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Analysis of an innovative adult education program: the case of Agriculture and Environment

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Analysis of an innovative adult education program: The case of Agriculture and Environment

by

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CHAPTER I: INTRODUCTION AND OBJECTIVES

Since passage of the Smith-Lever Act of 1914, the Cooperative Extension Service has become known as the major institution for adult education. Extension has earned this recognition with its efforts in teaching agricultural practices necessary to achieve efficient agricultural production. During the past two decades it has developed competence in areas other than agricultural production, but agricultural education continues to receive high priority.

For about forty years, federally funded institutions such as the Soil Conservation Service (SCS) have been working on educational and technical assistance programs in soil and water conservation. Their goal was to protect the environment so as to maintain long-term productivity of agricultural land. Recently the increased general awareness of and concern about environmental problems caused SCS programs to change and gave birth to new programs. Included in the new programs are: the passage of the Iowa Conservation Act, the promulgation of U.S. Environmental Protection Agency (EPA) guidelines on agricultural and feedlot pollution, and the cancellation and subsequent modification and reinstatement of the Rural Environmental Assistance Program (REAP). The EPA programs shifted attention from soil and water conservation to pollution abatement; from on-site to off-site damages; and from education and incentive payments to punitive sanctions.

Statement of the Problem

In an attempt to help farmers cope with these changes, agricultural educators are confronted with three major questions: "To what extent are farmers aware of changing program emphases?" "How are farmers responding to these changes?" and "What can be done to achieve desired responses?" Previous research indicates that while struggling for major successes, conservationists and extension agents for nearly four decades have not achieved their self-assigned goals. A recent Conservation Needs Inventory (1970) showed that only about half the practices which experts recommended as being needed on Iowa farms have actually been implemented. Furthermore the problem is becoming greater with the all-out push for agricultural production of row crops.

Psychologically, farmers are not well prepared to cope with the changing program emphases. Research shows that farmers feel that conservation is aimed almost exclusively toward preventing on-site damages, and they hold ambivalent attitudes towards who is financially responsible for pollution control. This situation suggests strongly that most farmers need a new set of concepts to be able to deal efficiently with changing conservation/pollution abatement programs and to understand the rationales for their being asked to comply with environmental protection programs.

This dissertation is part of a larger, five-year study conducted under Iowa Home Economics and Agriculture Experiment Station projects 1921 and 2009. The overall objectives of the larger study were as follows: (1) To measure the current state of farmers' general value structures, attitudes, and behavioral patterns on conservation/pollution abatement; (2) to measure changes in these phenomena as new programs are introduced; and (3) to implement a field experiment to test techniques for communicating information about problems associated with agricultural effects upon water quality.

This is the third major paper to be written from the project data. Steyn's (1972) Master's thesis dealt with an analysis of the prior situation. From this, she developed a "Communication Strategy based on Audience Analysis." Persinger (1975) completed a Master's thesis in which he spelled out the rationale for the experimental communication program on "Agriculture and the Environment." Persinger, along with Graduate Student Steve McMahon, was largely responsible for development and implementation of this educational attempt. The present dissertation directs its attention to the experimental information program's evaluation.

The Educational Program Studied

Steyn's (1972) analysis indicated that new ways of conceptualizing problems are probably needed in dealing with such environmentally-related problems as agricultural effects upon water quality.

A goal of the program analyzed in this dissertation was to communicate such a new set of general environmental concepts to farmers, so they could make sound decisions about the environment in their farming operations. In short, the concepts to be communicated in this program were designed to help farmers form a new theoretical framework. The definition of the "Theoretical Framework" and explanation of its differences with conventional extension educational efforts will be dealt with in the dissertation.

An important way of looking at common goals of various persuasive communication programs is provided by Bloom's (1956) Taxonomy of Educational Objectives. The section of the taxonomy dealing with knowledge applies to such programs. A fuller discussion of these concepts will be found in Chapter II of this dissertation.

Bloom (1956) classified knowledge into three categories: knowledge of specifics, knowledge of ways and means of dealing with specifics, and knowledge of the universals and abstraction in a field. In this dissertation Bloom's third category, knowledge of the universals and abstraction in a field, is of great importance. Bloom contends that this level of knowledge is the most difficult for students to acquire and, consequently, is the level most often ignored by teachers. To further complicate this situation, the "Agriculture and the Environment" program studied in this dissertation attempts to teach such concepts through a modified form of mass communication.

Mass communication techniques have the advantage of being able to reach a great number of farmers within a short time at low cost. However, research in the communication of technical information indicates mass media -- as conventionally used -- have been largely unsuccessful in imparting new understanding of involved concepts. (Although the classroom teaching of universals and abstractions is difficult, there is evidence that it can be accomplished in such interaction situations.) A major assumption of the program being evaluated was that this failure is a function of the ways mass media have been used. It does not represent an inherent limitation of the mass media themselves. Therefore a major purpose of this dissertation will be to examine responses to a series of experimental communication situations which systematically vary the content of messages and the journalistic treatments given these contents. An attempt will be made to determine the effectiveness of various combinations of manipulations for respondents with varying dispositions to receive the messages. The long-term theoretic contribution of the experiments should be to increase our general understanding of how and why receivers respond to communication. The more immediate and pragmatic pay-off should be to increase our understanding of how to effectively communicate complex subject matter -- a problem with which the research, teaching, and extension divisions of land-grant colleges and agricultural agencies are increasingly involved.

Dissertation Objectives

The purpose of this dissertation is to investigate a generalized model which will account for individual's response to selected communication messages. The specific objectives of the dissertation are:

1. To examine the problems of changing attitudes and behavior by imparting knowledge. Special emphasis will be given to a review of related research on the use of mass communication in such efforts.

2. To describe how the "Agriculture and the Environment" information program was organized in attempt to overcome limitations found in previous communication programs.

3. To develop a model to analyze audience responses to "Agriculture and the Environment" program.

4. To test under field experimental conditions the hypotheses generated from the evaluation model.

5. To discuss the findings of these tests and to draw implications for future communication programs.

CHAPTER II: COMMUNICATION OF NEW THEORETICAL FRAMEWORKS

As stated, the major goal of the educational program being evaluated was to communicate a new set of environmental concepts to farmers, so they might make sound decisions about the environment in their farming operations. Unlike many other persuasive programs, the concepts to be communicated in this program were intended to provide a new theoretical framework. The definition of the new theoretical framework and its difference will be explained next.

An important way of looking at common goals of various persuasive communication programs is provided in Bloom (1956). The section of the taxonomy which deals with knowledge applies to such programs. Its outline is presented in Figure 1.

I. Knowledge of specifics

   A. Knowledge of terminology
   B. Knowledge of specific facts

II. Knowledge of ways and means of dealing with specifics

   A. Knowledge of conventions
   B. Knowledge of trends and sequences
   C. Knowledge classification and categories
   D. Knowledge of criteria
   E. Knowledge of methodology

III. Knowledge of the universals and abstraction in a field

   A. Knowledge of principles and generalizations
   B. Knowledge of theories and structures

Figure 1. Levels of knowledge.

Overview of Bloom's Framework

Knowledge includes ". . . behaviors and test situations which emphasize the remembering, either by recognition or recall, of ideas, materials, or phenomena" (Bloom, 1956:62).

Knowledge also includes organization and reorganization of a problem in such a way that it provides the appropriate signals and cues for the information and knowledge the individual possesses. The arrangement of knowledge objectives is from the specific and relatively concrete types of behaviors of the audience to the more complex and abstract ones. Thus, the knowledge of specifics deals with types of information or knowledge which can be isolated and remembered separately, while the knowledge of universals and abstractions put emphasis upon the interrelations and patterns in which information can be organized and structured (Bloom, 1956).

Knowledge of specifics

The first order of "objective of knowledge" includes the recall of specific and isolated bits of information. Primarily it deals with the "hard core" of facts or information in each field of knowledge. This information represents the elements that the specialist uses in communicating about his field, in understanding it, and in organizing it systematically. Such specifics are the basic elements that the student or learner must know to be acquainted with the field or to solve any of the problems in it. Usually, these specifics carry with them symbols which have some concrete referents and are, for the most part, at a relatively low level of abstraction. As knowledge in the sciences and the humanities increases, the specialists, themselves, find it difficult to keep up with all the new specifics that are found or developed in the field. Specifics are serviceable to people working in the field in the very form in which they are presented because they need little or no alteration from one use or application to another (Bloom, 1956).

The second category of specifics is the "knowledge of terminology." This kind of knowledge includes the most accepted symbol referent, knowledge of the variety of symbols which can be used for a single referent, or knowledge of the referent most acceptable to a given use of a symbol (Bloom, 1956). Each field has a large number of symbols, either verbal or non-verbal, which have particular referents. These represent the basic language of the field -- the shorthand used by the workers in a field to express what they know. When the workers want to communicate with others about certain things within the field, they find it easier to use some of the special symbols and terms that they have constructed. The learners must become cognizant of these terms and symbols and must learn the commonly accepted definitions or meanings to be attached.

Knowledge of ways and means of dealing with specifics

The second order of knowledge involves ways and means of dealing with specifics. Included in this category are ways of organizing, studying, judging, and criticizing ideas. Each subject field has a body of techniques, criteria, classifications, and forms which are used to discover specifics as well as to deal with them once they are discovered. They differ from the specifics in that they form the connecting links between specifics, the operations necessary to establish or deal with specifics, and the criteria by which specifics are judged and evaluated. The behavior involved here is limited. It does not involve actual use of the ways and means so much as it does a knowledge of their existence and possible use (Bloom, 1956). The knowledge here signifies how workers in the field think and attack problems rather than the results of problem solving. Although this class does not differ significantly from knowledge of specifics, it appears very likely that the students will find it difficult to learn this knowledge because of its higher level of abstraction.

Five subclassifications of ways and means of dealing with specifics are subsumed under this category of knowledge. First, "knowledge of conventions" involves ways of treating and presenting ideas and phenomena. These ways include the usages, styles, and practices which are engaged in a field because the students find them suitable for their purposes and their subject matter.

Second, "trends and sequences" includes processes, directions and movements with respect to time. It involves analyses which attempt to show the interrelationships among a number of specific events separated by time. It is also a representation of processes which may involve time as well as causal interrelations of a series of specific events. Trends and sequences are those relationships and processes which have been selected by the students in the field. Many of them may be difficult to communicate because of their dynamic actions, processes, and movements which are not completely represented by static verbal, graphic, or symbolic forms. Learning trends and sequences may present difficulty unless the learners are familiar with the specifics on which such trends and sequences are based.

Third, "classifications and categories" refers to the knowledge of classes, set, divisions, and arrangements which are basically useful for a given subject field, purpose, argument, or problem. As a subject field, problem, or topic becomes well developed, the students working on it will find it helpful to develop classifications and categories which aid to structure and systematize the phenomena. The individual student is expected to know these classifications and to know when they are appropriate.

Fourth, "criteria" refers to evaluation. This implies knowledge of criteria by which facts, principles, opinions and conduct are tested or judged. Here again is a systematization which is found useful by students attacking the problems of a field. Students are expected to make use of the criteria as well as to have a knowledge of them. The criteria will vary markedly from field to field.

Finally, "methodology" includes the methods of inquiry in a particular subject field. It also includes methods of investigation of particular problems and phenomena. The emphasis is on the individual's knowledge of the methods rather than on his ability to use the methods. However, the student is required to know about methods and techniques and to know the ways in which they have been used (Bloom, 1956).

Several mass communication strategies stop at this level. They will provide relevant terminology and facts, and state how to organize those facts dealing with a specific problem and how to use the facts in attacking the problem. They shy away, as Bloom states, from dealing with the "major ideas, schemes, and patterns, by which phenomena and ideas are organized" (Bloom, 1956:76). They disregard "the large structures, theories, and generalizations which dominate a subject field or which are quite generally used in studying phenomena or solving problems" (Bloom, 1956:75). They fail to communicate the theoretical frameworks, which help to put together a large number of specific facts and events and describe the processes and interrelations among these specifics. The theoretical frameworks also enable the students to organize the total picture in a parsimonious form.

Knowledge of the universals and abstraction

The third order of knowledge includes two categories of universals and abstraction. "Principles and generalizations" refers to the knowledge of particular abstractions which helps us to summarize an observation of an event. These abstractions are found valuable in describing, explaining, predicting, and determining the correct and relevant action to be taken. "Theories and structures" implies that a set or body of principles and generalizations are interrelated to provide a clear, and systematic view of a complex issue, problem, or field.

These concepts are often ignored or left out, perhaps because the ideas and plans tend to be broad and are rather difficult for students to comprehend and communicate. They are difficult because many times the audience is not well acquainted with the issue or phenomena that the universals are intended to summarize and organize. These concepts are the most abstract formulations. As such, they are used to show the inter-relation and organization of a great range of specifics (Bloom, 1956). This situation is parallel to our current study because of the newness of emphasis on environmental programs and its relation to agriculture. Past communication programs had focused on soil conservation, but recently they began to include environmental concerns. But the level of environmental knowledge can be considered as specifics or ways and means of dealing with specifics. "Pollution" for example, is a relatively new attachment of agriculture. In some cases, agricultural pollution laws have now become a significant fact of the agricultural scene. Conservation programs include these environmental specifics because conservation practices serve as a major guarantee to control agricultural pollution.

As it has been indicated earlier, new specifics alone generally do not generate significant voluntary change. Steyn's (1972), audience analysis indicates that most farmers do not begin to think about changing environmental behavior voluntarily <u>until</u> they are acquainted with the environmental principles and generalizations and their relationships. They want to know how and why many farming operations (or lack of them) can cause serious environmental problems (Steyn, 1972). Therefore, an approach which laid emphasis on the environment and included the levels of the knowledge objectives was used.

Related Research

A review of research on previous communication programs which had goals similar to this one is discouraging. In 1960 Klapper indicated that persuasive mass communication often promotes reinforcement rather than change. He pointed out that "within a given audience exposed to particular communications, reinforcement, or at least constancy of opinion, is typically found to be the dominant effect. Minor change, as in intensity of opinion, is found to be the next most common; and conversion is typically found to be the most rare" (Klapper, 1960:15).

This does not mean that major changes and conversions do not occur, or that under particular conditions that they may not be widespread. But by comparison they are rare because persuasive mass communication tends to focus more heavily on the interests of reinforcement and of minor change. Persuasive mass communication has been found on different occasions, to create attitudes, to reinforce or modify existing attitudes. "It communicates facts, or even changes opinions on certain factual matters, without creating the more basic attitude changes that the facts were expected to produce" (Klapper, 1960:84).

In a number of these programs the audience either fails to see the problem, or perceives it to be unimportant. Studies show that the social process underlying audience decision-making are important. The communicator must be aware of the audience culture and their positions in a social system. He knows that he cannot change the audience personalities, group affiliations of audience members, and their customary modes of behavior which affect the ways they receive and interpret messages. So he must deal with knowledge, which poses the question "at what level?" If the audiences do not know the code, they cannot understand the message. If they do not know anything about the content of a message, they probably cannot understand it either. If they do not understand the nature of the communication process itself, the chances are good that they will misperceive messages. This can lead them to make incorrect inferences about the purposes or intentions of the source, and fail to operate in what may be their own best self-interest.

