quonochontaug Pond. The matrix below represents the relationships claimed by clean-up participants at Quonochontaug Pond. The line diagram graphically represents the same relationships.

	QP1	QP2	QP3	QP4	QP5	QP6	QP7	QP8	QP9
QP1	0	1	1	1	1	1	1	1	0
QP2	0	0	1	1	0	0	0	0	0
QP3	0	1	0	1	0	0	0	0	0
QP4	0	1	1	0	0	0	0	0	0
QP5	1	0	0	0	0	1	0	0	0
QP6	1	0	0	0	1	0	0	0	0
QP7	1	0	0	0	1	1	0	0	0
QP8	1	0	1	1	0	0	0	0	0
QP9	1	0	0	0	0	0	1	1	0

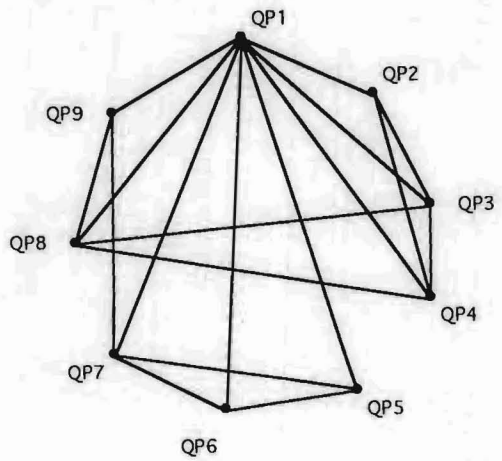


Figure 6. Network Data Matrix and Sociogram: South Kingstown Town Beach. The matrix below represents the relationships claimed by clean-up participants at South Kingstown Town Beach. The line diagram graphically represents the same relationships.

	SK1	SK2	SK3	SK4	SK5	SK6	SK7	SK8	SK9
SK1	0	0	0	0	0	0	0	0	0
SK2	0	0	0	0	0	0	1	0	0
SK3	0	0	0	0	0	0	1	1	1
SK4	0	0	0	0	0	1	0	0	0
SK5	0	0	0	0	0	0	0	0	0
SK6	0	0	0	1	0	0	0	0	0
SK7	0	1	1	0	0	0	0	1	1
SK8	0	0	1	0	0	0	1	0	1
SK9	0	0	1	0	0	0	1	1	0

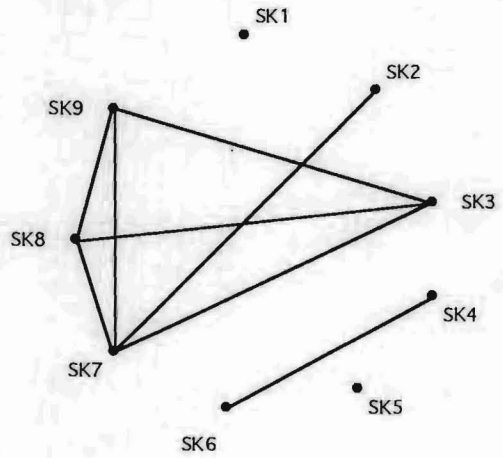


Figure 7. Network Data Matrix and Sociogram: East Matunuck State Beach. The matrix below represents the relationships claimed by clean-up participants at East Matunuck State Beach. The line diagram graphically represents the same relationships.

	EM1	EM2	EM3	EM4	EM5	EM6	EM7	EM8	EM9	EM10	EM11	EM12	EM13	EM14	EM15
EM1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EM2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
EM3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
EM4	0	0	0	0	1	1	1	1	0	0	0	0	0	0	0
EM5	0	0	0	1	0	1	1	1	0	0	0	0	0	0	0
EM6	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0
EM7	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0
EM8	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
EM9	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
EM10	0	0	0	0	0	0	0	0	1	0	1	1	0	0	0
EM11	0	0	0	0	0	0	0	0	1	1	0	1	0	0	0
EM12	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0
EM13	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
EM14	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
EM15	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0

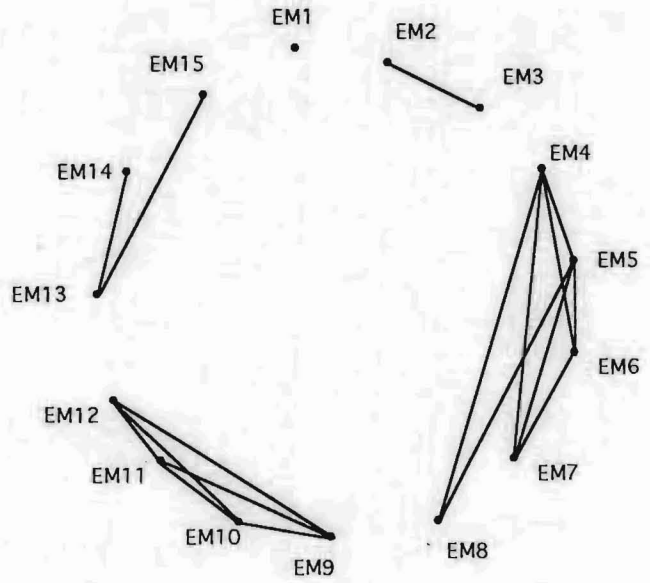
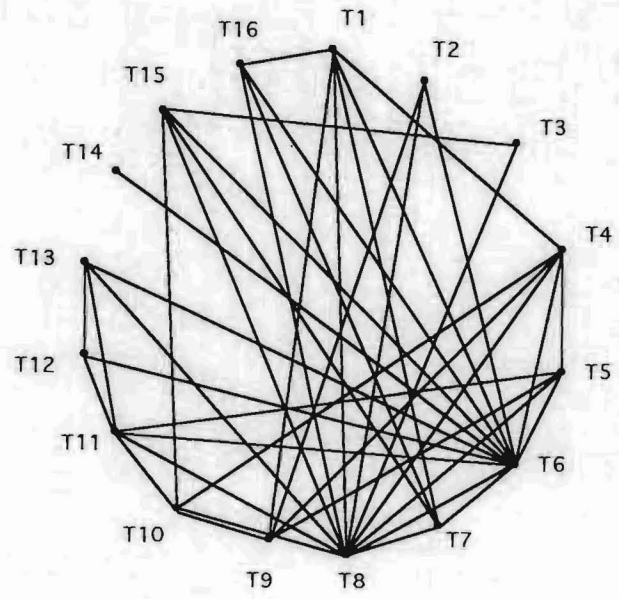


Figure 8. Network Data Matrix and Sociogram: Tiverton. The matrix below represents the relationships claimed by clean-up participants in Tiverton. The line diagram graphically represents the same relationships.

	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	T14	T15	T16
T1	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	1
T2	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0
T3	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0
T4	1	0	0	0	1	1	0	1	1	0	0	0	0	0	0	0
T5	0	0	0	1	0	1	0	1	1	0	0	0	0	0	0	0
T6	0	0	0	1	1	0	0	1	0	0	1	0	1	0	0	0
T7	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	1
T8	0	1	0	0	0	1	0	0	0	0	1	0	1	0	1	0
T9	1	1	0	1	1	0	0	0	0	1	0	0	0	0	0	0
T10	0	0	0	1	0	0	0	1	1	0	1	0	0	0	1	0
T11	0	0	0	0	1	1	0	1	0	0	0	0	1	0	0	0
T12	0	0	0	0	0	1	0	0	0	0	1	0	1	0	0	0
T13	0	0	0	0	0	1	0	1	0	0	1	1	0	0	0	0
T14	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
T15	0	0	1	0	0	1	1	1	0	0	0	0	0	0	0	0
T16	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0



expressed social ties. All of the graph diagrams in this study were create as if the data were undirected. Directed diagrams would represent the direction of a relationship with the use of arrowheads at the ends of lines.

In order to discuss a graph diagram, it is necessary to understand the vocabulary. An *agent* is the individual being discussed. Two agents are *adjacent* if they are directly related to or connected with each other. Adjacency is represented by a line connecting two dots. A point's *neighborhood* is composed of the points to which a particular point is adjacent. The number of points to which a particular point is directly connected is equal to that point's *degree*. Each line is *incident* to two points. That is, each line is connected to two points. The *distance between two points* is equal to the smallest number of lines between them. For example, the distance between two adjacent points is one. The shortest path between points is known as the *geodesic.* A *walk* is a sequence of uninterrupted lines in a graph. A *path* is a walk in which each point and each line are distinct. *Density* refers to the general level of linkage among points in a graph. Density compares the actual number of lines in a graph with the total number of lines which would be present if the graph were complete. *Inclusiveness* refers to the number of points included within the various connected parts of a graph. The level of inclusiveness is equal to the total number of points minus the number of isolated points.

Introduction to Participants and Information Flow

Quonochontaug Pond

Every participant at Quonochontaug Pond, except for one individual (QP2), was a member of the Salt Pond Coalition, an environmental group whose mission is to protect and preserve Rhode Island's salt ponds. The one participant who was not a member of the Coalition was the friend of two members, a married couple (QP3 and QP4). The clean-up was organized by the president of the Salt Pond Coalition (QP1; refer to Figure 9).

As a whole, the participants attended the clean-up because they valued a clean environment, wanted to set an example, valued the aesthetics of the area, felt it was their civic duty, and because they found the activity enjoyable.

Information about the clean-up was transferred over the phone to the coordinator of the clean-up from the Audubon Society of Rhode Island (Audubon from here on). He then informed Coalition members about the clean-up through an announcement in the Coalition's newsletter. The one participant who was not a member of the Coalition first learned about the clean-up through an Audubon announcement. Another participant (QP8), a member of the local conservation commission and the wife of the coordinator, also received an announcement from Audubon.