The research shows that something more than specifics and ways and means of dealing with specifics is needed. Communication of the "universals and abstractions" is considered to be appropriate because the audiences need a new framework which will help them to view the problem. Adoption-diffusion research provides evidence of this need. Adoption is fastest by those who have the most adequate theoretical frameworks. Several studies conducted in adoption diffusion showed that earlier adopters have more education, a greater ability to deal with abstractions, greater rationality, and more favorable attitudes toward change, risk, education, and science than later adopters (Bohlen, 1964).

Perhaps the best description of the programs involved here is "preventive communication." Studies in numerous areas also illustrate the ineffectiveness of communication of facts. Successful transfer of information or even opinion change often causes little or no change in behavior. Areas of study which will be reviewed in this thesis include family planning, presidential campaign, community shelter planning (civil defense), anti-discrimination, dental health, and smoking and health.

Family planning

The development of a national program on family planning started in Japan and India in 1952. In 1972 reports showed that fifty-four of the world's less developed nations had family planning programs or policies. The reports indicate that India has the largest family planning program in the world. Rogers (1973) reviewed the effectiveness of India's program. In many cases the audiences are aware of family planning methods and hold favorable attitudes towards the ideas, but the levels of adoption are much lower. This suggests that there is a large "KAP-gap" or the spread between knowledge, attitudes, and practice. Seventy-five to 90 percent of the adults surveyed in India have sufficient knowledge about family planning, and most of these hold favorable attitudes. However, only 8 per cent adopted the methods.

Like India, the majority of the highly populated nations have shown no downward shift in fertility rates because of a family planning program. While five small developing nations showed a decreased rate, 48 nations showed no change (Rogers, 1973). Rogers contends that the communication programs employed in family planning are based on false assumptions. The most common false assumption is that "national population policy goals can be reached if family planning programs can provide contraceptive services and conduct information activities, without implementing social structural and institutional changes to provide motivation for acceptance of the small family norm" (Rogers, 1973:406). This assumption is false because it is based on improper conclusions from early experiences with the receptive portions of the audiences in various countries and from experience in the Western countries, where motivation for the small family norm already is established (Rogers, 1973).

According to Rogers:

> The major function of family planning communication activities should not be to persuade, to convince, to motivate overt behavioral change. It should not be to inform. The wrong assumption of family planning officials is that awareness-knowledge automatically causes motivation. It does not (Rogers, 1973:288).

This implies that these programs must start with universals and abstractions, especially principles and generalizations. It calls for more than knowledge of "how-to" because people in most cases are aware of methods but have problems with practice. The knowledge of "how-to" is inadequate. Rogers states:

> It will be necessary to develop cognitions of a still deeper kind, even more difficult to accomplish: Those dealing with 'principles' knowledge -- these principles are difficult to teach. . . but the result of higher levels of principles knowledge will be higher 'quality' adoptions (Rogers, 1973:290).

Several studies and experience show that the audience must not be thought of as a "heterogeneous whole." Planners must segment the audience into "smaller homogeneous sub-audiences." A nice way to segment the audience is to determine the receptive and the resistant portions. In the case of family planning, the receptive sub-audience has, in many cases, been "used up." Rogers then feels it is necessary to move into beyond family planning policies in order to provide motivation for the small family norm among the hard core resistant audience. He therefore recommends a wider and different role for communication strategies in solving population problems. The communication strategies must put into an account motivation and information levels, and must provide convincing arguments for small families (Rogers, 1973).

In dealing with a resistant audience, Rogers recommends that "traditional" mass media channels, which have the ability to reach such an audience, be used. He suggests that the media must convey theoretical lessons and not specifics alone. The messages must deal with the positive experience of a satisfied user. A message aimed at the male audience should emphasize the economic advantages of the small family. The overall framework, of course, is the happiness and well-being of small families (Rogers, 1973).

Presidential campaign studies

A study by Lazarsfeld et al. (1948) focused on the effect of pre-election campaigns upon residents of a northeastern U.S. county. They found that out of 600 respondents whose vote intentions were ascertained in May (before the national conventions in October), the exposure to the intervening months of campaign propaganda had reinforced the original pre-campaign intentions among 53 per cent of the respondents. About 26 per cent switched from adherence to a particular party to "undecided," or from "undecided" to a particular party. Only 5 per cent were found to have been converted and have crossed party lines.

Berelson et al. investigated the decision-making processes of voters in Elmira, New York during the presidential campaign of 1948. Respondents were classified along a five-point scale, ranging from "strong Republican," to "strong Democrat." Their position on the scale in June was compared, by panel procedures, with their position in August, and their position in August was, in turn, compared with their position in October. They found that reinforcement, modification, and conversion occurred. Between June and August, about 66 per cent of a panel of 760 respondents maintained their original party adherence. About 17 per cent wavered between a given party and "neutral" or vice versa, and only 8 per cent were actually converted (Berelson *et al.*, 1954). During the second half of the campaign, the incidence of reinforcement was about the same (68 per cent), and that of conversion even lower (3 per cent).

In these studies, the people who were more highly exposed to the campaign were found to be more selective in their exposure and to be less likely to undergo conversion than were those who were less highly exposed.

Community shelter planning

Yarbrough *et al.* analyzed community shelter planning in three Iowa communities and found that there is a need for new approaches in a mass communication situation. He and his associates looked at the program development and its impact on the public. The goal of the programs is to make plans for efficient use of available fallout shelters and inform citizens where they should go for their shelters. "Conventional" mass communication techniques used include booklets, pamphlets, training courses, and publicity releases (Yarbrough *et al.*, 1972).

Yarbrough found that the Office of Civil Defense communication programs of 1956 failed to change the public's understanding about the technical issues and basic principles involved in the nuclear war threat and the civil defense response. The study suggested that the ways in which the communication techniques used are structured made them incapable of communicating new ideas. The study also included analysis of the effect of the audience predispositions. The findings showed that the most favorable response to new inputs comes from those who know the most and are most advanced in the adoption process. Thus, reinforcement with little change existed. In conclusion, Yarbrough said that "radical changes" in message treatment were needed to accomplish the intended objectives of the communication programs. At the same time, he cautioned that the low salience of the civil defense issue would perhaps prevent major increases in adoption rates, but knowledge levels could be increased (Yarbrough _et al._, 1972).

Anti-discrimination

An anti-discrimination film, entitled "Don't Be A Sucker" was shown to a group of 1,000 high school students. The students were divided into control and experimental groups. The objective of the film was to discourage people from prejudiced attitudes and behavior by showing the students facts about discrimination. They provided a detailed portrayal of how Hitler had set one minority group against another, to the eventual detriment of all, and hoped that the audience would see the moral of the tale and recognize the parallel between the German scene and the American scene. Cooper and Dinerman reported that a notable proportion of the experimental group accepted these messages about Nazi Germany, yet the attitudes of the group as a whole were not influenced. Prejudice remained as common among the test audiences as among the control group which had not seen the picture, and as common among those who accepted the messages as among those who did not accept the messages (Cooper and Dinerman, 1951).

Hovland et al. studied the effects of various communications on American soldiers during World War II. They had a control group and between 500 to 1,000 soldiers served in each of the several experimental groups. The communication study which is reviewed here was a film entitled "The Battle of Britain." The film objectives were (1) to communicate facts about the background of the war, which were intended (2) to induce in the soldiers more favorable opinions and attitudes relative to American participation. The opinions and attitudes, in turn, were intended (3) to increase the soldiers' motivation and willingness to serve.

Hovland et al. reported that the films differed in effectiveness in achieving various objectives. The films were also found to be successful in communicating facts about events that led up to the war. On the other hand, the film was almost entirely ineffective in changing "general attitudes toward the British" or toward American participation in the war. Such topics were not explicitly treated in the film, but the facts presented were expected to influence such opinions. The films also appeared to be totally ineffective in changing "the men's motivation to serve as soldiers, which was considered the ultimate objective of the program (Hovland et al., 1949).

The findings of Cooper and Dinerman (1951) are in general accordance with those of Hovland and his associates. In both cases the success of the films decreased steadily as the effect sought became less a matter of communicating objective facts and more a matter of changing attitudes. The films communicated information, but they accomplished no attitude or behavior change.

Dental health

Cohen and Lucye (1970) conducted a large number of studies on KAP-gap in grade school and high school. The program studied involved a series of lectures and hand-outs dealing with tooth structure, the decay process, and the number of teeth in the mouth. The study showed that the knowledge levels were adequate but the practice (tooth-brushing) was much lower. This study contradicts the assumptions of the "Agriculture and the Environment" program. The dental health study holds that knowledge of specifics alone changes behavior. Our present study holds that knowledge of the universals and abstractions in a field is needed in addition to knowledge of specifics.

Although part of this knowledge, particularly tooth structure and decay process, are assumed to be part of the theoretical level, a problem still existed. The children in the dental study seem to consider such content as being very irrelevant. Corliss's study showed that children in grades 4, 5, and 6 are not interested in the topics covered in dental health materials, but show interest in how to brush their teeth properly (Corliss, 1962).

Instead of a specific information approach, Cohen and Lucye used a "behavioral" approach. The behavioral approach calls for active participation of the audience through role-playing and daily classroom practice in toothbrushing. One program used students, teachers, administrators, and local dentists to carry messages to aid in making group decisions, and to reinforce the messages. Gravelle _et al._ points out that the program was more effective in changing behavior than a "typical" program (Gravelle _et al._, 1967).

Cohen and Lucye questioned the inability of the "traditional" approach with one-way communication from professional to client in changing behavior. They strongly suggest that the programs become part of the life of both professional and client in a cooperative relationship (Cohen and Lucye, 1970).

Making the communication system two-way is a logical recommendation for dental health programs, which have been basically interpersonal in the past. At the same time, the active group approach is very important in building commitments and in giving the children the appropriate basic framework in which to view and act on dental health problems.

Lewin noted that one of the means of gaining acceptance of ideas is through an "in-group," a group in which the members feel "belongingness." He also pointed out that under certain circumstances, the individual accepts the new system of values and beliefs by accepting belongingness to a group" (Lewin, 1948:67).

Smoking and health

In 1960, several studies reported that educational campaigns based on providing information about harmful effects of smoking were found ineffective in changing behavior. Briney confirmed that "anti-smoking programs appear to be based upon the premise that persons possessing factual knowledge about the ill effects of smoking will tend not to smoke." He studied the relationship between knowledge and behavior of high school seniors. Briney found no relationship for the boys but a positive relationship for girls (Zagona, 1967).

A study of 4800 Philadelphia parents indicated that they all wanted to quit smoking at a clinic. The study reported that less than 6 per cent attended meetings which were designed to give information, and only 3 per cent actually made it to the clinic (Zagona, 1967). In Chicago, a study found that an attempt to quit smoking was associated with physical ailments, heavier consumption, less supportive interpersonal environments (especially wives) unfavorable attitudes towards smoking, and a non-fatalistic outlook (Zagona, 1967). Each of these factors except the attitudes is independent of outside communication efforts.

The National Clearinghouse for Smoking and Health, with the San Diego Medical Society and other agencies, conducted a study in San Diego and Syracuse in 1960. Laboratory projects included youth education programs, involvement of health professionals, adult volunteer programs, and work with mass media (National Interagency Council on Smoking and Health, 1970). The project is continuous, but results of the first five-year period show that the percentage of males who quit in the experimental communities is about the same as the national rate (about one-third). Fewer women quit, but the rate in San Diego was higher than the national average. The number of smokers in grades 7 through 12 dropped. There were large changes in the percentage of boys smoking, but the rate for girls increased (National Clearinghouse for Smoking and Health, 1974).

Leventhal conducted a number of intervention studies at the national, community, and school levels and found most of them to be ineffective. He looked at the "laboratory" experiments and found that role-playing is a little better than other procedures. In his studies he indicated that the use of a doctor as a communicator "one-on-one" yield profitable results. Leventhal, therefore, emphasized the need to understand smoking behavior and not just striving for its elimination. He cautioned, however, that such knowledge might not help the communicator to change his audiences' behavior (in Borgatta and Evans, 1968).

The national picture up to 1970 showed that cigarette consumption was slightly down from the level just prior to the Surgeon General's Report of 1964. The 1970 report did not show any significant decrease when compared with the report published before the cancer scare began in 1953 (National Interagency Council on Smoking and Health, 1970).

But in terms of smoking behavior Beal notes there has been a substantial decline in the percentage of adult Americans who smoke, from approximately 60% in 1958-1959 to thirty-three percent in 1975 (Beal, 1976:4).

These findings indicate that overall the smoking campaign was effective because fewer adult Americans are smoking now than in the past.

The negative attitudes toward smoking behavior have led to recommendations of new approaches and some attempts to put them into practice. McKennell noted that a review of British research on smoking behavior suggests that:

> rather than short-term persuasion on lung cancer or any other single theme, the aim of dissuasive health education is best conceived as a long-term one, operating to influence the climate of opinion within which smoking behavior is viewed as socially acceptable (in Borgatta and Evans, 1968:162).

An experiment that shows a negative attitude of high school boys toward smoking behavior also indicated a need for similar new approaches. After reviewing the study, it was suggested that planners begin programs in earlier grades which will call for students involvement, and to develop ways to change adult and community attitudes toward smoking (Monk *et al.*, 1970). The results of the recent study that used this new approach were more satisfactory. The study involved class discussions, dissection of animal tissues, and demonstrations by health professionals to make the learning process more stimulating for the elementary and junior high school students. The teachers, pupils, and parents received the programs with great interest. As a result of the study, knowledge levels of the children increased tremendously and the preliminary studies showed lower smoking rates (Davis, 1973).

Summary of prior studies

The communication approaches in each case reviewed depended on a particular situation, yet they have certain elements in common. They can be termed as preventive communication. The studies pointed out that communication of facts alone is inadequate to change attitudes and behavior of the audiences. Studies of technical subjects, such as civil defense, indicate that a conventional approach may not even get the facts across to the audience very successfully. In some cases low salience was a problem because the issues did not fit the needs of the audience. Several times the audience failed to recognize some issues as problems. Therefore, recommended solutions vary from communication of more abstract kinds of knowledge to more active audience participation or other interpersonal factors. The need to understand the social processes underlying decision-making by the audience must be considered. The climate of opinion that makes actions desirable or undesirable must be put into an account. A communicator may seek to change behavior by changing a social norm (e.g., making the small family socially desirable), or he may try to reinforce an existing norm (e.g., encourage vaccination as something that "every good mother" should do for her children). These approaches deal with universals and abstractions and when used successfully should help us to develop or change basic theoretical frameworks. Whatever approach one takes, the communicator must know and understand his audience well.

The Issue of Soil Conservation

In general the literature cited indicate that past programs failed to achieve their aims and goals. The failure was in part related to the type of knowledge they imparted to the audiences. In this study, "Agriculture and the Environment" program deals with such problems by integrating the key concepts that the audience needs to know about environmental problems in the content of the message. The concepts dealt with in the "Agriculture and the Environment" programs are related to (1) shifting of conservation and pollution programs and changing emphasis from on-site to off-site damages; (2) the notion that to abate pollution one does what he has been doing under the old conservation programs; and (3) an emphasis on the discrepancy between experts and farmers on the seriousness of agricultural conservation/pollution abatement problems.

A number of experts agree that agricultural activities have their greatest environmental side effects on water quality. A recent federal-state report, Environmental Quality-Pollution in Relation to Agriculture and Forestry (U.S. Department of Agriculture, 1968b:7-8), listed five major problem areas: animal wastes, sediment, plant nutrients, pesticides, and plant residues. Iowa State University agriculture extension specialists believe that soil erosion and the resulting sediment pose the greatest potential for deterioration of water quality in Iowa.

For about forty years, various institutions, including the Soil Conservation Service and Extension Service, have worked to promote the adoption of conservation practices. Studies have shown that farmers believe, in general, that soil losses should be remedied, but their goals and achievements have not been close to what the specialists have recommended.

In a 1962 study, approximately 57 percent of the farmers surveyed rejected recommended conservation practices. These farmers either saw no need for conservation, or did not wish to change the way they farmed (Held et al., 1962). A 1963 study showed that about half of the soil conservation district cooperators in a rural county were making satisfactory progress toward effective erosion control. About 40 percent were making some progress, while 10 percent were making little or no progress (Timmons and Fischer, 1963).

The Iowa Conservation Needs Inventory (1970), estimated that over 17 million acres of crop land, out of a total of 26.4 million acres, needed additional conservation treatment. And out of 70 percent of the inadequately treated land (about 12 million acres), erosion was cited as the chief conservation problem. Contouring, strip-cropping, diversions, or terraces were recommended to control soil losses for much of this land. The study also suggested that only about 20 percent of the land susceptible to erosion in Iowa had been adequately treated. In 1972 an Iowa State University study (Steyn, 1972) measured farmers' opinions on their need for more conservation, and compared these results with the inventory. This comparison showed that, except for drainage, farmers estimated only about half as many conservation needs as do specialists.

In recent years, however, conservation specialists have been emphasizing new reasons for soil conservation. The major factor is an increased awareness of environmental problems. The impact of sediment, resulting from excessive soil erosion on water is not well accepted. A recent Federal Study states the potential severity of the problem (U.S. Department of Agriculture, 1968a).

Sediment becomes a pollutant when it occupies water storage reservoirs, fills in lakes and ponds, clogs stream channels, settles on productive lands and interferes with their use, destroys aquatic habitat, creates turbidity that detracts from recreational use of water, as well as when it degrades water for consumptive or other use, increases water treatment costs, or damages water distribution systems. In addition, sediment is a carrier of pesticides, herbicides, and fertilizer into water supplies (U.S. Department of Agriculture, 1968a:7).

In 1971 the Iowa Conservancy Act was passed. This law established limits on soil loss on agricultural lands and set up a procedure for action by complaint and possible administrative order and court action. Iowa, as well as the federal government, has proposed or put into effect environmental regulations governing feeding operations and pesticide application.

Government programs reflect greater environmental awareness. The Agricultural Conservation Program, which began in the 1930's, was aimed at controlling erosion and maintaining basic productivity of the soil. Over the years, the emphasis changed toward building capacity and increasing the inputs into farming operations. This program was subject to frequent controversy. Critics charged that practices designed to increase productivity were not justified during the period of agricultural surpluses (Steyn, 1972).

To remedy some of these criticisms, the program was changed to the Rural Environmental Assistance Program (REAP) in 1972. REAP increased the emphasis on the environmental quality and provided funds for diminution of polution from livestock operations. However, it was not successful in achieving the desired goal. In 1973 the Nixon administration froze the REAP funds on the charge that the program was an "income supplement" and no longer needed. However, a federal court ordered that the 1973 funds be reinstated.

After the reinstatement of the funds, the name of the program was changed to the Rural Environmental Conservation Program (RECP) in 1974. RECP was oriented towards practices on long-term environmental benefits. It provided for long-term contracts up to 10 years for financial and technical assistance, to be based on conservation plans, approved by the soil and water conservation districts.

In general, the programs and policies are shifting from soil conservation to pollution control through soil conservation; from on-site to off-site damages; and from incentive payments and information to legal requirements and penalties.

Steyn's (1972) analysis of the audience showed that Iowa farmers still practice conservation purposely for productivity and pride in wise management. And they are ambivalent toward who is financially responsible for pollution control. Many of them still do not count sedimentation as a pollution problem.

The attitudes of farmers concerning conservation practices are reasons why the communications approach proposed in this dissertation is essential.

This approach is considered to be appropriate after ruling out alternative approaches. Perhaps the most effective and powerful way to obtain sufficient adoption of conservation practices would be to enact legislation requiring it. Iowa has a conservancy act that sets soil loss limits on agricultural lands. However, action under the law depends on a complaint from the landowner damaged by sediment and the availability of 75 percent cost sharing for needed conservation practice. Five years after the passing of the law, very little mandatory action has been taken. Passage of more stringent laws is uncertain.

The attitudes towards soil conservation in the future appear to be voluntary, thus a kind of communication program is necessary. One approach would be that taken by existing programs, primarily the U.S. Soil Conservation Service (SCS). Steyn (1972) reviewed several evaluations of these programs. She found that the SCS supervisory boards at the county level were intended to set overall goals, set priorities, inform local farmers about soil conservation, and mediate between farmers and technical people in agencies. However, established procedures and farmers' attitudes apparently reduce the effectiveness of local boards. Even farmers who are "district cooperators" are under no legal responsibility and may receive assistance without actually implementing conservation practices. Most agency attention is devoted to educating and giving technical advice and assistance, rather than considering area-wide goals.

Strategy and Content of the "Agriculture and the Environment" Educational Program

The review of effectiveness of previous communication programs, analysis of past conservation programs and Steyn's analysis of audience beliefs, knowledge, attitudes and behaviors convinced the planners[1] of

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[1]Information on criteria and assumptions of the planners were obtained in private conversation with the project director, Paul Yarbrough of the Department of Journalism and Mass Communication, Iowa State University, Ames.

"Agriculture and the Environment" educational program that their effort would need to meet several criteria.

1. The program should constitute a substantial information input. This should include the conveyance of a significant volume of information regarding key concepts and supporting evidence for generalizations. The rationale for this decision was that major changes in farmers' positions were sought; such changes are unlikely to occur as the result of minor communication inputs.

2. This communication effort should be conducted over a moderately extended time period. This extension of time would allow the communicators to avoid overloading the attention capacity of farmers at any one time and would also allow reinforcement of key concepts from several particular viewpoints. It would also allow the communicators to cast messages within a timely framework.

3. Insofar as possible, the messages should emphasize basic principles and generalizations -- the whys -- regarding conservation/pollution abatement issues. This would include emphasis upon these ideas:

   a. To explain the shift in government programs and policies from soil conservation to pollution abatement; from on-site to off-site damages; from incentive payments and information to legal requirements and penalties.

   b. To emphasize that despite this change in goal emphasis, traditional soil conservation techniques remain the major means by which the new goal, agricultural pollution abatement, can be achieved.

   c. To note that, in general, farmers and experts disagree on the extent of need for conservation/pollution abatement practices. (Steyn's study showed that farmers estimates of needed conservation practices is only about half that of experts.)

   d. To define sedimentation from soil erosion and its deleterious effects upon water quality as Iowa agriculture's major contribution to environmental pollution.

   e. To the extent possible to show the long term economic benefits of conservation/pollution abatement practices both on and off the farm.

4. The messages must be treated in such a way as to show the relevance of the basic concepts to the farmer's situation. The messages and their source must gain the farmer's trust. They must be timely, interesting and relevant to his social, psychological and economic needs.

5. The program should provide for at least limited two-way interaction between the sender and receivers of the messages.

6. The program must be realistic in terms of potential cost for future full-scale implementation. In other words, it should be something that conservation workers and extension personnel could realistically implement, given their resources.

7. The program should be implemented in such a way as to allow for experimental control in order that its effects might be evaluated.

Modified newsletter format

A modified newsletter format was selected as the medium for the communication effort. The newsletter series was designed around the title "Agriculture and the Environment" and a symbol (a globe) was chosen. One or both of these appeared on all program materials to lend continuity to the monthly mailings. The newsletter format was chosen because it allowed for experimental control in evaluating message effects while allowing the experimenters to meet other program criteria. Furthermore, there is substantial research evidence to indicate that newsletters provide an effective communication format.

Spindler (1965) concluded from her study:

> Categorizing the advantages in the use of the newsletter, the communicator can precisely identify his audience, have complete control of his message, the message can be tailored to the specific information needs of the audience, he can adjust the timing and sequence of his message. The newsletter could be used by the audience as a reference pack; finally, the audiences could read the newsletter when convenient and at their own pace (Spindler, 1965:344).

On the other hand, Hadley Read (1966) outlined the disadvantages of the newsletter. He stated:

> You must build and maintain mailing lists; the message must compete in the mailbox; you need certain minimum physical facilities; and newsletters may be relatively expensive compared with newspaper, radio, and television (Read, 1966:98).

Watson (1970) concluded that the newsletter is an excellent way to reach client groups. He found that 82 percent of the clients remembered receiving copies and 65 percent remembered its general content and purpose. Thirty-seven percent reported they discussed the content with friends and neighbors and 29 percent used the newsletter as a reference in discussing public affairs (Watson, 1970).

Numerous studies show favorable attitudes toward newsletters. Bartz' (1966) study of young women found that 75 percent of the women indicated an interest in receiving newsletters for young homemakers. The surveys of ten Pennsylvania counties by Brown (1968), showed that the newsletter was the preferred method of receiving information about home economic topics. The information about Japanese beetles which was distributed near Philadelphia by request showed that 90 percent of the recipients had read the information, 77 percent had implemented the information, and 59 percent had passed the information on to other people (Brown, 1968). In a study of the effectiveness of a program to decrease mastitis, Brown (1968) found that of the mass media teaching techniques used, the newsletter was the most effective in reaching the dairymen, whereas news articles and radio programs were least effective. The newsletter appeared to reinforce the farm visit by the extension agent.

Content of the newsletters

While the planners felt a need to communicate basic concepts about conservation/pollution abatement, they also felt that these must be cast in a relevant framework for farmers. Economic rationality is the theme most often used to combine these two goals in communication with farmers. Unfortunately, convincing economic arguments often aren't available to the conservation/pollution abatement communicator. While it is undoubtedly in the long-term economic interests of society at large to maintain soil productivity and prevent off-site damages caused by sedimentation from erosion, such is often not the case for individual farmers. Practices such as terracing may have an expected pay-off period (if ever) of 40 years or more. Furthermore, the costs of conservation/pollution abatement practices are unevenly distributed among farmers. In lieu of such an overall economic rationale, the communicators chose to emphasize those effective practices which have positive short-term economic consequences, such as minimum tillage. They also emphasized emerging pollution abatement regulations with the implication that if farmers do not voluntarily comply with such programs, the regulations and coercive measures may become more stringent. Efforts were also made to play upon the farmer's sense of fair play and social responsibility by pointing up off-site damages resulting from soil erosion. Also discussed was the availability of government cost-sharing assistance and the existence of cooperative area-wide programs such as Watershed and Rural Conservation and Development projects.

The planners also soon found that it is virtually impossible to attain the two goals of communicating basic concepts and showing their relevance and still maintain in pure form the three levels of knowledge outlined by Bloom: (1) specifics, 2) ways and means of dealing with specifics, and (3) universals and abstractions. It was virtually impossible to create "relevant" articles on general principles without illustrating their application in concrete situations. Likewise, it was difficult to demonstrate the relevance of specific facts without casting these within a theme of some type of generalization. Thus, none of the articles produced represents a pure type when compared with Bloom's taxonomy. However, the articles do differ in the amount of emphasis they place upon one type of content as opposed to another. Figure 2 presents a classification of the 19 articles in terms of the level of knowledge emphasized. The actual articles included in the series are reproduced in Appendix A.

Treatment of the newsletter content

To show legitimacy and earn credibility, the program source was given as Iowa State University Cooperative Extension Service, and a covering personal letter from an extension agronomist was included with each packet.

Five "newsletter" packets were mailed to the treatment group between August 1974 and June 1975. Each newsletter packet contained three to five separate articles under these classifications: basic environmental concepts, environmental regulations, cultural practices, conservation structures, funding assistance, and information sources. The articles ranged in length from one to six pages. In all, 71 pages of single-spaced typewritten text were produced in the series. Three of the articles included photographs; five included other types of illustrations.

Month of Publication	I. Specifics	II. Ways and Means of Dealing With Specifics	III. Universals and Abstractions
	Level of Content Emphasized		
AUG	Soil Loss Regulations Concerned About Pesticide Safety? Conservation Cost-Sharing	Livestock and Pollution --Your Legal Duties	
JAN	Changes in Corn Rootworm Treatment	75 Fertilizer Outlook--What's New/What You Can Do	Pesticides, Pollution, and the Food Production Push
FEB	Old Funds About Gone --New Monies Debated		Soil Erosion Costs Money --On and Off the Farm Minimum Tillage: Conservation Plus
APR	Conservation Views: Farmers and Specialists	Problem-Solving With Grassed Waterways New Pesticide Regulations --Some Duties; Some Help	Terraces Protect the Land, Protect Farming Investments
JUNE	Conservation Programs Seem Confusing? Information Directory	Communities Cooperate in RC&D Projects	Landowners Cooperate in Watershed Development Who Pollutes?

Figure 2. Classification of articles in "Agriculture and the Environment" in terms of Bloom's level of knowledge by time of mailing.

The materials were arranged so that previous articles did not go out-of-date before the arrival of a new mailing. The articles were cross-referenced where possible and were intended to be "building blocks" for an environmental conservation library. The aim was to have the farmers keep and refer to the articles for at least the ten month duration of the program. To promote this behavior by the farmers, a ring binder with cover sticker was sent with the first mailing. The articles were loose-leaf and punched to fit into the binder which contained a title page and six colored divider pages, each one labeled with a content category. The articles were color keyed to the appropriate divided page. With each mailing an updated table of contents was provided. It was expected that materials sent in this manner would add more to the farmers' perceptions of their importance.

The aim of the strategy was first to send articles that were timely, interesting, useful, and non-controversial, so as to build familiarity. Then more technical and theoretical messages that introduce dissonance could be sent. It was expected that this sequence would more likely lead to acceptance of the theoretical concepts.

One aspect of personalization was the letter included with each newsletter mailing. Another aspect of personalization was the individualized treatment a farmer could receive by taking advantage of the feedback channels. Newsletter articles, when possible, identified publications giving further information on a topic. Each newsletter contained a return form and business reply envelope that the farmer could use to request free copies of these publications. He was also invited to ask for information on topics not covered in the newsletter, to ask specific questions pertaining to his own farming operation, and to comment on the communication program. All responses were promptly answered by personal letter, again from the extension agronomist.

Another two-way channel was built in by giving names and phone numbers of local (county) agencies and personnel who could help farmers individually with problems discussed in the newsletter articles. These local people had all been contacted previously in legitimizing the program. Funding programs, which involved nearly all county personnel in one way or another, were most conducive to this treatment. Information on the status of cost sharing funds and how to get them was given for each farmer's county.