South Kingstown Town Beach

Nine people cleared debris from South Kingstown Town Beach because of a shared concern for the environment and a desire to keep the area clean. The clean-up was coordinated by a member of the local Conservation Commission. The coordinator (SK2) first read about the clean-up in the *Narragansett Times*. Individual SK7 was the only other Conservation Commission member to attend. SK7 was accompanied by his

Figure 9. Sociogram: Quonochontaug Pond. The line diagram below was developed from the interview data to depict relationships among participants at Quonochontaug Pond.

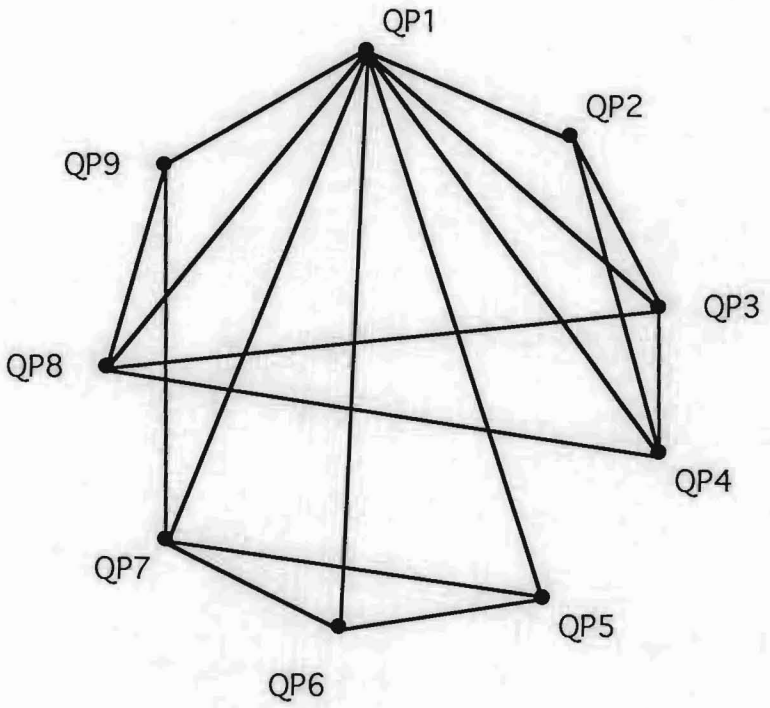
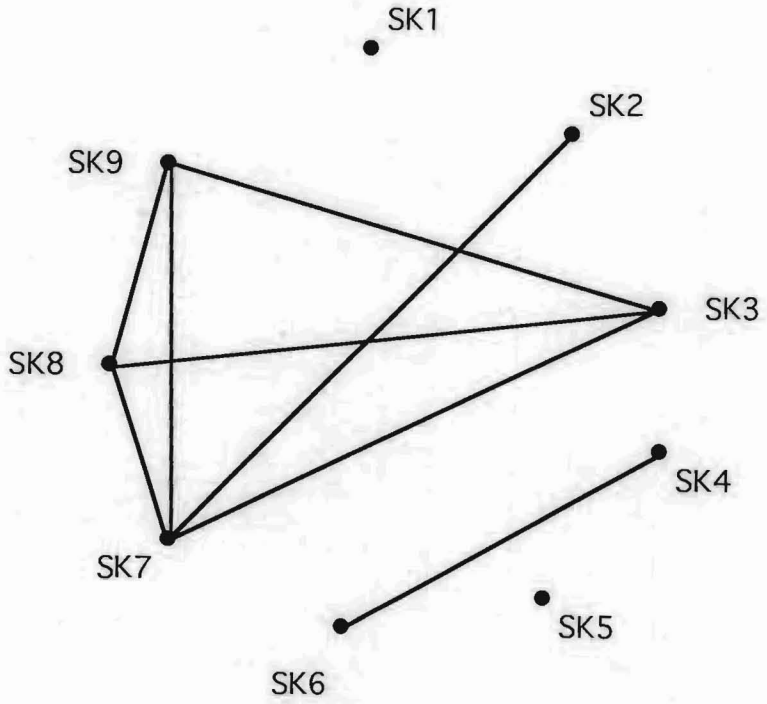


Figure 10. Sociogram: South Kingstown Town Beach. The line diagram below was developed from the interview data to depict relationships among participants at South Kingstown Town Beach.



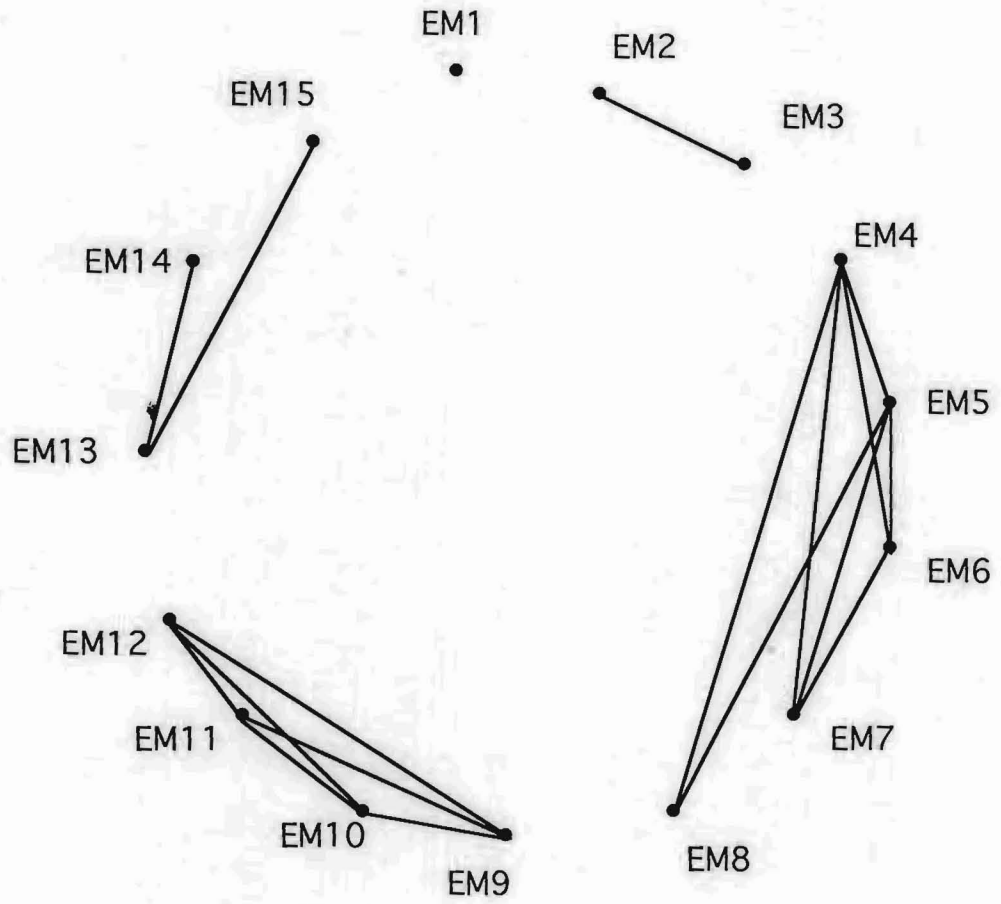
girlfriend (SK3), and two co-workers (SK8 and SK9). Actors SK8 and SK9 were married. Participants SK3, SK7, SK8, and SK9 were all employed by the Rhode Island Department of Environmental Management (DEM) and claimed social as well as professional relations with each other.

The other participants were a married couple (SK 4 and SK6), a man hired to haul the collected debris to the transfer station (SK1), and a woman who came alone although she thought a group of her friends were going to attend (SK5). The married couple learned about the clean-up through an announcement in the *Narragansett Times* and a flyer sent by Audubon. The remaining two participants learned of the clean-up through a co-worker and friends, respectively. The man who worked for the waste disposal company was required to attend the clean-up by his employer. Clearly then, he was not a volunteer. However, his responses were included in the analysis because the intent of this study was to learn why people *participated* in clean-ups. Although the assumption was that the participants would be volunteers, SK1 demonstrated that not everybody at the clean-up participated for purely benevolent reasons (refer to Figure 10).

East Matunuck State Beach

Fifteen adults participated in the East Matunuck clean-up (refer to Figure 11). In general, the people present at East Matunuck State Beach did not constitute a cohesive group. The event was organized by a woman (EM4) who had coordinated the clean-up since about 1988. She first learned of the clean-up through an announcement in the local newspaper. The coordinator was accompanied by her husband (EM5), her mother (EM7), her father (EM6), and a friend (EM8). There was a group of 12 students and 4 adults from Mount Pleasant High School in Providence. No students were interviewed. One of the teachers (EM12) learned about the clean-up at the Waterfront Festival the previous weekend. She enlisted the assistance of two other teachers (EM10 and EM11).

Figure 11. Sociogram: East Matunuck State Beach. The line diagram below was developed from the interview data to depict relationships among participants at East Matunuck State Beach.