Summary

In this chapter we have attempted to review Bloom's taxonomy of knowledge and to make a case for the need to communicate basic concepts to farmers relative to issues of soil conservation and pollution abatements. This rationale was based on the results of communication evaluation in other subject areas and an analysis of the farmer's predispositions toward conservation/pollution abatement. We then attempted to describe the rationale and resulting communication message of the planners of the information program being evaluated in this dissertation. An object of this dissertation is to determine if farmers' rationale is justified in terms of audience response. In the next chapter we will explore a conceptual model for evaluating this program. In subsequent chapters we will spell out the methodology and results of a field experiment aimed at this evaluation.

CHAPTER 3: A CONCEPTUAL FRAMEWORK FOR INFORMATION PROGRAM EVALUATION

Introduction

The purpose of this chapter is (1) to outline the model used to analyze audience responses to the "Agriculture and the Environment" program, (2) to identify the concepts to be investigated, and (3) to generate the general hypotheses.

Several approaches to the understanding of human communications have been advanced. Campbell (1959) pointed out that human communication has been a major concern of semantics and linguistics, information theory, psychology, sociology, social psychology, group dynamics, and studies conducted by journalists. The increasing number of new ideas, practices, and products, combined with the emergence of many alternative communication media to transmit information has resulted in increased efforts to determine the most appropriate communication procedure to use in varying situations. This, in turn, has stimulated students of communication to seek principles, models and theories that could be universally applied when developing a communication program, campaign, or message.

In order to understand human communication (1) an effort should be made to develop theoretical constructs, or abstract models, of the system within which the communicative act takes place. (2) Attention should be paid to the processes by which receivers respond to communication. In the present situation the soil conservation communicator wants the response to his communication stimuli to be consistent with his intent. To achieve this end, he is able to specify the source, manipulate his message, choose the channel and to a limited degree control the situation wherein the message is received. However, the receiver also plays a major role in this process. The receiver can attend the message or not, can comprehend accurately or inaccurately, and accept or reject the meanings comprehended. The receiver brings into the communication situation factors such as his biological capabilities, mental dispositions, and situational factors which were not originally present, but which can influence the effect of the sender's message. A major concern of this dissertation is the receiver's response to a message and factors that influence that response.

Brown (1965) says that the principle of consistency (congruity, balance, and dissonance) holds that the human mind has a strong need for consistency. Disparate messages upset previously attained states of consistency and set up a drive to attain a new state of consistency. Attitudes are generally changed in order to eliminate such inconsistency.

Another theory relating to the way receivers respond to messages is that of psychological behaviorist: Stimulus Response ($S \rightarrow R$). In this conceptualization the sender "innoculates" an audience with a message and the audience responds in a relatively invarying way to the message. $S \rightarrow R$ theory originated during the World War I period and appeared to explain the generally influential nature of the propaganda campaigns of that war. According to DeFleur (1966), the assertions of critics that the $S \rightarrow R$ theory assumed that nothing intervened between the media and an individual's response was incorrect. He held that the theory included definite assumptions about human nature and the nature of the social order. One basic assumption was that man's behavior was governed by inherited biological mechanisms which were more or less the same from one individual to another. These biological mechanisms gave the individual motivations to respond to given stimuli in given ways. Another assumption of $S \rightarrow R$ theory was that man was a member of mass society. In mass society the individual is psychologically isolated from others, is impersonal in interactions and is free from binding social obligations. These assumptions about the nature of man and the nature of the social order indicate that the sender should have enormous powers of persuasion. All he has to do to persuade is to construct the proper message and the receiver would be at his command.

Bohlen's (1967) theory of the way receivers respond to a message holds that such a response is a two-stage process:

Stimulus → Interpretation → Response

The individual responds not to the stimulus per se, but to the interpretations or meanings which he assigns to the stimulus within the environmental context wherein the stimulus is perceived. The meanings one assigns to a stimulus are based upon what he has learned through his experiences in the social world. Since the experiences and learning of individuals are different, individuals assign different meanings to the same stimulus.

Several researchers have noted that interpreting is not a simple one-step process -- for example Hovland, Janis, and Kelly (1953). Hovland and Janis (1959) have generated three stages of decoding as attention, comprehension, and acceptance. Other authors who had similar divisions include Schramm (1954), Hartley and Hartley (1955), Waples *et al*. (1960), Lazarsfeld *et al*. (1966), and Fearing (1964).

A Receiver Response Model

In order to arrive at a well accepted generalized model of a receiver response to a communication message, Yarbrough (1968) developed a conceptualization which attempts to account for both the _what_ and the _why_ of a receiver's response to messages. Yarbrough's model draws extensively upon existing theories, hypotheses, and conceptual schemes as well as the findings of the past research.

The model has been used to study a variety of purposive communication programs ranging from homemaker response to a newsletter to long-term civil defense information campaigns. It has been used to investigate effects of one time messages as well as series of messages. Yarbrough _et al._ (1970) used this model in a series of civil defense communication studies and found it very useful. Groves (1973) applied the model to the study of the "Expanded Nutrition Program." The model was found helpful and meaningful when it was used in the study of the "Changing Food Behavior" (Gillespie, 1975). The model has gone through several stages of evolution. The most recent version (Yarbrough and Gillespie, 1976) is used as the general evaluation framework for this dissertation. The generalized model of a receiver's response to agriculture and environmental messages is outlined in Figure 3. This model includes six major concepts:

(1) _Sender Inputs_. The message which is prepared by change agents and communicators and sent to target audience(s). These include the overall communication strategy as well as the physical information inputs such as booklets, brochures, and news releases. The sender inputs also include source identification, message content, message treatment, channel selection, and situation.

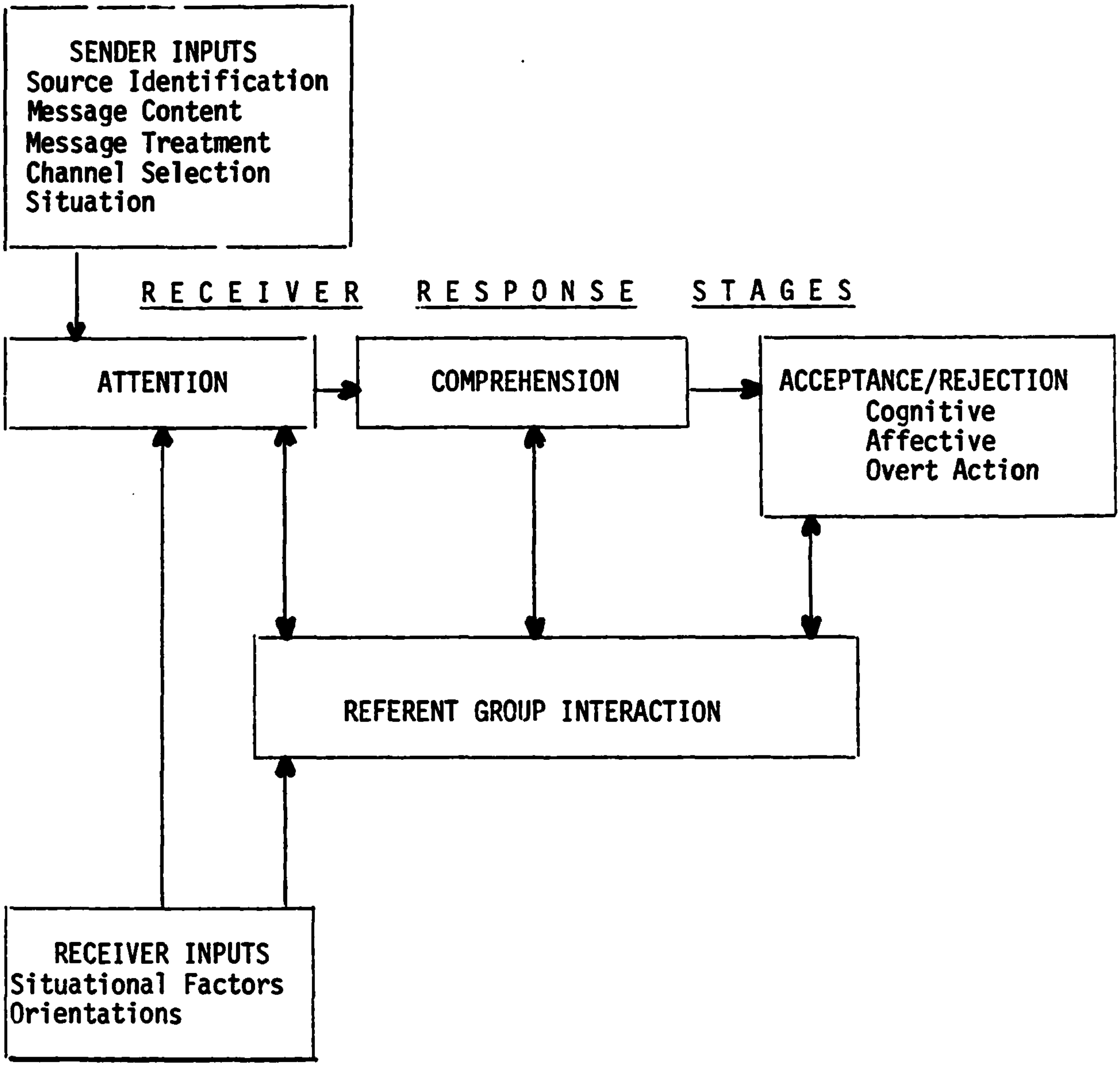

Figure 3. A generalized model of an individual response to a message (adopted from Yarbrough and Gillespie, 1976).

(2) Receiver Inputs. The skills, beliefs, knowledge, values, and attitudes receivers have before the message is sent to them; the prior actions they have taken, their social status, and other situational factors.

(3) Attention Stage involves the processes by which the individual selects the stimuli from his environment upon which he will focus. Far more communication stimuli are available to an individual than he has time or interest to attend. Fortunately, humans have a biological capacity to focus on some of these stimuli and to avoid others.

(4) Comprehension is the process by which an individual transforms sensory stimuli into meanings. Once an individual has decided to read or listen to a message, he may proceed to select certain parts of it for special attention, often distorting them, and meanwhile overlooking other parts entirely.

(5) Referent Group Interaction involves any conversations the receiver may have had with others regarding the message. Referent groups play an important part in the development of the individual's value system. Roles and role behaviors are prescribed by the general social system in which the individual finds himself. Man's behavior is partly patterned in terms of those referent groups or individuals whose norms he adapts for himself.

(6) Acceptance/Rejection Responses. The changes and/or reinforcements of the receiver's knowledge, attitudes, and overt action that result from exposure to the communication.

Operationalizing the model for AEP

The operationalization of the concepts included in Figure 3 in the case of the "Agriculture and the Environment" program is summarized in Figure 4. An explanation of Figure 4 is presented in the following sections. The concepts will be discussed in the following order: (1) attention, (2) comprehension, (3) referent group interaction, (4) acceptance/rejection responses, (5) sender inputs, and (6) receiver inputs. The general hypotheses to be investigated will be developed in conjunction with the last two sections.

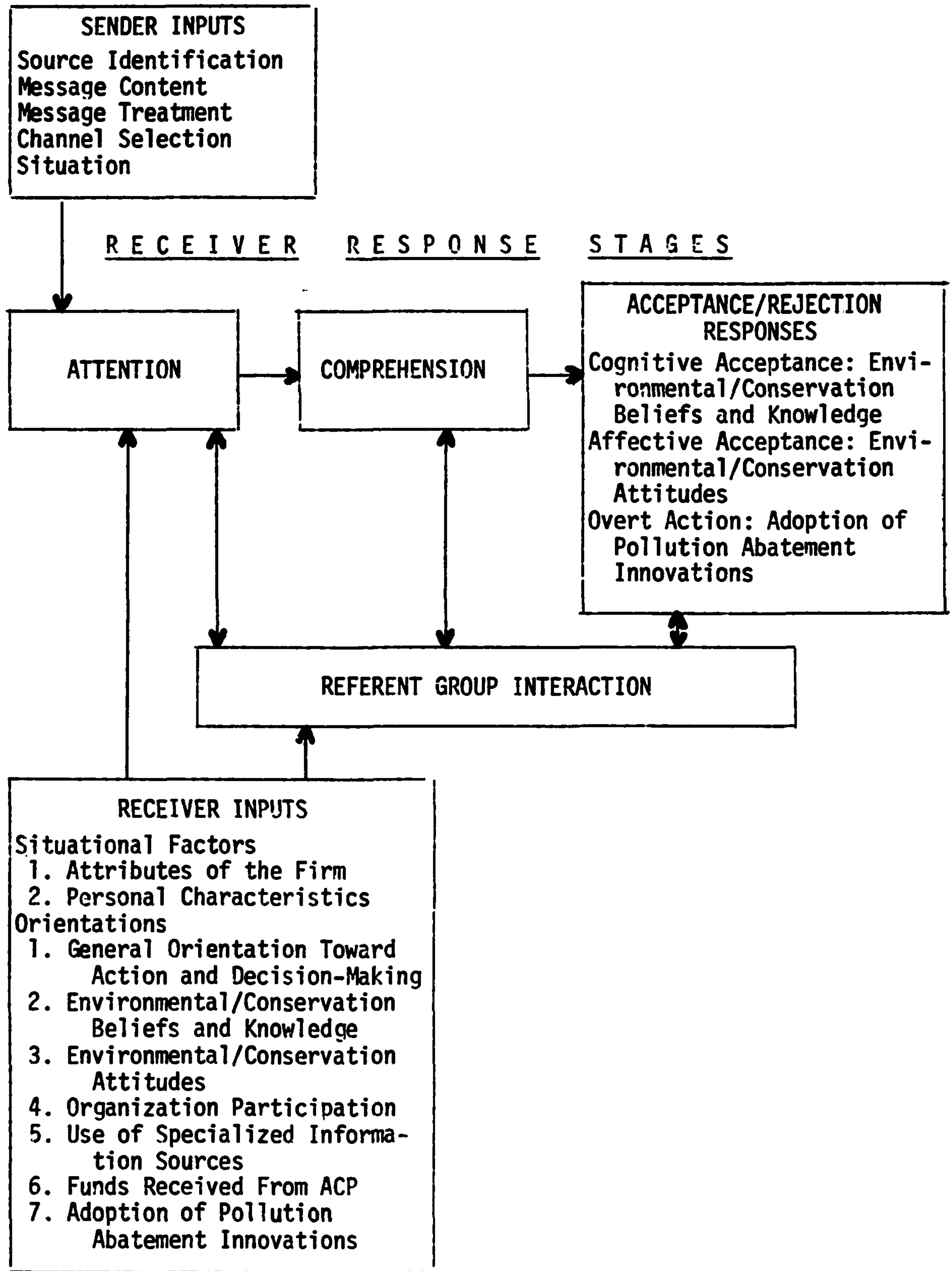

Figure 4. Applying the model to evaluation of the "Agriculture and the Environment" program.

Receiver Response Stages

A major concern of the communication model used in this dissertation is with the responses which the potential audience (selected by the sender) makes to the message. This response is not a simple receive or fail to receive phenomenon. Rather, the receiver must perform several functions. These functions can be integrated into a flow of action, the stages of action representing a series of communication response stages. Four major stages included in the model are: attention, comprehension, referent group interaction, and acceptance/rejection in terms of cognitions (beliefs), affectual response (attitudes and values), and overt actions.

Yarbrough (1968) indicates that at each response stage the receiver has two or more possible courses of action. If the alternatives are dichotomous (as in the intial attention stages) failure to pass through the stage means that the receiver is eliminated from the communication situation until subjected to another set of stimuli (or resubjected to the initial stimuli set). If multiple alternatives are available at the response stage (as in the differential exposure, comprehension, referent group interaction, cognitive and affective acceptance and overt action stages), then the receiver's response at one stage will mediate his response at subsequent stages.

One measure of the impact of a communication event is the degree to which the responses made by the selected audience correspond to the responses desired by the sender.

Attention

According to William James (1892) attention is the process of selectivity through which an individual is able to sort out for special emphasis some stimuli from among all those available to him and thus is able to reduce the "blooming, buzzing confusion," which is our environment, into some sort of order meaningful to him.

The extreme selectivity humans exercise in choosing stimuli to focus upon cannot be over emphasized. Yarbrough (1968) states that at any one time we do not perceive even a thousandth of those stimuli physically available to us. The capacity to receive and select stimuli is biological. The manner in which the selection is implemented is social.

The problem of gaining the attention of the receiver is very important from the communication sender's point of view. Consciously or unconsciously, individuals select from the numerous stimuli available only a few upon which they will focus. They base this selection upon a meaningful symbol, the channel through which it is conveyed, or opinions about the sender.

The receiver's decision to attend to a message involves passing through four attention stages (Yarbrough, 1968). The attention stages are (1) awareness, (2) decision to attend, (3) differential exposure, and (4) secondary contact (resulting from the two-step flow of information). Initial attention responses are dichotomous (yes-no); if it is not "yes," the receiver is eliminated from the communication event until he receives additional stimuli. Later stages of attention are qualitative. The initial decisions to attend are made on the basis of cues; later stages are decided on the basis of elaborated content encountered through the attention process.

Comprehension

Comprehension is here defined as the process by which an individual transforms sensory stimuli into meanings. Any phenomena which a communicator wants to transmit must first be transformed into representative symbols which can be conveyed and observed as sensory stimuli. The symbols such as words, pictures, and gestures that man uses are arbitrary and have no intrinsic meaning. Yarbrough (1968) indicated that individuals involved in the communicative act must give meaning to these symbols. Communication is effective (from a sender's point of view) only when the meanings the receiver attaches to the symbols approximate the meanings which the sender intended. This means that the receiver should comprehend the meanings in much the same manner as the sender. The agreement on meanings is a matter of degree and often men distort the intended meanings of the messages they receive. One reason is that the receivers do not give equal attention to all parts of the message; they may also remember parts and forget the rest. Distortion also stems from the fact that individuals must reconstruct in mental terms the reality they experience. Phenomena are comprehended on the basis of the receiver's own needs, his own emotions and his own previously formulated notions about the phenomena. Receivers differ in needs, emotions and preconceptions. Different individuals will, therefore, comprehend the same message differently.

Referent group interaction

The response to a message is rarely achieved completely within an individual. Yarbrough et al. (1971a) say that:

> Rather, communication response is a social phenomena, involving not only ourselves as receivers and our own evaluations, but also involving the evaluations of those others we value highly . . . . And much of what we converse about stems initially from our exposure to communication messages.
>
> One of the effects of our conversing is to spread the impact of the original message. . . . We establish a two step flow of information, giving others secondary contact with messages we encounter.
>
> An important consequence of such conversations, however, may be the influence it has on the person who initiates the conversation. . . . In short, we hypothesize that in much interpersonal communication we talk to others to convince ourselves.

At this stage of the generalized framework of a receiver's response to a message, the receiver's predispositions and communication inputs can be considered jointly. One party has something to say to the second party; the sender has a message for the receiver. Acts of communication are rarely, if ever, performed in social isolation. Individuals talk to others to clarify their thoughts on a topic. In this arena feedback plays an important role. Feedback may add to or alter these thoughts and he may be forced to defend his views, thus often making them more durable.

Referent group interaction is also important because it may include looking for more information on a topic. The use of additional senses can make the message better remembered. Unintentional exposure to more information on a topic can reinforce it as well. For example, talking about conservation practices with relatives, neighbors, friends, or an agent may generate interest and make the farmers remember more about the topic.

Acceptance/rejection

In most communication situations, the sender desires the receivers to not only understand the meanings of his messages; he also desires them to accept his conclusions. Yarbrough et al. (1970) identifies three acceptance responses that a receiver may make to a single message as cognitive, effective and overt action.

Cognitive acceptance: environmental/conservation beliefs and knowledge   Cognitive acceptance (or rejection) involves the degree of validity which a receiver assigns to the concepts being communicated; that is, the degree to which he accepts the meanings he comprehends as being valid, factual, correct or true.

According to Krech et al. (1962) cognitive world refers to that particular way an individual interprets and responds to persons and things as they are comprehended by him within his physical and social environment.

Although no two persons have an identical conception of the world, there are some common features of the world images of people. This is true because all men have similar nervous systems, because all men share certain wants, and because all men must cope with certain common problems. The cognitive worlds of the members of a particular ethnic background and culture group are similar to an even greater degree because of greater similarities in their wants and goals, in the social and physical environments to which they are exposed, and in their learning experiences.

Krech et al. (1962) gave four factors which cause an individualized image of the world. These four determinants are: (1) his physical and social environments, (2) his physiological structure, (3) his wants and goals, and (4) his past experiences. Therefore, if one wants to understand the cognitive factors involved in communication of information, he must examine the determinants that provide this individual with an image of the world.

Among those concepts which can be delineated as aspects related to the cognitive world of a receiver of "Agriculture and the Environment" are: (1) his general concern about pollution, (2) his knowledge about erosion, and (3) his perception of erosion problems.

General concern about pollution This is an indication of how an individual feels about environmental quality and reaction to the "environmentalist" position.

Knowledge about erosion This is a measure of farmer's knowledge about factors affecting soil erosion, erosion control measures, and the consequences of soil erosion.

Perception of erosion problems This involves the farmer's perception of how important or unimportant soil erosion is on his farm.

Affective acceptance: environmental/conservation attitudes Affective acceptance is essential because it is at this stage that the receiver accepts (or rejects) the sender's conclusions as being desirable. He makes judgments of the message in terms of good-bad, desirable-undesirable.

It is important to note that cognitive and affective responses are sometimes not in agreement. For example, a farmer may conclude that the environmental and conservation messages are needed but find them undesirable from an economic or convenience viewpoint. Yarbrough (1968) suggested that in the case of both cognitive and affective acceptance, reinforcement of previously held beliefs and sentiments is the most likely result of communication.

Values and attitudes of the individual determine to a great extent how he sees his world and how he thinks about it. Therefore, the individual's perceptual response to a stimulus is a dynamic process through which he comes to terms with his environment by seeking meaningful organizations. That is, meaningful in terms of its congruency with his existing values and attitudes.

Dimensions of affective acceptance for which measures have been developed in this thesis are (1) attitudes about who is responsible for erosion control, (2) attitudes about land ownership rights, and (3) willingness to adopt erosion control.

Steyn (1972) hypothesized that to a certain extent such attitudes influenced farmers' acceptance of communication messages about conservation/pollution abatement. It is expected that farmers who have favorable attitudes about environment and conservation will accept the "Agriculture and Environment" practice recommendations.

Overt action: adoption of conservation and pollution abatement practices Most communication senders desire not only that members of their audience attend to, comprehend, and cognitively and affectively accept their message, they also desire that the receivers take some specified overt action. In short, the senders want the receivers to do something about the sender's conclusions. In Yarbrough's (1966) model, overt action refers to those positive behaviors taken by the receivers which are beyond the attending, comprehension and cognitive and affective acceptance (or rejection) processes. He holds that man is resistant to change. "This resistance to change -- resistance to communication impact -- may be seen as a necessary, psychological protective device. If the individual was changed by every communication to which he is exposed, his life would soon be chaos" (Yarbrough, 1968).

The related concept for which measures have been developed in this dissertation is the adoption of conservation and pollution abatement practices. According to Bohlen:

> The adoption stage for any individual on any given practice is that point at which he accepts an idea or practice as a part of his ongoing behavior. He has become habituated to the idea. The mental set of critical evaluation characteristic of the previous two stages has changed to one of satisfaction with the idea of practice (Bohlen, 1964).

Adoption-diffusion research indicates that such overt action of adoption usually takes a long time. Adoption of new technology, ideas, and practices is generally the result of the interaction of communication behavior and decision-making. Exposure to many messages through diverse channels over a period of time is needed to move the individual from awareness of the innovation to a decision about adoption.

Adoption-diffusion research also indicates that a change in the overt behavior of an individual demands a change in other things in his both cognitive and affective structures. He must comprehend how the idea works, how it will really make a difference to his life, and how it will be better than what he presently has or does.

Cognitive acceptance, affective acceptance, and overt action may include direct responses made to the message, or they may involve creating change in specific or communication-bound orientations. Persuasive messages might alter latent psychological process which, in turn, yields change in cognitive, affective, and overt acceptance. This is what DeFleur (1966) considered to be the psychodynamic model of the persuasion process:

> . . . it has been assumed that the key to effective persuasion lies in modifying the internal psychological structure of the individual so that the psychodynamic relationship between latent internal processes (motivation, attitudes, etc.) and manifest overt behavior will lead to acts intended by the persuader (DeFleur, 1966).

DeFleur indicated that extensive use has been made of persuasive messages aimed at individual attidues or opinions under the assumption that there is a close relationship between a person's attitudinal structure and the way he behaves in overt social situations. However, research is not clear as to which of the acceptance responses; cognitive acceptance, affective acceptance, or overt action must come first. There is an indication that it is sometimes easier to change a behavior. Adjustments in cognitive and affective reactions will follow. Festinger (1957) has shown that when people are in a situation where behavior is incongruent with attitudes they will change their attitudes.

In the study of various processes and orders of change, Beal and Powers (1972) dealt with five typologies of change (development): empirical-rational; normative, re-educative; influence-manipulative; power coercive; and conflict. The theme of the "empirical-rational" is that all men are rational, and they will follow their rational self-interest to make rational decisions based on the information they possess. This process is slow and often ineffectual. The "normative, re-educative" category emphasizes involvement of the client system in working out changes desired and the possibility is recognized that decisions may be worked more rationally if more adequate technical information is provided. This process takes into account an educational component. It is assumed that "re-educative activities should be carried out for problem clarification-solution, and changes of values, attitudes and norms are a pivotal concern" (Beal and Powers, 1972).

Rogers and Shoemaker (1971) suggested that change agents must center their activities in a client system with an innovation that possesses a high degree of relative advantage. If such innovation is compatible with existing beliefs, there is a very high likelihood of success. This will create a positive set toward change and will influence later ideas that may be introduced.

The overt action of concern in the present study is the adoption of conservation abatement innovations. Based on the findings of past researchers, it is expected that farmers who previously had adopted the most conservation practices are the ones who will respond most favorably to the "Agriculture and the Environment" program by further increasing their adoption behavior.

Sender Inputs

When a sender attempts to communicate with an audience, he has a number of options which should have a bearing upon receivers' responses. He is able to specify the source or apparent sender of his information, he is able to select the ideas to be emphasized and ignored (message content). He is able to vary the treatment given these ideas in terms of brief vs. detailed exposition, humerous vs. serious context, the order of argumentation, the types of appeal (e.g., emotional vs. rational), and the communication codes chosen to express the ideas. The sender also has choices regarding the channels through which the message will be conveyed, and he can influence certain aspects of the overall communication situation including the time and place the message will be received, repetitiveness of the signal, and the overall definition as to whether the communication is intended to be primarily one-way or reciprocal.

Chapter 2 presented a detailed description of the choices made by the senders of the "Agriculture and the Environment" information program. Their decisions were based on a consideration of communication theory, past research and a detailed analysis of their audience. There is, therefore, every reason to believe that they should meet with success. Gauging that success, however, presents a number of problems. We have already noted that a receiver responds to any communication event at a number of different levels. Comprehension and acceptance response evaluations can be made by resorting to classical experimental models. The responses made by a group receiving the treatment may be compared with responses made by a non-treated control group. If the design is appropriate and care has been exercised in operationalization and execution of the experiment, the difference in responses between the treated and non-treated groups should be attributable to the effects of the experimental message.

Attention and interaction, however, present a problem of a different sort. These responses exist only because the experimenter has introduced his message. Thus if only one person out of a very large number of experimental subjects reads or talks about the message, the message has been effective when compared to a non-treated group. However, such a level of response would probably not be satisfying to a sender. A more appropriate comparison, then, would seem to be to compare attention and interaction responses to some abstract criteria or to the experiences of other communicators. Since no agreed upon abstract criteria exists, this study compares attention and interaction effects with a number of similar programs.

Sender inputs as predictors of attention and interaction

If one is to gauge success by such comparison, an appropriate question seems to be what predicates success. From a broad reading of communication literature, experience and logical analysis, we have identified six factors which should influence attention and interaction responsiveness: (1) signal repetitiveness (redundancy), (2) signal strength in contrast with the environment, (3) delivery assurance, (4) personal relevance of the content, (5) feedback opportunity, and (6) discussion probability.

Signal redundancy Information theorists have demonstrated that one way of assuring accurate delivery of messages is to repeat them, to make them redundant. A tornado warning is sounded repeatedly so that people who missed the first sounding might hear the next and take cover. Advertisers use the principle extensively when they employ the rule-of-thumb that the essential information (usually product name) must be repeated at least three times within every ad. Television commercials are made super-redundant by back-to-back repetition of similar commercials for the same product, by multiple spots within the same program, by presenting spots on different programs during the same evening and on different networks and on different days.

Signal strength   Another principle of information theory is that the signal is more likely to "get through" if the power behind the signal is increased. However, the power needed is relative to the amount of background noise. The higher the background noise, the greater the signal strength must be. In other words, signal strength is measured in terms of its contrast with the environment. Thus emergency vehicles use a variety of contrasting signals to warn others in the traffic flow of their approach -- flashing lights, sirens with warbling sounds, bright colored vehicles, and fog horns. This strong contrast is needed to make sure the information -- the warning to "get out of the way" -- gets through to motorists who may be riding with windows rolled up and the car radio tuned at a high volume. On the other hand, a cough during a quiet passage of a symphony concert will be highly distracting to the audience.

Information theorists further note that signal strength and redundancy are exchangable. If the signal is weak, a high degree of redundancy can help make sure the information gets through.

Delivery assurance   We label a related concept delivery assurance. This involves the determination that the message (whether strong or weak, redundant or not) will reach the receiver at a time and place that he can attend to it. Thus, a single printed message, properly delivered, is more likely to reach its intended receiver than is a one-time radio or televi-ion broadcast. This is because the printed message can be read at the receiver's convenience. He must be near a receiver at the time of broadcast to receive an electronically conveyed message. Likewise a message personally addressed to a specific member of a household is more likely to gain his attention than one simply addressed to "householder."