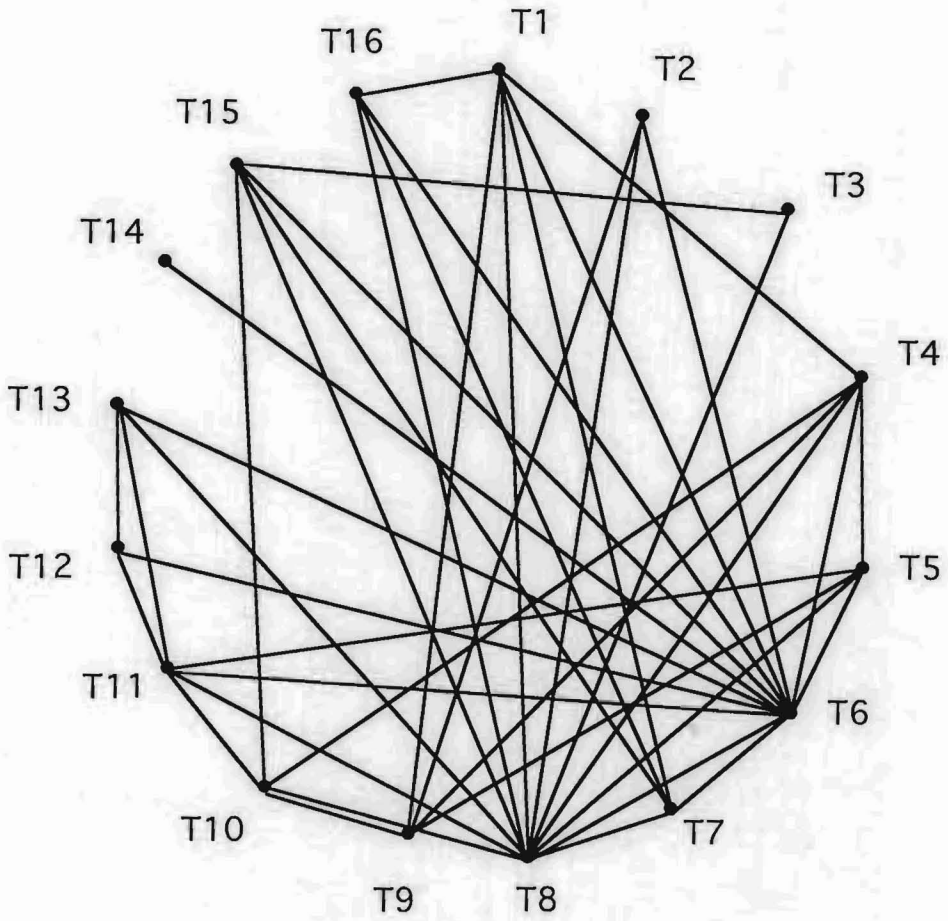
Participant EM11 was accompanied by his girlfriend (EM9). There was also a group of 7 students and 3 adults from LaSalle High School. Again, none of the students were interviewed. Two of the adults were moderators for the Environmental Club. Teacher EM13 learned about the clean-up through an Audubon announcement. She, in turn, informed the girls in the club and the other moderator (EM15). The LaSalle group was accompanied by a friend of EM13. Additionally, a couple new to the area participated in the clean-up because of their concern for a clean environment and with the hope of getting to know some of their neighbors. They learned about the clean-up at the Waterfront Festival as did EM1, a man who came by himself.

Tiverton

The clean-up in Tiverton was co-sponsored by the Garden Club and the Conservation Commission. A total of 16 adults volunteered (refer to Figure 12). The coordinator (T6) was contacted by Audubon. She informed 6 of the participants at a Garden Club meeting (T1, T2, T4, T5, T8, and T9). The head of the Conservation Commission (T13) conveyed information to an additional three participants (T7, T11, and T12). Most of the remaining participants learned about the clean-up through friends or relations who were members of one of the above organizations. Participant T3 learned about the clean-up through friends not associated with the Garden Club or the Conservation Commission.

Reasons for participating were generally similar to those given previously. However, it is worth noting that three individuals mentioned town pride among their reasons for participating.

Figure 12. Sociogram: Tiverton. The line diagram below was developed from the interview data to depict relationships among participants in Tiverton.



Component Analysis: Cores, Cliques and Clans

After developing matrices and graph diagrams, the data for each beach was analyzed for the presence of discrete components, or maximally connected subgraphs. This analysis was conducted in order to find supporting evidence for the hypothesis that participants at each clean-up location would be clique members and/or would be structurally equivalent.

A subgraph is simply, "any collection of points selected from the whole graph of a network, together with the lines connecting those points" (Scott 1991, p. 103). A graph is maximal if it is impossible to add any new members without destroying the quality of connectedness. For example, an isolated point cannot be joined with an existing component because the point has no connection with any of the other member points (Scott 1991, p. 105). The justification for this sort of analysis is that among people's social networks, there are cohesive sub-groups which have their own norms, values, orientations, and sub-cultures (Scott 1991, p. 103). Component analysis allows the social structure of a population to be reduced to one or more components and a number of isolated points. In component detection algorithms all connections are treated as binary (indicating merely the presence or absence of a relationship). Three types of component analysis were utilized in this study; k-core, n-clique, and n-clan.

A k-core is defined as "a maximal subgraph in which each point is adjacent to at least k other points; all the points within the k-core have a degree greater than or equal to k" (Scott 1991, p. 113). K-cores identify areas of the graph which contain clique-like structures although they themselves are not necessarily cohesive subsets. All points in a 1k-core have a degree of at least 1; each person is tied to at least one other person. In a 2k-core, each point has a degree of at least 2; each person is connected to at least two other people. The higher the numeric value of the k-core, the better connected are the members of the sub-group. A k-core must have at least k+1 members. The sociogram

for Quonochontaug Pond (Figure 9) illustrates a 3k-core. Every point is connected to at least three other points. This means that every participant knew or was known by at least three other participants. The k-core procedure in the UCINET software package calculates all k-values for every possible value of k beginning with k = 1. Once k becomes so great that no k-cores are identified, the procedure stops.

Whereas a component is maximal and connected, a clique is maximal and complete. That is, all points are connected to one another. The term n-clique refers to what is typically considered a "clique" in everyday parlance. All members of a 1-clique are directly adjacent to each other. Participants SK3, SK7, SK8, and SK9 form a 1-clique (see Figure 10). All members of a 2-clique are connected either directly or through a common neighbor. There is little sociological value in identifying n-cliques where n is greater than 2. People who are separated by more than one communication link are generally too far removed to be considered "close". As Granovetter (1973, 1974), Weimann (1983), and Brown and Reigen (1987) demonstrated, these weak links are extremely important for communication between components, but influence is more often exerted through strong social ties.

The boundaries of a clique can be restricted by requiring that the longest geodesic that connects members of the clique be no greater than n. This type of analysis is conducted with an n-clan model. A 2-clan will be composed of points, all of which are connected by two or fewer lines. The two furthest points are separated by no more than two lines. Participants EM13, EM14, and EM15 form a 2-clan (see Figure 11). Generally speaking, EM15 communicates with EM14 through EM13.

Quonochontaug Pond

K-core analysis revealed that all individuals participating in the beach clean-up at Quonochontaug Pond were directly connected to at least three of the other participants (see Table 8). There were no isolates and no participants who knew fewer than three

Table 8. Subgroupings of Clean-up Participants. Participants listed along a horizontal line are members of the same component.

Beach	Component	Participants
Quonochontaug Pond	3k-core	QP1, QP2, QP3, QP4, QP5, QP6, QP7, QP8, QP9
	1-cliques	QP1, QP2, QP3, QP4 QP1, QP3, QP4, QP8 QP1, QP5, QP6, QP7 QP1, QP7, QP9 QP1, QP8, QP9
	2-clique	QP1, QP2, QP3, QP4, QP5, QP6, QP7, QP8, QP9
	2-clan	QP1, QP2, QP3, QP4, QP5, QP6, QP7, QP8, QP9
South Kingstown	1k-cores	SK2, SK3, SK7, SK8, SK9 SK4. SK6
	2k-core	SK3, SK7, SK8, SK9
	1-clique	SK3, SK7, SK8, SK9
	2-clique	SK2, SK3, SK7, SK8, SK9
	2-clan	SK2, SK3, SK7, SK8, SK9
East Matunuck	1k-cores	SK2, SK3 EM4, EM5, EM6, EM7, EM8 EM9, EM10, EM11, EM12 EM13, EM14, EM15
	2k-cores	EM4, EM5, EM6, EM7, EM8 EM9, EM10, EM11, EM12
	3k-cores	EM4, EM5, EM6, EM7 EM9, EM10, EM11, EM12
	1-cliques	EM4, EM5, EM6, EM7 EM4, EM5, EM8 EM9, EM10, EM11, EM12
	2-cliques	EM4, EM5, EM6, EM7, EM8 EM9, EM10, EM11, EM12 EM13, EM14, EM15
	2-clans	EM4, EM5, EM6, EM7, EM8 EM9, EM10, EM11, EM12 EM13, EM14, EM15

Table 8 (continued)

Beach	Component	Participants
Tiverton	1k-core	T1 - T16
	2k-core	T1, T2, T3, T4, T5, T6, T7, T8, T9, T10, T11, T12, T13, T15,
	3k-core	T1, T2, T4, T5, T6, T7, T8, T9, T10, T11, T12, T13, T15, T16
	4k-core	T1, T4, T5, T6, T7, T8, T9, T10, T11, T15, T16
	1-cliques	T1, T6, T7, T8, T16 T6, T7, T8, T15 T4, T5, T6, T8 T5, T6, T8, T11 T2, T6, T8 T1, T4, T6, T8 T6, T8, T11, T13 T3, T8, T15 T4, T8, T10 T8, T10, T11 T8, T10, T15 T4, T5, T9 T1, T4, T9 T4, T9, T10 T6, T11, T12, T13
	2-cliques	T1, T2, T4, T5, T6, T7, T8, T10, T11, T12, T13, T15, T16 T1, T2, T3, T4, T5, T6, T7, T8, T10, T11, T13, T15, T16 T1, T2, T4, T5, T6, T7, T8, T9, T10, T11, T15, T16 T6, T11, T12, T13, T14
	2-clans	T1, T2, T4, T5, T6, T7, T8, T10, T11, T12, T13, T15, T16 T1, T2, T3, T4, T5, T6, T7, T8, T10, T11, T13, T15, T16 T1, T2, T4, T5, T6, T7, T8, T9, T10, T11, T15, T16 T6, T11, T12, T13, T14

people. With links to 8 other individuals, participant QP1 had the most social ties. He was the coordinator and president of the Salt Pond Coalition.