Personal relevance If the message, and especially the attention cues, can demonstrate its relevance to the receiver's needs and wants it is more likely to be attended to and discussed. This relevance might stress the ways the message can help the receiver solve some social, psychological or economic problem. Advertisers often use this principle by identifying audience segments and slanting different appeals to different segments of the audience.

Feedback opportunity Mass media have been traditionally used as a one-way communication channel. It is difficult or impossible for the receiver of the message to ask a question, or to challenge the assertions of the sender. By definition, this formulation should cut down on the amount of interaction engendered by the message. We also suspect that the lack of feedback opportunity makes the communication situation less inviting to the receiver and thus lowers his initial attention to the message. As we have noted previously, it is possible to modify mass communicated messages and systems so as to allow feedback to the sender.

Discussion probability Messages are also more likely to be attended if they provide an opportunity to discuss among the receivers' referent groups the problems and solutions addressed. This may lead to additional exposure to the message through the two-step flow of communication, and, by definition, it will increase interaction among receivers. Senders can encourage such interaction by (1) telling the receivers they should talk to others, (2) by giving them something interesting or provacative to talk about (e.g., people are more likely to talk about subjects which involve an element of conflict), (3) by presenting them with a problem that requires the help of others for solution, and (4) by making sure that all members of the referent group receive the same message so that they will have a basis for talking.

The attention and interaction potential of several technical information programs: a comparison and prediction

Using these criteria, we compared the messages in the "Agriculture and the Environment" series with five other information programs which attempted to convey semi-technical information to generalized and specialized audiences. Each of the comparison programs had been studied for effectiveness. In addition the AEP was compared with articles in daily newspapers. The technical information programs included Community Shelter Planning for civil defense (CSP) (Yarbrough *et al.*, 1971a, b); the Home Fallout Protection Survey (HFPS) (Yarbrough and Klonglan, 1970); an experimental newsletter for participants in Extension Service's Expanded Nutrition program (ENP) (Groves, 1973); a newsletter aimed at community leaders in a 10-county rural development area (TENCO) (Kern *et al.*, 1965); and the readership of a single extension pamphlet on "Growth and Nutrient Uptake by Corn (Corn) (Yarbrough, 1966). From the descriptions of these programs outlined by the authors of the studies, each information program was scored on a five point scale (low = 0, high = 4) for each of our five criteria. The scores for criteria were then summated for each information effort to arrive at a prediction of the attention that would be given to that program. The evaluations and assignment of scores are presented in Figure 5. The scores indicate that attention to the "Agriculture and the Environment" program should be among the highest of the programs compared. We would not expect discussion of the program to be high, however, since it ranks low in comparison with others on the criteria of personal relevance and probability of discussion with peers.

Other sender minipulations

In addition to the purposive communication manipulations outlined in Chapter 2, two factors in the design of the experiment have message-like qualities and are expected to influence overall responses to the program. These include pretesting some of the experimental and treatment groups prior to the program and the selection of a "high practitioner" sample to be contrasted with the random sample of farmers. Fortunately these two factors can be controlled by the design of the experiment and the analysis techniques employed. The nature of these manipulations and the manner in which their effects are statistically controlled are explained in greater detail in Chapter 4.

DESCRIPTION	PROGRAM AG./ENV.	CSP	HFPS	ENP	NEWSPAPER ARTICLES	TENCO	CORN
Signal repetitiveness (redundancy)	High 4	Low 0	Avg. 2	Mod. High 3	Mod. Low 1	Mod. High 3	Low 0
Signal strength in contrast with environment	Mod. High 3	Mod. High 3	Avg. 2	Mod. High 3	Mod. Low 1	Avg. 2	Mod. High 3
Delivery assurance	High 4	Mod. High 3	Mod. High 3	High 4	Avg. 2	High 4	High 4
Personal relevance	Avg. 2	Mod. High 3	High 4	Avg. 2	Mod. Low 1	Avg. 2	Mod. High 3
Feedback opportunity	Mod. High 3	Low 0	High 4	Mod. High 3	Low 0	Mod. Low 1	Low 0
Discussion probability	Low 0	Avg. 3	Mod. High 3	Mod. Low 1	Avg. 2	Mod. Low 1	Mod. Low 1
Total	16	12	18	16	7	13	11

Figure 5. Classification of seven information programs by types of sender inputs.

Summary of sender input-related hypotheses

It is expected that the various manipulations of the senders of the "Agriculture and the Environment" messages will have a positive impact upon the audience. These effects can be summarized in the following hypotheses.

General Hypothesis 1: Overall attention given the "Agriculture and the Environment" program will rank among the top third of a variety of specialized communication programs and will be substantially greater than attention given the average daily newspaper story.

General Hypothesis 2: Attention given the "Agriculture and the Environment" is partly a function of experimentally introduced "message-like" manipulation and audience selection.

General Hypothesis 3: Interaction with referent groups about the "Agriculture and the Environment" program will rank among the lower third of a variety of specialized communication programs.

General Hypothesis 4: Interaction with referent groups about the "Agriculture and the Environment" program is partly a function of experimentally introduced "message-like" manipulation and audience selection.

General Hypothesis 5: The treatment group will have more accurate comprehension of emphasized concepts than will the control group.

General Hypothesis 6: Comprehension of the emphasized concepts in the "Agriculture and the Environment" program by the treatment group is partly a function of experimentally introduced "message-like" manipulation and audience selection.

General Hypothesis 7: The treatment group will have greater cognitive acceptance of the sender's position than will the control group.

General Hypotehsis 8: Cognitive acceptance of the "Agriculture and the Environment" practices is partly a function of experimentally introduced "message-like" manipulation and audience selection.

General Hypothesis 9: The treatment group will have greater affective acceptance of the sender's position than will the control group.

General Hypothesis 10: Affective acceptance of the treatment group about the "Agriculture and the Environment" practices is partly a function of experimentally introduced "message-like" manipulation and audience selection.

General Hypothesis 11: The treatment group will have adopted more of the recommended pollution abatement practices than will the control group.

General Hypothesis 12: The adoption of the recommended "Agriculture and the Environment" pollution abatement practices by treatment group is partly a function of experimentally introduced "message-like" manipulation and audience selection.

Receiver Inputs

The receivers predispositions, in addition to sender's inputs, influence the receiver's response. According to Yarbrough:

> Differential response of individuals to a message in terms of the attention they give to it and the way they comprehend and accept it is not a random process. Individuals are "predisposed" -- through their previous experience, through what they perceive to be their "interest" -- to react to a given message in a predictable manner (Yarbrough, 1968).

Hobbs' et al. (1964) conceptualization holds that action (response to communication stimuli) is a function of the biological capacities and limitations of the individual, his mental dispositions and situation wherein he acts. This classification of receiver response to communication is assumed to operate in a continuous way preconditioning an individual's response. For example, A may interact with B, B with C and A with C. Thus, a skill might be considered as the interaction of the biological capacity and the mental dispositions of the individual social status-roles or personal characteristics might be considered both as part of a mental disposition and as part of the situational factors influencing receiver responses.

Biological capacities

Man is born with certain biological potentials among which are his intelligence, predisposition to act, or to sustain physical activity. Man must act so as to live. He must move, respond to stimuli and relate himself to the world around him (Bohlen, 1967).

Biological capacities which have a basic influence on man's ability to communicate can be put into many subcategories, but only skill will be discussed.

Zadrozny (1959) defined skills as learned abilities to perform some functions well. Zadrozny's definition is consistent with Yarbrough's (1968) conceptualization that skills may be thought of as highly specialized complexes of habitual behavior which have been learned. In communication the necessary skills include the ability of the individual to listen, read, write, think and deal with abstract symbols so that he will be able to decode the symbols and manipulate the meanings symbolically.

Berlo (1960) in his study stated that if the receiver does not have the ability to listen, read, and think, he will not be able to perform well the function of decoding the messages that the sender (source-encoder) has transmitted to him. Hartley and Hartley (1955) argued that the sender must adjust to variations in the skills levels of the receiver and not present the messages in a form that is too complex for the receiver to understand or so far below his level of ability as to fail to stimulate his interest.

Although a part of the general receiver response model, skills are not operationalized in the present study.

Situational factors

Situational factors are defined as all those factors external to the individual which may have an effect on his actions and decisions.

Schramm and White (1955) report that those younger in age, having a higher education and higher economic status read or disseminated a great quantity of information than those who were older in age, less educated and of lower economic status. Lionberger (1960) found that the adoption and diffusion of new ideas is related to the individual or personal characteristics of the individual himself.

Two general categories of the situational factors that are being considered in this dissertation: (1) attributes of the firm, and (2) personal characteristics.

<u>Attributes of the firm</u> An individual's selection of goals is mainly based on the accessibility of the goals and the means or resources to attain them in the given situation. It is clear then that situational factors relating to the individual's firm can either enhance or constrain behavior that would lead to the adoption of new ideas and practices. For example, the individual may not be able to obtain the capital to procure the innovation; also the size of the firm may not permit the efficient use of the innovation.

Hobbs *et al.* said that all individual action takes place and decisions are made in a situation which is unique to the individual actor (Hobbs *et al.*, 1964). He included environmental influences and availability of resources in the environment to attain the ends of the actor. In agriculture, economic organization of farming, market, credit and transportion systems are part of what Hobbs classified as situational factors preconditioning the receiver's response to communication.

One major category of situational factors that Hobbs *et al.* (1964) and Coughenour (1968) dealt with and found to be related to the individual innovativeness are the characteristics of the enterprise or firm. Of the many aspects of the firm that could be examined, this thesis will focus upon one -- scale of operation.

The size of the enterprise and the monetary resources available can either limit or provide the opportunities for the adoption of new technology. It may have this influence by conditioning the needs (goals and ends) of the enterprise, by providing the resources (means) needed to reach these ends, and by conditioning the social relationships of the actor with other actors (Edwards, 1969). For example, a farmer with a small farm may not need or be able to efficiently use large machinery, such as a corn combine, in his farming operations. At the same time, a farmer with a large farm, but inadequate financial resources may be unable to buy the machinery he could efficiently use.

Personal characteristics An individual brings to a communication event his personal and social characteristics. These are achieved and ascribed social statuses occupied by the individual. Lionberger (1960) found that the adoption and diffusion of new ideas is related to the individual himself.

Social status-roles are aspects of an individual's social situation that constitute "internal" or mental disposition to act. The groups of which the individual is a member, his reference groups, the social systems in which he operates provide the basis for his status-roles and for his role expectations within those systems. Social status-roles are situational in the sense they are imposed from outside; they are mental dispositions to the extent that role expectations have been internalized (Yarbrough, 1968). Two sub concepts which can be related to the general concept of personal characterisitcs in this study are (1) age, and (2) education.

Age Age is a situational characteristic in the sense that it is achieved and the age of the farmer would be likely to affect his ultimate actions and decisions. Age is also important because it reflects the attitudes and interests of the farmer.

Hobbs _et al_. state:

> As the individual becomes older, he tends to become more conservative and tends to make decisions directed primarily toward minimizing the possibility of losses rather than maximizing profits (Hobbs _et al._, 1964).

This conservative strategy may be partly explained by the expected longevity of the individual -- the total time he will be able to use the innovation. It is usually implicitly assumed that longevity is at least partially accounted for by age. Thus, older farmers would be less likely to respond to the appeals of the "Agriculture and the Environment" program since most actions it prescribed were long-term investments.

Education Education is here defined as the formal training an individual has obtained. The years of formal education possessed by a person has generally been regarded as a means of increasing knowledge about new farm practices. Education helps develop the ability to solve problems. It also provides the study habits, reading skills, and the vocabulary for those who prefer more scholarly publications. Hovland and Kelly (1953) measured intellectual ability with the years of formal schooling. In their investigation of the documentary film as a medium of persuasive communications they found that persons with high intelligence (formal education) are more likely to be influenced when exposed to persuasive communication which rely on logical arguments than those communications which rely on "unsupported generalities or false, illogical, irrelevant argumentation." These findings as well as other research supports the generalization that formal education is positively related to an individual's ability to deal with abstract communication messages.

Orientations

Students of human behavior often note (as we have) that behavior takes place within a situation which in some ways limits and shapes it. Just how definitely that situation molds behavior or what exact influence it has is a matter of varied speculation. Those who claim behavior to be "situationally bound" point to the many instances in which one apparently can change only the situation in which the person acts and his behavior also changes. But others, including many social scientists, have observed that behavior often varies independently of the objective situation of action. Evidence indicates the individual creates his own definition of the situation and acts within the situation as he defines it. A few social scientists have taken a middle ground by contending that the objective situation plays a direct role in determining behavior and also indirectly influences behavior by determining the parameters of an individual's possible interpretations or orientations to that situation. This dissertation takes such a middle ground.

We have hypothesized that if situational attributes change, the receiver's communication response will also change. However, past research offers ample evidence that different receivers in the same situation respond differently to the same message. These receivers must be interpreting the same situation differently, at least to the extent that they believe it calls for different responses.

The actor's orientation to the situation may be viewed in several different ways. One way of viewing it is in terms of constructs: socially, psychologically, biologically and situationally determined mental states (Yarbrough et al., 1970). Such constructs of mental states (or dispositions) include beliefs, values, attitudes and habits. Each provides the actor with a simplified model which he can use to evaluate and act upon the stimuli he is receiving. This simplified model is based upon reflections of past experience and (1) suggests the meaning of the stimuli received, including its relationship to the remainder of the individual's constructed world of reality, (2) suggests modes of previously determined evaluations of the stimuli in terms of correct-incorrect, desirable-undesirable and (3) in varying degrees suggests possible courses of action with regard to the stimuli. In short, dispositions are learned mental states which provide the individual with intellectual short-cuts in his dealing with the vast amount of stimulation with which he is constantly bombarded (Yarbrough et al., 1970). Where well-organized dispositions are present, the individual needs to spend little time and effort "intellectualizing" a problem before he arrives at a decision to act.

Beliefs   Beliefs are understood to be propositions held by the actor of the existence of specific phenomena and what the relationships between various phenomena are considered to be. Beliefs are thus existential and relational statements of "is," accepted by the actor as being true, although they have no necessary truth or falsity attached to them (Yarbrough et al., 1970).

Yarbrough's definition of belief, which is that used in this dissertation, is consistent with the definition of Krech's belief as "an enduring organization of perceptions and cognitions about some aspect of the individual's world." They strongly suggest that the concept be used in a generic sense to include knowledge, opinions, and faith.

Rokeach (1968) defines beliefs as inferences made by an observer about underlying states of expectancy. He defined a belief system as having represented within it, in some organized psychological but not necessarily logical form, each and every one of a person's countless beliefs about physical and social reality. Rokeach's definition differs from that of Yarbrough and Krech and Crutchfield in that his beliefs may include an element of evaluation. The other authors reserve the evaluative component for attitudes. However, Rokeach does introduce the notion of "centrality of belief" which we find useful. He identified five classes of belief ranging from most to least central as: primative beliefs, 100 percent consensus; primitive beliefs, zero consensus; authority beliefs; derived beliefs; and inconsequential beliefs. Rokeach holds that the more central a belief, the more difficult it is to change. He also holds that the more central the belief changed, the more widespread the repercusions in the rest of the belief system.

Yarbrough states that:

> Beliefs and knowledge are especially relevant when communication is taking place. To be able to adequately comprehend the implications of communications and to be able to base rational decisions upon the meaning comprehended requires a certain level of technological competence on the part of the receiver. This technological competence is needed because communication can be attained only when there is a frame of reference common to both sender and receiver. If the receiver of a message does not have a partial understanding of what the sender is talking about, he may reject

> the message before it has fully gained his attention, or he may misunderstand once the message has gained his attention (Yarbrough, 1968).

Yarbrough et al. (1970) distinguish beliefs and knowledge by stating that knowledge differs in the degree to which the belief is generally held to be true and the manner in which its truth has been verified. This mode of verification is in terms of some system of knowing, one of which is the scientific method.

Environmental/conservation beliefs and knowledge Many beliefs and kinds of knowledge are held by the farmer and comprise a significant part of his orientation. In this dissertation three classes are identified which are thought to be particularly germane to responses to the "Agriculture and the Environment" program. They are (1) general concern about pollution, (2) knowledge about erosion principles and control practices, and (3) perception of erosion control problems. It is hypothesized that the more concerned a farmer is about pollution problems in general, the more he perceives erosion to be a problem on his farm, and the more knowledgable he is of principles underlying the causes and control of erosion prior to encountering the educational program, the more positive will be his responses to that program.

It may be noted that these dispositions to favorable response have their counterparts in the cognitive acceptance responses discussed earlier. This is because the very changes a communicator hopes to achieve are often influenced by the receiver's prior positions on that topic. The difference is operational. Dispositions are measured prior to the communication event. Cognitive acceptance responses are measured afterwards.

Values and attitudes   Values and attidues are also two closely related constructs. Values are the actor's enduring system of positive and negative evaluations, emotional feelings and action tendencies with respect to general classes of phenomena. Attitudes are conceptualized to be derivatives of values and to be more specific (Yarbrough et al., 1970). Thus, while an individual's values precondition his action toward general classes of phenomena, his attitudes relate to specific instances within this class. Both concepts are feelings the actor holds about what ought to be the relationship of phenomena.

Hobbs et al. (1964) point out that in function values are closely related to the beliefs of individuals. Hobbs also made it clear that unlike beliefs, values involve an expression of approval or disapproval. Attitudes are similar to values and beliefs because they all serve as a function of both perceptual and cognitive elements. In contrast, attitudes include motivational and emotional elements, thus having a more direct relationship to individual action than beliefs. All attitudes, therefore, incorporate beliefs, but not all beliefs are part of attitudes.

Krech et al. (1962) have written extensively about attitudes. They identified three components of attitudes: the cognitive component, the feeling component, and the action tendency component. The cognitive aspect of attitude consists of the evaluative belief of the individual about the object. It is a demonstration of the attribution of favorable or unfavorable, desirable or undesirable, "good" or "bad" qualities of the object. The feeling component of an attitude refers to the emotions connected with the object or the affect connected with the object. The action tendency component of an attitude consists of all the behavioral readinesses associated with the attitude; the predisposition to take action with respect to the object.

Each of the components of an attitude may vary in valence and in degree of multiplexity. Valence refers to direction and degree of favorability with respect to the object of the attitude. Multiplexity means the variation in the number and kind of elements which make up the component (Krech et al., 1962).

Values and attitudes also vary in their salience for the individual. Salience is the relative importance which a given value or attitude has for an individual, compared with his values and attitudes toward other classes of phenomena.

Katz (1960) identified two main lines of thought with respect to man's attitudes as determinants of his behavior. The one tradition assumes an irrational model of man. It holds that individuals have very limited powers of reasoning and reflection, weak capacity to discriminate, only the most primitive self-insight and very short memories. Whatever mental capacities people possess are easily overwhelmed by emotional forces and appeals of self interest and vanity.

The second approach is related to that of the ideologist, who invokes a rational model of man. It recognizes that human beings have a cerebral cortex, that he seeks understanding, that he consistently attempts to make sense of the world about him, that he possesses discriminating and reasoning powers which will assert themselves over time, and that he is capable of self-criticism and also self-insight. The two approaches are equally good and useful, Katz contends, because each one of them can point to various evidences which support its assumptions, and can make criticisms of its opponent. The rational model approach is highly favored in this thesis.

Within the realm of the rational man model, the theories of "consistency" offer a considerable assistance in explaining the relationship between man's attitudes and mass media behavior patterns. The concept of consistency underscores and presumes rationality. Its argument or contention is that behavior and attitudes are not only consistent to the objective observer, but that the individuals try to appear consistent to themselves. It assumes that inconsistency is an undersirable state setting up pressures to eliminate it or reduce it.

Among those who supported the theory of consistency framework and pushed it to a conceptualization is Zajonc, who states:

> . . . the unity of a person can be traced in each instance of his life. There is nothing in character that contradicts itself. If a person who is known to us seems to be incongruous with himself that is only an indication of the inadequacy and superficiality of our previous observation (Zajonc, 1960: 45).

This theory is closely related to Heider's (1946) theory of balance, Osgood and Tannenbaum's (1955) theory of congruity, and Festinger's (1957) theory of dissonance in the notion that thoughts, beliefs, attitudes and behavior tend to organize themselves in meaningful and sensible ways.

<u>General orientation toward action and decision-making</u> Steyn's (1972) model assumes that:

Man has some indeterminate number of goals characterized by the dimensions of time and flexibility;
To obtain his goals man must act:
To act man must make choices based on his cognitive organization of the alternatives available and evaluation of these alternatives.

Six conceptual dimensions derived from the model and their scale directions are:

Goal Orientation, Time Dimension:
immediate (-). . . . . non-mediate (+)
Goal Orientation, Multiplexity Dimension:
simplex (-). . . . . . multiplex (+)
Goal Orientation, Flexibility Dimension:
rigid (-). . . . . . . flexible (+)
Action Orientation:
reaction (-) . . . . . anticipation, initiation (+)
Analytic Orientation:
few (-). . . . . many (+)
Analytic Orientation, Evaluative Dimension:
superficial (-). . . . thorough (+)

Three of the six dimensions and their scales were used in this dissertation: (1) Range of alternatives scale is meant to measure the extent to which a person prematurely closes consideration of alternatives based on some dominant goal structure, (2) the goal time scale was meant to measure personality dimensions of future orientation, and (3) action scale was used to measure generalized information seeking.

Steyn (1972) found that such rational value orientations were among the strongest predictors of favorable environmental beliefs and attitudes and of the adoption of conservation/pollution abatement innovations. For this reason we would expect that farmers with rational orientations towards action and decision-making will be among those who respond most favorably to the "Agriculture and the Environment" program.

Environmental/conservation attitudes   Three aspects of environmental/conservation attitudes dealt with in this study are (1) farmer's attitude about who is responsible for erosion control, (2) attitudes about land ownership, and (3) his willingness to adopt erosion control.

Steyn (1972) audience analysis showed consistent but rather weak relationships between such attitudes and the farmer's adoption of conservation/pollution abatement innovations.

Other research in adoption and diffusion indicates that if the innovation is relevant to the existing attitudes, adoption is more likely to be achieved (Rogers, 1962).

It is expected that these aspects of attitudes about environment and conservation will have a positive relationship with the "Agriculture and the Environment" practices.

Habits   Habits are defined as learned acts, regularly repeated, that are performed by the individual with reference to a given stimulus or in a certain kind of situation, and usually without thinking about the mechanics of doing it (Yarbrough et al., 1970). A habitual response occurs when the actor repeatedly receives similar stimuli, interprets them, and responds in the same satisfaction producing manner. While he initially may have thought extensively about his response to the stimuli, the repetitious cycle of similar stimuli-similar interpretation-similar response-satisfying reward tends to decrease the depth of his interpretation until he makes his typical response after only cursory scrutiny of the stimulus. Habits differ from such other dispositions as beliefs, values and attitudes primarily on the basis of the amount of intellectualizing required to move from reception of a stimulus to action. If a habitual pattern is present, the actor need only to identify the stimulus and the learned response is "wired in." The probability that an actor will behave consistently to a given stimulus is almost certain. Other dispositions are not nearly so determinant. Beliefs, values and attitudes are more guides to evaluation than they are direct determinants to action. The resulting behavior is much more likely to be situationally bound when beliefs, attitudes and values are the operative dispositions than when habits are operating.

Most human activity is probably habitual. This includes the cycle of our daily regimen of work, eat, play, sleep; the way we walk; when and from what sources we receive communications; even to such mundane patterns as the particular seats students choose to occupy day after day in a classroom.

Conservation related habits (prior behaviors) This dissertation examines four classes of farmer's prior behaviors which are thought to bear on his responsiveness to the "Agriculture and the Environment" program. Each of these is thought to represent a set of habituated behavior. Because they vary in origin and the ways they are thought to effect communication response, each will be discussed in some detail in the paragraphs below.

Organization participation Organizational participation is here defined as the degree to which people participate in formal voluntary associations. Research shows that when a farmer seeks out another farmer as a source of information, he does it partially on the basis of the types of organizations in which that farmer participates. In order for persons to pass along their personal messages about innovations and new ideas, they must have direct contact with their receivers.

Lionberger (1960) and Van den Ban (1957) found farm opinion leaders had greater participation in formal organizations than farmers with less influence. Beal and Bohlen (1962) reported that early adopters have direct contacts with agricultural agencies and are usually the leaders in farm organizations. They participate more than the majority in formal organizations and have wider social contacts.

In Pakistani villages Rahim (1961) showed that opinion leaders were members of more organizations than their followers. The degree to which farmers participate in farm organizations was revealed by Lionberger (1960) to be an important factor in selecting other farmers to whom they will go for information concerning farming matters. Social participation is additionally important because it may reflect people's interests and abilities. In some cases it may perhaps reflect certain attitudes because of different policy positions that exist in the farm organizations. A person who has a large number of farm organization memberships is more likely to attend the meetings of these organizations than one who has fewer memberships. The more opportunity a person has to interact with others, the more information this person is likely to pass on to other people. Therefore, one might expect that if a farmer has a large number of memberships in farm organizations, he will have more knowledge about agriculture and environment and will pass on more information to others concerning agriculture and environment than farmers with fewer farm organization memberships. It may be hypothesized that there would be a positive relationship between the number of farm organization memberships and the farmer's response to the "Agriculture and the Environment" program.

Use of specialized sources of information Individuals obtain information about the innovation from numerous sources. Often that the amount of information from these various sources is greater than the individual has time or interest to attend. This puts him into a situation where he has to select based on cues, only a fraction of the information available to him.

The sources of information vary in different dimensions. For example, they include varieties of mass media such as radio, television, magazines, newsletters, newspapers, short courses, meetings, and personal sources like extension agents, friends, neighbors, and scientists. They also vary according to their level of technological competence.

Yarbrough (1966) indicated that there are differences among information sources in the competence level of messages they convey. For example, popular news media like newspapers, radio, television and mass circulation magazines intentionally downgrade and simplify concepts in order to gain a minimum level of understanding with the largest number of persons possible. As a result, the information suffers in the reduction process. While journal articles and books written by one expert and read by experts in the same field normally have a high degree of technological competence, such written work cannot be read to an understanding without the help of skills acquired through specialized training.

Information from friends and neighbors generally tends to have a lower level of technological competence than from extension agents, while information from the research worker and specialist tends to be of a very high level of technological competence.

Beal and Bohlen (1962) reported 35 research studies conducted in the United States, and found that innovators, to a greater extent than farmers in other adopter categories, receive their information directly from the research worker and specialist at land-grant colleges, county agents, or commercial workers and subscribe to many farm magazines and papers including more specialized publications.

Previous research has shown differential use of competent information sources among individuals. Rogers and Burdge (1962) in a study of innovative behavior among Ohio truck growers found that innovators received information from neighbors, friends, or relatives.

Based on the findings of the cited studies it is expected that use of specialized sources of information would have a positive relation with responsiveness to the "Agriculture and the Environment" program.

Funds received from ACP The federal government provides funds for the Agricultural Conservation Program. The funds are to be given to the farmers as technical assistance (1) to encourage the use of conservation practices (2) to acquaint the farmers with various practices, and (3) to provide all the expenses that the practices may require.

Steyn (1972) audience analysis indicates that those farmers who received funds from ACP were more favorable toward conservation issues and had adopted the greatest number of pollution abatement practices.

It is expected that farmers who received funds from ACP would refer to their past experiences and have positive response with the "Agriculture and the Environment" program.

Adoption of pollution abatement innovations The individual's adoption stage on any given practice is at the point where he accepts an idea or practice as a part of his ongoing behavior. At this stage individuals would have become habituated to the idea. The mental set of critical evaluation characteristic of the previous two stages has changed to one of satisfaction with the idea or practice (Bohlen, 1967).

Traditional definitions of adoption demand manifestation of full scale use of the innovation, incorporating it into the adopter's life system or thought pattern (Rogers, 1962).

According to Barnett (1953), an innovation can be considered to be a new method of organizing cultural elements for attaining a given end. Innovations exhibit certain characteristics. Klonglan et al. (1967) classify innovations on the basis of the presence or absence of an object component. Based on this notion, they delineate two types of innovations: (1) innovations with only an idea component, and (2) innovations with both an idea and an object component. Klonglan and his associates point out that all innovations have an idea component but not all have an object component associated with the idea. For example, an innovation like communism has no object component associated with it except perhaps a membership certificate, and even then, it is only a symbol representative of the idea. There is no definite way to measure acceptance or degree of acceptance.

Most innovations associated with agriculture have both an idea component and an object component. For example, the object component of the innovation, planting corn in narrow rows can either be the actual practice of planting corn in narrow rows or the practice combined with a product like fertilizer. In the present study we are concerned with the adoption of conservation practices which are also considered to be pollution abatement innovations. Eleven conservation practices have been identified which farmers could adopt to help solve the deleterious effects that their farming operations have upon the environment. The set of practices are considered to be innovations which have both idea and object components.

It is expected that prior use of conservation practices will be positively related to the adoption of "Agriculture and the Environment" practices.

Summary of predispositional hypotheses We have proposed that people will be more favorably predisposed to the "Agriculture and the Environment" program when they have larger farm operations and are younger and better educated. Likewise, we have proposed more favorable response from those who maximize rational values in decision-making and from those who profess pro-environment beliefs and attitudes. If the receiver has participated in numerous social organizations, has a pattern of seeking information from specialized sources, has received funds from ACP and had adopted extensive conservation/pollution abatement practices, he is also expected to respond favorably to the program. In a more formal sense these expected relations may be stated as follows:

General Hypothesis 13: Those people who are more favorably predisposed will give greater attention to "Agriculture and the Environment" program than will unpredisposed people.

General Hypothesis 14: Those people who are favorably predisposed will be more likely to interact with referent groups about "Agriculture and the Environment" program.

General Hypothesis 15: Those people who are more favorably predisposed will likely have more accuarate comprehension of emphasized concepts in the "Agriculture and the Environment" program.

General Hypothesis 16: Those people who are more favorably predisposed will have more favorable cognitive acceptance of "Agriculture and the Environment" practices recommendations.

General Hypothesis 17: Those people who are more favorably predisposed will have more favorable affective acceptance of "Agriculture and the Environment" practices recommendations.

General Hypothesis 18: Those people who are more favorably predisposed will have favorably adopted "Agriculture and the Environment" practices recommendations.