Clique analysis for strong subgroups within the group revealed five 1-cliques. Individual QP1 was a member of each of these cliques. Analysis for 2-cliques revealed a single clique of which each participant was a member. Membership in the 2-clan matched membership in the 2-clique.

South Kingstown Town Beach

Analysis of k-cores revealed two groups at the 1k-core level and 1 group at the 2k-core level (see Table 8). One 1k-core was composed of the coordinator and the group of DEM employees. The other 1k-core was the married couple. The 2k-core was the DEM group minus the coordinator.

The individuals composing the 2k-core were also members of the single 1-clique. There was one 2-clique and one 2-clan, each of which contained the five members of the DEM/Conservation Commission group

East Matunuck State Beach

K-core analysis revealed four 1k-cores (see Table 8). These subgroups corresponded to the coordinator and her family and friend; the Mount Pleasant High School Group; the LaSalle High School group; and the married couple. Two 2k-cores were identified. These were the coordinator's group and the Mount Pleasant High School Group. The 3k-cores were identical to the 2k-cores except that the coordinator's friend was removed from the firs subgroup.

Three 1-cliques were identified. These were the coordinator and her family; the coordinator, her husband, and her friend; and the Mount Pleasant High School group. There were three 2-cliques composed of the coordinator, her family, and her friend; the

group from Mount Pleasant High School; and the group from LaSalle High School. Three 2-clans were identified which were identical to the 2-cliques described above.

Tiverton

The 1k-core included everybody who was present at the clean-up (see Table 8). Everybody except for T14 was included in the 2k-core. T14 was a member of the Garden Club but claimed ties only to the coordinator and two individuals who were not present. At the 3k level, everybody except for T14 and T3 were included. T3 was attending the clean-up in Tiverton in order to assist with data collection. She and T15, another interviewer, were included in the data for Tiverton because they had intended to participate in the clean-up regardless of whether or not this investigator was writing a thesis on the subject. No other interviewers were included in the analysis. Analysis of 4k-cores removed three more individuals from core inclusion. The implication of the k-core analysis is that eleven individuals out of 16 knew or were known by four or more other participants.

Clique analysis revealed 15 1-cliques. There was a great deal of overlap in membership between cliques. For example, individuals T6 and T8 were members of 7 different cliques. Four 2-cliques were identified. Again, there was much overlap in membership between cliques. The majority of participants were in 2 or 3 different cliques. Individuals T6 and T11 were both in all four cliques. The 2-clans were identical to the 2-cliques.

Structural Equivalency Analysis

The next step in the analysis was to investigate structural equivalence. Structural equivalence is concerned with the types of relations which particular categories of people maintain. A group of workers who all take directions from the same supervisors can be considered structurally equivalent because they all maintain the same type of relationships with the same people. The objective of structural equivalency analysis is to find individuals whose web of relationships is similar or identical to that of other individuals. The focus is on the pattern of relationships and not necessarily on the particular individuals to which each ego is tied. The CONCOR algorithm was used to identify structurally equivalent actors. CONCOR stands for CONVergence of iterated CORrelations. Scott (1991) describes the CONCOR algorithm as follows.

> The first step in the analysis is to calculate the correlations between all pairs of cases in the matrix. . . . For each pair of cases it is possible to measure their 'similarity' by the value of the Pearson correlation coefficient: two cases with exactly the same pattern of affiliations would show a correlation of +1 while a pair with completely different patterns of affiliation would have a correlation of -1. . . . The second step involves the use of a clustering procedure to group the cases into structurally equivalent sets, according to their measured similarity. . . . For each pair of cases, [CONCOR calculates] the correlation between their scores in the correlation matrix which has been constructed. That is, the correlations among the correlation scores are calculated and they are entered into a new correlation matrix. This process is repeated over and over again for each successive matrix - correlating the correlations of the correlations, and so on. Repeated correlations of this kind have been found to produce, eventually, a matrix in which all the cells will contain values of either +1 or -1 (Scott 1991, pp. 134-135).

Based on the cell values, the data can be partitioned into two clusters. Each cluster contains a "block" of structurally equivalent actors. Each cluster can then be further partitioned using the same procedure. The clusters can be divided as many times as the researcher chooses. Care should be taken, however, because interpretation of results becomes increasingly more difficult with each successive partition. The decision of when to stop the partitions is an arbitrary decision of the researcher. For this study, three partitions were run with the data from each beach. The blocks exposed by a single

partition were too general to be of much use in drawing conclusions. For the two smaller beaches, Quonochontaug Pond and South Kingstown, two partitions were sufficient to elicit meaningful results. Three partitions were analyzed for the East Matunuck and Tiverton clean-ups.

Quonochontaug Pond

After two partitions, the CONCOR algorithm identified two blocks (see Table 9). The first was composed of a married couple (QP3 and QP4) who were members of the Salt Pond Coalition. They both named each other as people whom they knew in addition to naming a mutual friend who was present at the clean-up but was not a Coalition member (QP2). Both QP3 and QP4 were named by the organizer (QP1) as people whom he knew through common group membership although neither member of the couple named the organizer as a contact. Despite their lack of acknowledgment, it is clear that members of a group do know, however slightly, the leader of the group.

The second block consisted of individuals QP1, QP5, QP6, QP7, and QP8. The people were the organizer, his wife, a married couple, and another woman, all of whom were members of the Coalition. There were mutual claims of acquaintance or friendship between these individuals.

Two individuals were not included in either block. One (QP2) was the friend of QP3 and QP4. Apparently, in addition to not being a member of the Coalition, he did not know any members other than QP3 and QP4. Consequently, he could have no relations with any of the other clean-up participants. However, the organizer did claim to know QP2. The other participant who is not included in a block of structural equivalence was QP9. He was a member of the Coalition who arrived late to the clean-up. Although he named three other participants that he knew, none claimed knowledge of him because he arrived after the initial interviews were conducted. It can be assumed that if he had been

Table 9. Blocks of Structurally Equivalent Actors. Participants listed along a horizontal line are all members of the same block.

Beach	Number of partitions	Structurally equivalent actors
Quonochontaug Pond	2	QP1, QP8, QP7, QP6, QP5
		QP3, QP4
South Kingstown	2	SK1, SK5
		SK6, SK4
		SK3, SK9, SK8, SK7
East Matunuck	3	EM1, EM2, EM3
		EM13, EM14, EM15
		EM10, EM11, EM12
		EM4, EM5
		EM6, EM7
Tiverton	2	T1, T2, T4, T5, T9, T10
		T3, T7, T15, T16
		T6, T8, T11, T12, T13, T14
	3	T1, T2, T5, T10
		T4, T9
		T3, T15
		T7, T16
		T6, T8
		T12, T13

present while the other interviews were being conducted he would have been named by at least some of the other participants and, thus, would be considered structurally equivalent to the other actors in block 2.

South Kingstown Town Beach

After two partitions, the CONCOR algorithm identified three blocks of structurally equivalent actors at South Kingstown Town Beach (see Table 9). The first block contained the two isolates; the man hired to haul the debris away (SK1) and the woman who had planned on meeting friends at the beach (SK5). These two individuals were similar in that they lacked relations with any of the other participants. The second block was composed of the married couple who knew no other participants (SK4 and SK6). They both claimed ties only to each other. The third component was composed of SK3, SK7, SK8, and SK9. These individuals were, respectively, the Conservation Commission member/DEM employee, his girlfriend, and the other two DEM employees. They all claimed mutual ties to each other. The only person not included in a block of structurally equivalent actors was the organizer (SK2). She knew SK7 through the Conservation Commission but none of the other participants.

East Matunuck State Beach

Three partitions elicited five blocks of structurally equivalent actors at East Matunuck State Beach (see Table 9). The first block was composed of the man who came by himself (EM1) and the couple who had recently moved to the area (EM2 and EM3). Again, their commonalty was a result of their lack of relations with other clean-up participants. The second block consisted of the group of adults from LaSalle High School. Teacher EM15 and friend EM14 were both associates of teacher EM13, the woman who first suggested that the Ecology Club attend the clean-up. The third block consisted of the teachers from Mount Pleasant High School (EM10, EM11, EM12). They

all claimed working relationships with each other. Although they were not asked about their relationships with the students, it is probable that because of their roles as teachers, they maintained similar types of relationships based on instruction and guidance. The fourth and fifth blocks were composed of the organizer and her husband (EM4 and EM5) and her parents (EM6 and EM7). Each individual claimed strong ties to his or her spouse and familial ties with the other individuals.

Two participants were not found to be structurally equivalent to any other participants. These people, EM9 and EM8, were friends of participants but did not know the other people to whom their friends were tied. EM9 was the girlfriend of one of the teachers from Mount Pleasant High School (EM11) and EM8 was a friend of the organizer (EM4).

Tiverton

The CONCOR algorithm executed three partitions of the data to reveal six blocks of structurally equivalent actors at the Tiverton clean-up (see Table 9). Members of the first block (T1, T2, T5, and T10) all expressed ties to individuals T8 and T9 as well as to other individuals. Participants T8 and T9 were both popular members of the Garden Club. The second block was composed of T9 and T4. Both of these individuals had numerous ties to individuals in block 1. The third block consisted of T3 and T15. T3 and T15 are good friends with the principal investigator and with each other. T15 grew up in Tiverton but has not lived there full-time for about ten years. T3 had met members of T15's family prior to the clean-up but knew no other participants. Participants T7 and T16 composed the fourth block. They each claimed unreciprocated knowledge of T8. The fifth block was comprised of the organizer (T6) and popular Garden Club member T8 (T15's mother). Both women were linked to numerous other participants. There were two participants in the sixth block, T12 and T13. Both men were members of the

Conservation Commission and both claimed ties to the organizer (T6) and to another Conservation Commission member (T11).

T11 was not included in any block of structurally equivalent actors. However, he was one of the two people included in every clique at the N=2 level. The fact that this well connected person was not included in a single block suggests that the partitioning should have been stopped after the second partition. After two partitions, participant T11 was associated with the organizer (T6) and the popular T8. This seems like a logical position for T11 to occupy because of his role as an active member of the Conservation Commission and his many social ties to other clean-up participants.

Summary

The results of the social network analysis component of this study support the hypothesis that participants would be clique members and/or would be structurally equivalent. Some participants at each clean-up location did form cliques. Furthermore, there were structurally equivalent actors at each beach. As predicted by Erickson (1988), these two types of social structure foster agreement in attitudes and behavior

The group of participants at Quonochontaug Pond could be characterized by their involvement in the Salt Pond Coalition. All participants, except for one, were members of the environmental group. The one non-member was friends with two members, however. Analysis revealed that each participant was connected with at least three other participants. It is evident that the existence of a supportive social group such as the Salt Pond Coalition can facilitate the involvement of members in environmentally-associated activities.

Unlike Quonochontaug Pond, participants at the South Kingstown clean-up were not affiliated with a non-profit organization. However, circumstances existed that were supportive of environmental activism. The largest component revealed through 2-clique analysis was composed of the DEM employees and the coordinator. The DEM employees were friends as well as co-workers. Furthermore, one of the employees was a member of South Kingstown's Conservation Commission and had a good working relationship with the clean-up coordinator, another Conservation Commission member. The Department of Environmental Management and the Conservation Commission are two entities committed to sound environmental management. The fact that five of the nine people at the beach were affiliated with these two entities and were also friends attests to the importance of both structured organizations with an environmental focus and social ties in individuals' decisions to become environmentally active. Both factors

enhance the probability that individuals will participate in environmentally-oriented activities.

Participants at the East Matunuck clean-up were members of non-affiliated groups. Each group was developed around ties of blood, friendship, or place of employment. The characteristic common to each group was the existence of a supportive social environment based on clique membership or structural equivalency.

The component analysis of relationships at the Tiverton clean-up revealed a jumble of overlapping connections. The participants at that locale were all affiliated through common group membership and ties based on family and friendship. The results from Tiverton again reveal the importance of existing environmentally-focused organizations and of friends and family in the decision of individuals to voluntarily donate their free time for an activity meant to clean-up the environment and to draw attention to the problem of marine and coastal pollution. More so than at the other study sites, the Tiverton clean-up was perceived as a social event; as a way to do something positive for the environment and the town while spending time with friends.

In addition to confirming the third hypothesis, the analysis revealed the degree to which friendship and authority can influence behavior. At each location, "peripheral" actors were present because of forces associated with relationships based on friendship or authority. Peripheral actors were those participants who were not closely associated with many (or any) of the other participants but whose involvement, nonetheless, was encouraged by another individual or individuals. For example, there was a woman at the South Kingstown Town Beach, SK5, who attended the clean-up because several of her friends had also planned on participating. Although the woman expressed historic concern for the environment, she had never attended a clean-up before. The one factor which encouraged her to participate this year that was missing in previous years was the extension of a personal invitation from a friend. Thus, while cliques and structural equivalency may be conducive to the creation of group action, they are not necessarily

the sole models of influential social structures. Participants SK1, QP2, EM8 and EM9 provide further examples of how alternative forces can influence behavior.

Actor SK1 was an isolate who was required to attend the clean-up by his supervisors at the waste disposal company. The company had a new policy that employees who were assigned to haul the debris from the clean-ups had to participate in the clean-up. Individual SK1's presence at the clean-up is demonstrative of the power of authority to influence behavior.

The participation of individual QP2 (the friend of two Salt Pond Coalition members) demonstrated that non-equivalent members of society could be encouraged by friends to become active in environmentally-associated activities. Likewise, two participants at East Matunuck State Beach (EM8 and EM9) were not included in any of the five blocks of structurally equivalent actors identified at that location. Both actors were friends of people who had higher degrees of contact with other participants. Friendship was the factor responsible for their participation. From these examples, it can be asserted that environmentally-focused groups directly encourage the activism of their members and that these members, in turn, facilitate the involvement of non-members.

An alternative conclusion could be that the artificial boundaries established for this study (e.g., the population was limited to only those people who were present at each clean-up location), prevented the identification of other significant cliques and blocks of structurally equivalent actors. For example, while SK5 was not a member of any of the cliques present at South Kingstown Town Beach, it is likely that she was a member of other cliques based on family, work, and friendship. Each of these groupings would likely foster the same types of social comparison and attitude agreement that was revealed among the strong clique-members in this study. The presence of these other cliques is, of course, only conjecture. Because of the potential to be quickly overwhelmed with relational data, it was not practical to expand the boundaries to include all of the social affiliates of each participant. This being the case, it was necessary to

base conclusions on the available data. Therefore, it can be asserted that in addition to cliques and structural equivalency, people exert influence over the behavior of other individuals through their role as friend, relation or colleague/supervisor.

• 6 •

Discussion

Additional findings with regard to motivating factors behind environmental activism are presented in the first part of this chapter. These findings are followed by an analysis of information dispersal patterns and consequences. The chapter concludes with a discussion of how the findings of this project may be applied toward the encouragement of environmentally-responsible behavior.

Additional Findings

Rational Choice, Normative Conformity, and Affective Bonding

The research reported herein supports the research of Knoke and Wright-Isak (1982). In their study of individual decisions to commit personal resources to voluntary groups, Knoke and Wright-Isak identified three primary motivations; rational choice, normative conformity, and affective bonding processes. Taken as a whole, these factors form a synthesized model useful as a tool in the explanation of individual decisions to contribute personal resources to the collectivity. Each of these factors, as they pertained to the participants' decisions to participate in a beach clean-up, were indirectly investigated during this study.

Rational choice refers to the belief that individuals will make decisions based on the probable gains or losses associated with a set of alternative actions. The gain or loss may accrue to the actor or to some other party whose welfare is valued by the individual. Information about individual motives was collected during the personal interview. Respondents overwhelmingly listed their concern for the environment as a reason for participating. They perceived that their active involvement in the clean-up would

contribute to a cleaner environment. Thus, because their actions benefit something they valued (the environment), their decisions to participate can be categorized as rational choices.

Normative conformity refers to the tendency of people to conform to societal expectations. The importance of normative conformity was revealed by the fact that 24 of the clean-up participants were members of environmentally-focused groups whereas only 3 of the people interviewed at DMV were members of such organizations. The clean-up participants were, therefore, subject to peer pressure from other group members. Group membership facilitates social comparison and thus enhances agreement in attitudes (Erickson 1988). This agreement in attitude creates a supportive environment for collective action. Thus, organizations such as Garden Clubs, Conservation Commissions, and Ecology Clubs are able to encourage their members to participate in projects such as beach clean-ups.

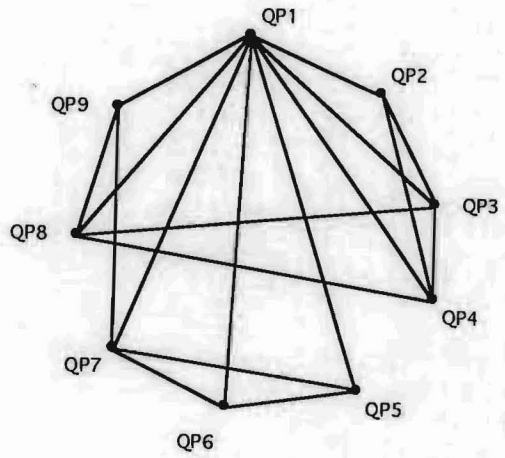
Affective bonds are emotional motives, particularly those pertaining to interpersonal relationships, that incite people to commit themselves to collectivities. The number of references to friends and family members who encouraged participants to attend the clean-up illustrates the importance of affective bonding to individual decision making processes. Many of the participants, both group members and peripheral actors, mentioned the presence of family or friends in their decision to participate. The clean-ups afford participants the opportunity to spent time with their loved ones (affective bonding) while doing something that they find to be rewarding (rational choice) and socially acceptable (normative conformity).

Communication

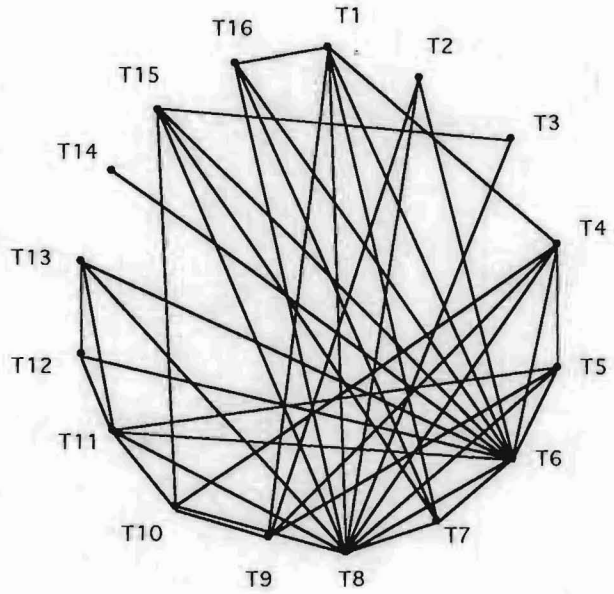
Information source is associated with group cohesion. At beaches where people learned of the clean-up through group membership, there was a greater degree of cohesion than at beaches where people learned about the clean-up through the public

Figure 13. Comparative Sociograms. At beaches where people learned about the clean-up through group membership, there was a greater degree of social cohesion among participants. Notice that the line diagrams for Quonochontaug Pond and Tiverton are much more dense than those for South Kingstown Town Beach and East Matunuck State Beach.

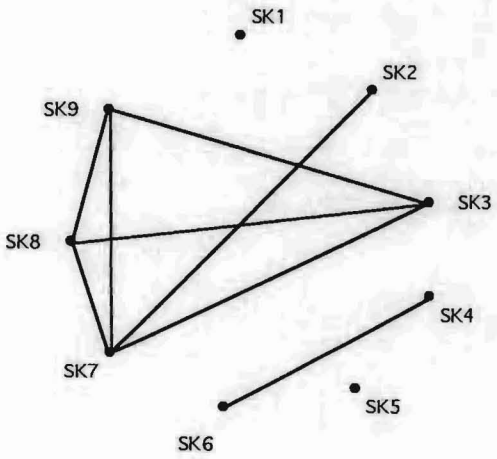
Quonochontaug Pond



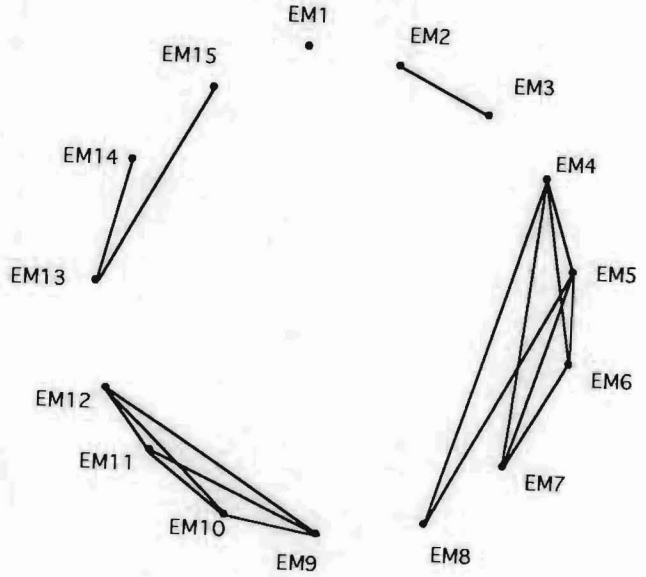
Tiverton



South Kingstown Town Beach



East Matunuck State Beach



media. Reference to Figure 13 vividly illustrates this assertion. At Quonochontaug Pond and Tiverton, most of the participants learned about the clean-up through common group membership. Participants at the South Kingstown Town Beach and East Matunuck State Beach clean-ups primarily learned about the clean-up through the public media. Clearly, the social networks of the Quonochontaug Pond and Tiverton clean-ups were more dense than those of the South Kingstown and East Matunuck clean-ups.

Audubon directly contacted the organizers of the Quonochontaug Pond and Tiverton clean-ups. These people, in turn, informed members of the groups to which they were affiliated (Salt Pond Coalition, Garden Club, and Conservation Commission). Of the 25 people present at the two clean-up locations, only three (QP2, T3, and T14) learned of the clean-up from a source other than a group leader or member.

Conversely, at South Kingstown Town Beach and East Matunuck State Beach, the predominant primary information sources were newspapers, magazines, and announcements and verbal invitations distributed at the Waterfront Festival by the Audubon Society. Once the information was received by responsive individuals, they enlisted the assistance of additional volunteers. The diverse information sources drew a much less inclusive, although equally committed, group of individuals. The organizer at South Kingstown Town Beach first learned of the clean-up through the *Narragansett Times*. The coordinator then encouraged the involvement of fellow Conservation Commission member SK7. Subsequently, SK7 facilitated the participation of his friends and co-workers (SK3, SK8, and SK9). A total of five like-minded people participated because one individual responded to an announcement in the local paper. Similar chains of communication culminated in people attending the clean-up at East Matunuck State Beach. For example, Mount Pleasant High School teacher EM12 first learned about the clean-up at the Waterfront Festival. She then informed two co-workers (EM10 and EM11). EM11 told his significant other (EM9) about the clean-up. If the 12 students

that accompanied the 4 adults are included, then the participation of 16 individuals can be attributed to EM12.

Overall, 13 people learned about the cleanup through direct contact such as Audubon announcements, the public media, and Waterfront Festival activities. An additional 36 people (not including students) learned about the clean-up through secondary sources of information. Clearly, secondary sources of information, such as word-of-mouth contact, are of substantial importance to the organization of voluntary activities. To facilitate secondary communication, group leaders ought to be targeted in order to take advantage of existing organizational inclination and communication channels. Furthermore, attempts should be made to contact less obvious but likewise influential individuals. Investment in diverse forms of publicity is, therefore, essential.

Implications of Findings

The three hypotheses set forth in this study were developed in order to identify the motivating factors behind environmental activism. The motives behind activism were sought as a first step towards encouraging environmentally-responsible behavior. Once it is known what factors influence behavior, then measures can be taken to encourage behavioral change.

The first component of this study revealed that actual commitment is significantly correlated with affect, age, education, knowledge, and verbal commitment. Regression analysis indicated that, of these factors, age, education, and verbal commitment, in combination, are the greatest predictors of expressed actual behavior. Age, education, and verbal commitment, then, are the traits with which managers, administrators, and organizers should be concerned if they are seeking a responsive audience for campaigns intended to encourage environmentally-responsible behavior.

Younger people have historically tended to exhibit greater environmental concern (Van Liere and Dunlap 1980, Jones and Dunlap 1992). Howell and Laska (1992) reported, however, that age is no longer a reliable indicator of environmental concern. The findings reported here that older adults are more environmentally active are, therefore, not consistent with any of these studies on the topic. This inconsistency may be a result of the aging of the population. The average age of the clean-up participants was 47.1 years. These people would have been in their mid-twenties during the first peak of the environmental movement (1968-1972). During the intervening decades, they have raised families, established careers, and now are once again able to contribute to environmental causes.

Knowledge and education are clearly associated with environmental activism. Clean-up participants were more knowledgeable and better educated than people interviewed at the DMV by statistically significant amounts (refer to Table 1). According

to Howell and Laska (1992), well educated individuals are likely to be more concerned about the environment because information about ecological systems and consequences is more likely to reach and to be retained by the educated. It is worth noting that education is the one influential variable which managers, administrators and community organizers can directly enhance.

Verbally-committed individuals have already expressed a willingness to take action. If opportunities to participate in environmental activities exist, then these people are more inclined to accept the invitation to action. The clean-up participants were more verbally-committed than the people interviewed at DMV by a statistically significant difference.

The second component of the study revealed that social structure and social ties influence behavior. Clique members form cohesive groups of like-minded individuals. Structurally equivalent actors associate with other individuals in the same manner. Both of these social configurations are conducive to social comparison and, therefore, to the creation or enhancement of similar attitudes. Social ties are also important because they serve to encourage the participation of non-group members. As demonstrated by participants QP2, EM8, and EM9 a personal invitation from a friend may be the determining factor in whether or not an individual attends a beach clean-up or expresses any other sort of environmentally-responsible behavior. The final significant facet of social structure concerns information dispersal. More than two and two-thirds as many people learned about the clean-up through secondary sources of information as learned through direct targeting.

The implication of these findings is that verbally-committed, well-educated people on the high side of middle age who have the support of their social associates should be the initial targets of publicity/educational campaigns. These people should be targeted first because they are the people who are most likely to respond to the call for action. While age and education are relatively simple to select for, identifying verbally-

committed people who have the support of their social associates may seem to be a more elusive endeavor. However, membership in environmental organizations can be serve as a proxy for verbal commitment and social support. Once these people have been identified, a number of strategies can be applied to encourage environmentally-positive behavior. Refer to Cook and Berrenberg (1981) for a review of approaches to encouraging conservation behavior.

A responsive audience should be sought for the first stage of any campaign whether it be the initiation of a recycling program or something that requires greater personal sacrifice. Once an idea or practice has been accepted by a portion of society, then social forces can be harnessed to disperse the commitment away from existing pockets of concern. Social ties will provide the channels for communication and influence. As demonstrated by the number of references to family members and friends and by the number of peripheral actors at each clean-up location, personal communication from a respected associate may be all that is required to initiate action by previously uninvolved individuals.

Social influence may be applied by encouraging environmentally-active individuals to share their commitment with friends, family, and colleagues. Additionally, environmental managers, administrators, and organizers should publicize the actions of individuals in a variety of mediums including television, radio, and print. Publicity produces two benefits. First, the person being recognized receives the gratification of knowing that his or her actions are appreciated and deemed valuable. Personnel managers have long known that the ability to properly recognize and compensate people for their contributions is essential to the retention of good employees (Denton 1992). While activists as described herein are not paid employees, the underlying principal is the same; recognition of an individual's efforts demonstrates respect for that individual (Denton 1992, p. 173). When a person feels that his or her actions are valuable and

appreciated, then that person will be inclined to contribute further effort to the job, activity, etc.

The second, benefit of publicity is that it creates greater awareness of the issues and demonstrates that individual actions can produce tangible results. By highlighting the efforts of a few committed individuals, other people may be inspired to act in a similar manner. As Hynes (1990) noted in her book about environmental activism, individual examples serve to enlighten and also supply models to encourage others to "go and do likewise".

Dispersal of environmental commitment through social networks cannot be relied upon as the sole method to encourage non-active people to become active. An investment in education is a necessary component of any plan intended to produce wide-spread results. Recall that the clean-up participants were both more knowledgeable and better educated than the people interviewed at the DMV (refer to Table 1). In order to persuade non-active people that they should contribute their energy to environmental causes, knowledge needs to be increased through education. As part of a larger agenda, managers, administrators and community organizers should support investments in public education. However, educational efforts need to extend beyond traditional classroom settings. People need to be informed at work, through audio-visual and print media, and via other less formal forms of education. Leaders should produce and distribute *factual* information. Presently, much of the educational activities undertaken by environmental groups have been "based more on emotion than fact" (Spranger 1989, p. 4). Because the analysis reported in Chapter 4 revealed that there was no significant difference in attitude between the two study groups and because Dunlap and Scarce (1991) reported that support for the environment is at an all-time high, there is no logical reason why educational efforts should continue to emphasize emotion over fact. Rather, education should deliver accurate, objective information about environmental issues and about what types of local actions can be taken to respond to the issues (Spranger 1989, p. 1).

Thus, two complimentary approaches to encouraging environmental activism are available to managers, administrators and community organizers. The first approach involves publicity both before and after an event. The first step is to inform people about the activity or event. For organizations with a limited budget for publicity, their best option is to concentrate their efforts on pre-existing organizations of environmentally-committed, well-educated people on the high side of middle age. By targeting the leaders of groups such as the Salt Pond Watchers, the organizing group can take advantage of existing formal and informal information dispersal mechanism. For groups with a larger budget and more time to spent on publicity, efforts should be made to canvas as great an area as possible with multiple forms of information. In this manner, information can be dispersed through a greater portion of society. Publicity should also be utilized to disperse information away from existing sympathetic audiences. Managers, administrators, and organizers can facilitate social dispersion by publicly recognizing the efforts of volunteers. Recognition also demonstrates respect for environmental activists.

In order to more effectively motivate non-active people to become involved, managers, administrators and community organizers should endeavor to increase factual knowledge. It is imperative that efforts be taken to increase knowledge. Knowledge initiates a cycle by giving reason to action. Action provides hope which, in turn, supports further action (Hynes 1990). As people grow to understand the relations between human activities and environmental responses, they will be more inclined to live environmentally-responsible lives.

• 7 •

Conclusion

This study was initiated to investigate the motivating factors behind environmental activism. The researcher was curious to know what factors contributed to the decision by each of forty-two individuals to participate in a beach clean-up. Towards this end, three hypotheses were investigated. First, it was hypothesized that clean-up participants would harbor pro-environmental attitudes. Second, it was hypothesized that participants would be relatively young, politically liberal, well-educated, and wealthy. Finally, it was hypothesized that particular types of social structure would influence a person's decision to participate in a beach clean-up. Specifically, it was hypothesized that participants at each clean-up location would be clique members and/or would be structurally equivalent.

In order to test the first two hypotheses, information about attitudes, knowledge, behavior, and socio-demographic attributes was elicited from each participant. Furthermore, in order to compare environmentally-active persons to the general public an additional forty-two people were surveyed at the Department of Motor Vehicles. None of the people interviewed at the DMV participated in the 1992 clean-up.

A student t-test was used to compare the mean affect (attitude) scores of the two study groups. Surprisingly, it was revealed that there was virtually no difference in attitude between the clean-up participants and the individuals interviewed at the DMV (refer to Table 1). The similarity in attitudes may be a manifestation of the all-time high level of environmental concern reported by Dunlap and Scarce (1991).

There were statistically significant differences between the clean-up participants and the DMV group in verbal commitment, actual commitment, knowledge, education, and age. Generally, the clean-up participants were more verbally- and actually

committed, more knowledgeable, better educated, and older than the people surveyed at the Department of Motor Vehicles. Except for age, all of these findings were consistent with the work of other researchers. Younger people have been traditionally associated with environmental activism (Van Liere and Dunlap 1980, Jones and Dunlap 1992). However, Howell and Laska (1992) found that age was no longer a factor in predicting support for the environment. Contrary to these findings, the clean-up participants were older than the admittedly small sample of the general public surveyed. The aging of the American population is one possible explanation for these unexpected findings.

Pearson's product-moment correlation coefficients were calculated as the next step in analysis. The first-order correlations for the two data sets combined indicated that older, better educated, knowledgeable people who expressed a high degree of affect and verbal commitment were more likely to express greater actual commitment. Stepwise multiple regression analysis was then run to determine how well combinations of independent variables could predict expressed actual commitment (dependent variable). A derived multiple regression revealed that age, education, and verbal commitment, in combination, explained 47.7% of the variance in expressed actual commitment. That is, in coastal Rhode Island, verbally-committed, better educated, older adults tend to express greater actual commitment.

The second portion of the study dealt with relational data. Information about social affiliations was collected from clean-up participants in order to investigate the influence of social ties on behavior (hypothesis #3). Analysis of the interview data revealed the existence of cliques and structural equivalency at each clean-up site. These findings support Erickson's (1988) assertion that attitude similarity is influenced by social structure. Recalling that affect (attitude) is correlated with actual commitment, it can be inferred that social ties influence behavior. In other words, it can be concluded that the existence of cliques and structural equivalency among a population does enhance the probability that members of that population will be inclined to act in a similar manner.

Cliques and structural equivalency were not the only models of social structure to impact behavior, however. At each clean-up location there were a number of participants who knew few, if any, of the other participants. With only two exceptions[3], these individuals were present because of the encouragement of family or friends. Thus, it is clear that the behavior of individuals is influenced by the desires of their social affiliates.

This research offers support for the first and third hypotheses and partial support for the second hypothesis (while clean-up participants were well educated, they were not especially young, liberal, or wealthy). In affirming these hypotheses, evidence was found to corroborate Knoke and Wright-Isak's (1982) findings that the primary motivations behind volunteerism are rational choice, normative conformity, and affective bonding processes. The clean-ups afford participants the opportunity to spent time with their loved ones (affective bonding) while doing something they find to be rewarding (rational choice) and socially acceptable (normative conformity).

The pattern of social structure at each beach was found to be associated with information source. At beaches where people learned of the clean-up through group membership, there was a greater degree of cohesion than at beaches where people learned about the clean-up through public media. Regardless of what the primary source of information was, secondary sources of information proved to be two and two-thirds times more effective at informing participants about the clean-up.

The objective behind identifying factors which motivate environmental activism was to learn how best to encourage environmentally-responsible behavior. Verbally-committed, well-educated people on the high side of middle age who have the support of their social associates should be the initial targets of publicity/educational campaigns because they are likely to be the most responsive audience. If resources are available, publicity should be planned to reach as great an audience as possible. Once an idea or

[3]The single man at East Matunuck and the man employed by the waste disposal company at South Kingstown

practice has been accepted by a portion of society, then social forces can be harnessed to disperse the commitment away from existing pockets of concern. Social dispersion can be facilitated by recognizing the efforts of volunteers after an event. A variety of mediums, including television, radio, and print, ought to be utilized so as to reach as great an audience as possible. However, dispersal of environmental commitment through social networks cannot be relied upon as the sole method to encourage non-active people to become active. An investment in education, with an emphasis on increasing *factual* knowledge, is a necessary component of any plan intended to produce wide-spread results. As people grow to understand the relations between human activities and environmental responses, they will be more inclined to live environmentally-responsible lives.

Glossary of Terms

Agent. The individual being discussed.

Adjacent. Two agents are adjacent if they are directly related to or connected with each other. Adjacency is represented by a line connecting two dots.

Alter. The individual in a dyadic relationship whose vantage point is not being considered.

Clan. A restricted clique in which the longest geodesic connect members of the clique is no greater than n. For example, all members of a 2-clan would be separated by no more than two lines.

Clique. Cliques are subgroups of the larger population composed of individuals who are more closely associated with each other than with the remainder of the population. All members of a 1-clique are directly adjacent to each other.

Comprehensive behavioral index. A survey instrument designed to measure the likelihood that a respondent will be involved with particular types of activities as opposed to determining which specific activities he or she will be involved with.

Degree. The number of points to which a particular point is directly connected.

Density. The proportion of the potential relations in a network that actually exist. The general level of linkage among points in a graph. Compares the actual number of lines in a graph with the total number of lines which would be present if the graph were complete.

Distance between two points. Equal to the length of the shortest path (the geodesic) between the points.

Dyadic. A relationship between two people.

Ego. The individual from whose vantage point a relationship is being discussed.

Geodesic. The shortest path connecting two points.

Incident. Each line is "incident" to two points. That is, each line is connected to two points.

Inclusiveness. Refers to the number of points included within the various connected parts of a graph. Equal to the total number of points minus the number of isolated points.

K-core. A maximal subgraph in which each point is adjacent to at least k other points: all the points within the k-core have a degree greater than or equal to k.

Maximal. Describes a graph that is "complete". No new members can be added without destroying the quality of connectedness.

Multiplex. A situation in which multiple types of relations exist between agents. For example, two women may be co-workers, neighbors, and friends.

Neighborhood. Points to which a particular point is adjacent.

Network structure. The pattern of relationships among actors (see social structure).

Path. A walk in which each point and each line are distinct.

Relational data. The ties and connections between actors.

Social comparison. Social comparison refers to the tendency of people to modify their attitudes based on comparisons to other individuals whom they consider to be similar to themselves.

Social structure. Describes the overall configurations of relations in a network (see network structure).

Sociogram. A figure that represents social structure.

Structural equivalence. Structurally equivalent actors are tied to the same people by the same types of relationships.

Subgraph. A portion of the whole graph.

Walk. A sequence of uninterrupted lines in a graph.

Appendices

A - Interview Guide and Record Sheet

B - Survey Instrument

C - Statements on Verbal Commitment Scale

D - Statements on Affect Scale

E - Statements on Actual Commitment Scale

F - Multiple Choice Questions Testing Knowledge

Appendix A - Interview Guide and Record Sheet

Personal Interview Beach _____ Interviewer _____

Hello, I'm XXX XXX from the University of Rhode Island. We are conducting a study of the reasons people chose to participate in environmental activities. Part of what we are looking at is the role that personal relationships have on environmental commitment. To this end, and with your consent, I will be asking you to name some fellow clean-up participants. In order to insure that I identify people correctly, I will need to ask you for first names and the first and last letter of people's last names. I want to assure you that all information will be kept confidential and that no real names will appear in the final report. Will you answer my questions?

- What is your name? GET FIRST NAME & FIRST AND LAST INITIALS OF LAST NAME _____

- Have you participated in the CMC clean-up before? Yes ____ No ____
  If YES, when? how many times?

  If NO, had you heard about the clean-up before? Yes ____ No ____
  - If YES, **What made you come this time?? Why didn't you come before?**

- **Why are you here?** - *(be sure to draw answers out - why?why?why?)*

- How did you first hear about today's clean-up? *(Interviewer, you don't necessarily need to list these possibilities - they are just some suggestions to prompt people)*
  ____ newspaper? (which one?)
  ____ radio? (what station?)
  ____ friend?
  ____ co-worker?
  ____ poster? (where)
  ____ other?

- Did you discuss the clean-up with anybody? Yes ____ No ____
  If YES, who? GET FIRST NAME & FIRST AND LAST INITIAL OF LAST NAME - *write on first line below*

- Are they here today? Yes ____ No ____
  If NO, how did they respond when you told them you were coming? *find out if they were generally supportive or not.*

- Did anybody [else] come with you today? Yes ____ No ____.
  Who? GET NAME - *write on line below*

- How many people here today do you know? (get each person's name, go onto additional sheet if more than five people are named, stop with 10 names)

For each person that was named, find out how the respondent is related to them (it's possible that a person may fall into more than 1 cat.)

_____	_____	_____	_____	_____
Spouse/Significant other	Spouse/Sig other	Spouse/Sig. other	Spouse/Sig. other	Spouse/Sig. other
parent	parent	parent	parent	parent
sibling	sibling	sibling	sibling	sibling
child	child	child	child	child
other family	other family	other family	other family	other family
co-worker	co-worker	co-worker	co-worker	co-worker
member of group	memb o' group	memb o' group	memb o' group	memb o' group
neighbor	neighbor	neighbor	neighbor	neighbor
friend	friend	friend	friend	friend
advisor	advisor	advisor	advisor	advisor
other - specify	other - specify	other - specify	other - specify	other - specify
don't know	don't know	don't know	don't know	don't know
Is the tie				
strong	strong	strong	strong	strong
moderate	moderate	moderate	moderate	moderate
weak	weak	weak	weak	weak

Appendix B - Survey Instrument

Because of your participation in the clean-up, you appear to be an environmentally-conscious person. As such, I would appreciate your honest response to the following questions.

For this first section, assume that we live in an ideal world in which each of the following options is available and would produce the desired result.

In order to help reduce environmental degradation, I would be willing to: [check all that apply]

_____ ride a bicycle or take the bus to work.
_____ drive a car fueled by natural gas.
_____ pay a 5¢ deposit on beverage containers in order to promote recycling.
_____ donate a day's pay each year if I knew it would help improve environmental quality.
_____ stop buying products from companies guilty of producing excessive amounts of pollution.
_____ write my congressperson weekly concerning ecological problems.
_____ go house to house distributing literature on the environment.
_____ pay a gas tax to discourage reliance on fossil fuels.

Please check the following statements with which you **AGREE**.

_____ In general, people do not demonstrate an adequate level of concern for environmental quality.
_____ It frightens me to think that much of the ocean is contaminated.
_____ It genuinely infuriates me to think that the government doesn't do more to help control pollution of the environment.
_____ Today's children will suffer as a result of environmental degradation.
_____ I become incensed when I think about the harm being done to plant and animal life by pollution.
_____ I get mad when I find a lot of trash on the beach.
_____ When I think of the ways industries are polluting, I get frustrated and angry.
_____ I worry about the effects of pollution on myself and/or on my family.

Please place a check beside all of the following statements which are **TRUE** for you.

_____ I keep track of my representative's and senator's voting records on environmental issues.
_____ I have written a congressperson concerning environmental problems within the past year.
_____ I have chosen to buy a particular product because it is less polluting than other similar products.
_____ I make a special effort to buy products packaged in recycled material.
_____ I recycle on a regular basis.
_____ I have switched products for environmental reasons.
_____ I am a member of an environmental group. Which one(s)? _____

Appendix B (continued)

I am curious to learn how knowledge of the marine environment is related to environmentally positive action. Please circle the best answer to each of the following questions.

The leading source of oil pollution in the oceans is
a. commercial shipping.
b. urban runoff.
c. tanker spills.
d. suntan oil.
e. do not know

What is the harmful effect of phosphates on marine life?
a. causes cancer
b. renders fish sterile
c. induces nervous reactions in fish
d. fosters an explosive growth of algae
e. do not know

The best season to catch bluefish from the shore is
a. Winter.
b. Spring.
c. Summer.
d. Fall.
e. do not know

Plastics can take up to _____ years to decompose in the marine environment.
a. 2
b. 200
c. 400
d. 1,000
e. do not know

Plastics in the ocean can
a. strangle marine life.
b. be mistaken for food by marine life.
c. interfere with boat propellers.
d. all of the above
e. do not know

Piping plovers
a. are a type of insect.
b. feed in the surf zone.
c. contribute to global warming.
d. nest along rocky shores.
e. do not know

MARPOL Annex V regulates the disposal of
a. oil.
b. toxic chemicals.
c. radioactive waste.
d. plastics.
e. do not know

During a full moon
a. tides are extremely high and low.
b. tides are not effected.
c. the chance of flooding is reduced.
d. there will be an on-shore breeze.
e. do not know.

Personal characteristics - Again, I want to assure you that this survey is entirely confidential

Age? _____
Sex? _____
Highest level of education attained?
_____ did not complete high school
_____ completed high school
_____ technical training/certification
_____ Associates degree
_____ Bachelors degree
_____ Graduate or professional degree
Town of residence? _____
Would you describe your neighborhood as rural, suburban, or urban?
_____
Would you consider yourself politically liberal, conservative, or middle-of-the-road? _____
What is your occupation? _____
What is your spouse's occupation (if applicable)?
_____
Annual household income?
_____ under $5,000
_____ 5,000 to 19,999
_____ 20,000 to 34,999
_____ 35,000 to 49,999
_____ 50,000 to 64,999
_____ 65,000 to 79,999
_____ 80,000 to 94,999
_____ over 95,000

What do you consider to be the most important aspect of this beach clean-up?
_____ Community involvement
_____ The potential to influence policy
_____ The beach is left cleaner
_____ Public education
_____ Other? (please specify)

Thank you for your participation in this study. I greatly appreciate your assistance and would be pleased to read any comments that you may have.

Appendix C - Statements on Verbal Commitment Scale

In order to help reduce environmental degradation, I would be willing to:

- ride a bicycle or take the bus to work.
- drive a car fueled by natural gas.
- pay a 5¢ deposit on beverage containers in order to promote recycling.
- donate a day's pay each year if I knew it would help improve environmental quality.
- stop buying products from companies guilty of producing excessive amounts of pollution.
- write my congressperson weekly concerning ecological problems.
- go house to house distributing literature on the environment.
- pay a gas tax to discourage reliance on fossil fuels.

Appendix D - Statements on Affect Scale

- In general, people do not demonstrate an adequate level of concern for environmental quality.
- It frightens me to think that much of the ocean is contaminated
- It genuinely infuriates me to think that the government doesn't do more to help control pollution of the environment.
- Today's children will suffer as a result of environmental degradation.
- I become incensed when I think about the harm being done to plant and animal life by pollution.
- I get mad when I find a lot of trash on the beach.
- When I think of the ways industries are polluting, I get frustrated and angry.
- I worry about the effects of pollution on myself and/or on my family.

Appendix E - Statements on Actual Commitment Scale

- I keep track of my representative's and senator's [sic] voting records on environmental issues.

- I have written a congressperson concerning environmental problems within the past year.

- I have chosen to buy a particular product because it is less polluting than other similar products.

- I make a special effort to buy products packaged in recycled material.

- I recycle on a regular basis.

- I have switched products for environmental reasons.

- I am a member of an environmental group. Which one(s)?

Appendix F - Multiple Choice Questions Testing Knowledge

- The leading source of oil pollution in the ocean is... (a. commercial shipping. b. urban runoff. c. tanker spills. d. suntan oil. e. do not know)

- What is the harmful effect of phosphates on marine life? (a. causes cancer b. renders fish sterile c. induces nervous reactions in fish d. fosters an explosive growth of algae e. do not know)

- The best season to catch bluefish from shore is... (a. winter. b. spring. c. summer. d. fall. e. do not know)*

- Plastics can take up to ____ years to decompose in the marine environment. (a. 2 b. 200 c. 400 d. 1,000 e. do not know)

- Plastics in the ocean can... (a. strangle marine life. b. be mistaken for food by marine life. c. interfere with boat propellers. d. all of the above. e. do not know)*

- Piping plovers... (a. are a type of insect. b. feed in the surf zone. c. contribute to global warming. d. nest along rocky shores. e. do not know)*

- MARPOL Annex V regulates the disposal of... (a. oil. b. toxic chemicals. c. radioactive waste. d. plastics. e. do not know)

- During a full moon... (a. tides are extremely high and low. b. tides are not effected. c. the chance of flooding is reduced. d. there will be an on-shore breeze. e. do not know)*

* An astric marks those questions which the researcher felt would be relatively easy for coastal residents to answer correctly.

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