CHAPTER 4: METHODOLOGY

Introduction

In the previous chapter a general conceptual framework was developed. This framework included its theoretical orientation, definitions of the theoretical concepts, and general hypotheses, which were developed in a logical procedure to serve as a guide for the remainder of the study. The discussions from Chapters 5 through 11 will be directed to the operationalization of the concepts and the development of empirical measures. Chapter 6 through 11 will also test the specific relationships of sender and receiver controlled inputs upon responses made to the "Agriculture and the Environment" series. From these tests, inferences will be made concerning the general level, hypothesized statements of relationship.

The first part of the present chapter contains the study design. The second part deals with data analysis techniques. The third portion will be devoted to data collection and sampling procedures.

Study Design

The experimental design utilized is an extension of Solomon's four-fold design (Solomon, 1949). It allows the researcher to control for both internal and external biasing factors. The extended design consists of 12 basic groups interviewed at three different times, 1972, 1974, and 1975. The design also has three basic factors: (1) treatment -- whether or not the receiver gets an experimental message with "yes" or "no" condition, (2) number of times that the groups have been pretested (this has three levels to it), and (3) sample, which is a comparison of two groups of people selected as high practitioners (H.P.) and a random sample (R.S.) from study population. Figure 6 presents the groups. An X designates groups that received treatments. The groups that are not assigned X serve as control groups. R indicates that the respondents were randomly assigned to the experimental conditions.

	Year of Interview				
	1972	1974		1975	Sample
R	0	0	X	0	H.P.
R	0	0	X	0	R.S.
R	0	0		0	H.P.
R	0	0		0	R.S.
R		0	X	0	H.P.
R		0	X	0	R.S.
R		0		0	H.P.
R		0		0	R.S.
R			X	0	H.P.
R			X	0	R.S.
R				0	H.P.
R				0	R.S.

Figure 6. Twelve-group design utilized in the "Agriculture and the Environment" communication experiment.

The first four groups were pretested twice. They were also the subjects of the post-tests. However, only the first two groups received treatments; the third and fourth groups did not. Groups five to eight had a pretest and post-test each -- the fifth and sixth groups receiving the treatments. Groups nine and ten had a treatment and a post test each and groups eleven and twelve only had a post-test each.

Given this design, several possible analyses can be conducted; however, there is no single statistical procedure which can examine all possible changes and isolate their source at once. However, by selecting only part of the data to examine or by making assumptions about some of the cells, one can analyze specific aspects of the data. For example, one can look at each sample as it was introduced and obtain unbiased estimates of those two groups at each point of time. Such an examination would allow a trend analysis of group responses. One can obtain an estimate of the effect of preconditioning by examining the difference on post-test responses between those not previously interviewed and those pretested.

The major concern here is to examine the effect of the experimental message and that can be done most directly as suggested by Campbell and Stanley (1963), by looking only at 1975 data. By considering the number of pretests and samples as well as message presence as experimental manipulations, a 3 x 2 x 2 analysis of variance of 1975 responses becomes an appropriate test for the design. The effect of the message will be the sum of squares associated with message presence/absence when number of pretests and sample are controlled. Examination of interaction of the message with pretest and sample may reveal other effects of interest. For example, it is possible that the message may have had differential impact upon the pretest group than upon the control group.

Attention and interaction responses cannot be measured so directly since any response by the treatment group at these levels is, by definition, a function of the treatment. Thus, as already suggested, a more appropriate test is to compare the attention and interaction responses with responses to other programs. However, there is no direct statistical test for such effects. Thus our concern is not only whether or not there was attention to and interaction about the communication message, but in determining the magnitude of this effect in relation to other programs of a similar nature. We also wish to determine the effects such attention and interactions have on further responses to the program and its recommended practices. The experimentally introduced effects on attention and interaction can be examined by controlling on sample and pre-interviews in a 2 x 3 ANOVA.

Receiver inputs will be analyzed simply by correlating 1974 with 1975 data. Receiver inputs test is confounded by the fact that pre-conditioning of the pre-interview will affect the level of response. It is also confounded in that regression tends to move the data towards means. However, there is no other way to test the receiver's inputs. Regression toward the mean will tend to lower the relationship of the receiver's preconditions with post-test positions. In the correlation of 1974 and

1975 data no attempt will be made to control the sample due to the fact that some had more than one pretest. Those people who received treatment were interviewed both in 1974 and 1975 and will be isolated.

Sampling and Data Collection

Data in this dissertation are drawn from a larger study of farmers and pollution control conducted by the Iowa State University Agriculture and Home Economics Experiment Station between 1972 and 1975.

In the 1972 study the sample consisted of 89 Iowa farmers who operated 80 or more acres and took part in the management decisions for the farm unit. The sample was drawn from three counties: Story, Union, and Woodbury.

Counties are included as units of study because of the functions they serve. Counties are political divisions. They include an urban center, a few small town centers, and about 10 to 15 neighborhoods. The urban center includes the municipal government, bank, social services, recreational and educational services as well as a courthouse. In short, counties are the smallest geographic units in which a communicator can retain some semblance of control over mass media messages. The counties selected represent different farming patterns and conservation needs and serve as main areas of operation for local conservation technicians and extension agents.

Forty-five of the farmers were drawn randomly within the three counties by area sampling methods. Forty-four of the farmers were selected as high practitioners of soil conservation. The high practitioners' group was selected by asking the County Extension Director and the County Soil Conservationist in each county to give a list of names of farmers whom they thought were concerned about and practicing soil conservation to a much greater extent than the average farmer.

The three counties sampled were chosen to represent a range of soil types, farming patterns, and conservation problems. The selection of the high practitioner group was used to provide evidence that a sufficient number of respondents practiced extensive soil conservation.

Steyn (1972), states that the sample as a whole is not random, thus the estimates of population characteristics based on results from the whole sample would be invalid. However, much of our interest is in the relationships between variables. Such relationships between variables are generally more stable from one sample to another than the actual values of the variables themselves.

All data were obtained by using a structured schedule in a personal interview situation at the respondent's home. Interviews were conducted in 1972, 1974, and 1975. Out of 89 farmers who were interviewed in 1972, nineteen were lost before 1974.

In 1974, one hundred and three respondents were added to the 70 original respondents who were still participating.

Before the 1975 interview, two more of those interviewed in 1972 were lost. A hundred and twelve new respondents were added and interviewed in 1975.

In part of the analysis 1974 data will be examined for possible differences between the two samples: random and high practitioners. The total number of cases examined in this analysis is 173. Table 1 presents 1974 respondents.

Table 1. Number of farmers in the panels in the 1974 interview.

Number of Pre-interviews	Random	High Practitioner	Total
1	31	39	70
0	61	42	103
Total	92	81	173

In 1975 the data were further broken down to include treatment and control groups. The breakdown is important in examining the impact and describing the effects of the communication program on the respondents' comprehension, acceptance of environment/conservation practices, and adoption of pollution abatement innovations.

The total number of cases to be analyzed from 1975 data is 273 and is outlined in Table 2.

As suggested earlier, to study attention to and interaction with referent groups about the "Agriculture and the Environment" program, only the treatment groups from 1975 data will be analyzed using 2 x 3 ANOVA design. This analysis allows isolation of the experimentally introduced factors, number of pre-interviews and sample (H.P. vs. R.S.). In the 1975 data the total number of cases to be examined is 177 and outlined in Table 3.

Table 2. Number of farmers in the panels in the 1975 interview.

Number of Pre-interviews	Random		High Practitioner		Total
	Control	Treatment	Control	Treatment	
2	10	20	14	24	68
1	19	36	14	24	93
0	24	44	15	29	112
Total	53	100	43	77	273

Table 3. Number of farmers in the 1975 treatment group.

Number of Pre-interviews	Random	High Practitioner	Total
	Treatment	Treatment	
2	20	24	44
1	36	24	60
0	44	29	73
Total	100	77	177

The receiver's inputs which are associated with the treatment groups interviewed both in 1974 and 1975 also will be analyzed. The total number of cases is 104 and presented in Table 4.

Table 4. Number of farmers in both the 1974 and 1975 interviews and receiving the treatment message.

Number of Pre-interviews	Random	High Practitioner	Total
	Treatment	Treatment	
2	20	24	44
1	36	24	60
Total	56	48	104

Scale Construction

Due to the multidimensional nature of the theoretical concepts, most of the receiver's inputs are operationalized by using scales. Most of these scales were developed in Steyn's (1972) pre-study. No attempt was made to re-validate her scales for the present sample. However, Steyn provides ample evidence on the validity and reliability of the selected measures as they apply to the 1972 data. The empirical measures developed for each aspect of the receiver's inputs are presented in the next chapter.

CHAPTER 5: RECEIVER INPUTS

Receiver inputs, in addition to sender inputs make a difference in what happens when a message is sent to a receiver. Receiver inputs include the knowledge and attitudes receivers have before the "Agriculture and the Environment" program was sent to them. Their prior conservation practice behavior, social status and other situational factors are also considered as part of the receiver inputs. The dimensions of the receiver inputs examined in this study include: situational factors, predisposition orientations and prior behavior.

The discussion and variables used to measure each dimension were drawn mainly from the Steyn (1972) study. The distribution tables are new additions for this section. The reader may wish to refer to Steyn's study for further details.

The discussion and the tables in this chapter are based on 1974 responses. The tables, for the most part, report findings in terms of categories. However, all variables except NETINC, were actually measured on interval scales and the raw interval scales (not the category data reported) will be used in all data analysis in the dissertation. Reported mean scores are based on the raw interval data.

The distribution of respondents is based on a pooling of the four categories of farmers outlined in the tables. The categories are shown because they will be relevant in the analyses reported in subsequent chapters.

The missing data are also excluded from the tables, thus the number of cases reported from table to table are not always identical with the number of cases reported in the previous chapter.

Attributes of the Firm

Attributes of the firm are operationally defined by three indices: net firm income, acres farmed and percentage of land owned. Each of these indices is used to measure the extent to which attributes of the firm may have an effect on an individual's actions and decisions regarding the adoption of environment-pollution control practices. Previous studies (Held and Clawson, 1965; Held, et al., 1962; Timmons and Fisher, 1963), indicate that the costs of conservation practices are frequently a hindrance to adoption. The studies suggest that a change in acreage coupled with a change in income might provide evidence whether a farm operation is expanding or decreasing. An increase in net income would likely indicate a greater ability to finance conservation practices. However, an increase in acreage might force the farmers to use more of his financial resources. This might decrease his ability and willingness to undertake conservation practices at the same time. Timmons and Fischer (1963) state that farm operators who are also owners are generally more concerned about and willing to adopt soil conservation practices.

Variable X-1: net farm income (NETINC)

Net farm income was measured by asking the respondents to indicate which income category "best estimates your average net income from your farming operation during the past 3 years?" Table 5 shows the distribution of the respondents according to net income category. Examination of this table indicates that about half of the respondents' net farm income spread between $7,500 to $19,999.

Variable X-2: total farm acreage (TOTALACR)

Total farm acreage was measured by asking the respondents to give their total farm acreage in 1973. The total farm acreage was the number of acres (owned or rented) operated in 1973. Table 6 shows the distribution of respondents' total farm acreage operated by category. The total farm acreage ranged from 80 to 2,500. Examination of this table shows two-thirds of the respondents farmed more than 320 acres of land in 1973. For the entire population the average of the total farm acreage operated by a respondent was 443 acres.

Variable X-3: percent of land owned (PCTOWNED)

Percent of land owned was measured by asking the respondents to indicate the number of acres farmed in 1973 which they owned. The percent of land owned was obtained by dividing the number of acres farmed in 1973 by the total farm acreage. Table 7 shows the distribution of respondents according to percentage of land owned by category. The respondents' percentage of land owned ranged from 0 to 100 percent. Examination of this table indicates that about half of the respondents owned between 80 to 99 percent of their land while the other half of the respondents spread between 0 to 79 percent. Based on the entire population an average farmer owned 65 percent of his land.

Table 5. Distribution of respondents according to net income category, 1974 survey.

Net Income Category	High Practitioners 1972 Panel % of 38	High Practitioners 1974 Panel % of 35	Random Sample 1972 Panel % of 30	Random Sample 1974 Panel % of 51
Under $2,500	0	3	3	2
$ 2,500 to $ 4,999	3	11	17	20
$ 5,000 to $ 7,499	10	9	30	24
$ 7,500 to $ 9,999	10	20	27	21
$10,000 to $14,999	21	11	13	21
$15,000 to $19,999	24	20	7	2
$20,000 to $29,999	21	17	0	8
$30,000 to $39,999	3	0	3	2
$40,000 and over	8	9	0	0
Total	100	100	100	100
Median	$15,000 to $19,999	$10,000 to $14,999	$5,000 to $7,499	$7,500 to $9,999

Table 6. Distribution of total farm acreage operated by category, 1974 survey.

Category	High Practitioners 1972 Panel % of 38	High Practitioners 1974 Panel % of 38	Random Sample 1972 Panel % of 30	Random Sample 1974 Panel % of 55
80 to 160	5	5	17	18
161 to 320	24	18	23	35
321 to 480	21	21	30	25
481 to 640	21	37	13	15
641 and over	29	18	17	7
Total	100	99	100	100
Mean	530	536	411	338

Table 7. Distribution of respondents according to percentage of land owned by category, 1974 survey.

Category		High Practitioners 1972 Panel % of 38	High Practitioners 1974 Panel % of 38	Random Sample 1972 Panel % of 30	Random Sample 1974 Panel % of 55
0 to 19		8	13	23	31
20 to 39		16	11	10	11
40 to 59		13	11	7	13
60 to 79		21	5	7	11
80 to 100		42	60	53	34
	Total	100	100	100	100
	Mean	69	76	70	52

Personal Characteristics

Personal characteristics are operationally defined by two indices. Each of these indices is used to measure the extent to which personal characteristics may have an effect on an individual's actions and decisions on the adoption of environment-pollution control practices.

Variable X-4: age

Age was measured by response to the question: What year were you born? From this the age in 1974 was calculated. Table 8 shows age distribution according to years of age categories. The ages of the respondents ranged from a low of 34 years to a high of 65 years. Examination of the table shows that most of the respondents are between their late forties (45 to 54); and early sixties (55 to 64); with the majority between 45 to 54 years. The average age of the respondents was 49.

Variable X-5: education: years of formal schooling

Several studies of agricultural innovations use the number of years of formal schooling as an empirical measure of education (Rogers, 1962). The number of years of formal schooling is assumed to be an achieved characteristic of general competence and knowledge. Education was measured by asking the question, "How many years of formal education have you completed?" The actual response in years of formal education was recorded. The education of the respondents ranged from 8 to 17 years of formal schooling. Table 9 shows the distribution of the respondents according to level of education achieved. Examination of this table

Table 8. Distribution of respondents' age by category, 1974 survey.

	High Practitioners		Random Sample	
Years of Age	1972 Panel % of 38	1974 Panel % of 38	1972 Panel % of 30	1974 Panel % of 55
34 years and under	11	11	17	18
35 to 44 years	16	10	13	22
45 to 54 years	34	50	30	29
55 to 64 years	29	29	27	24
65 years and older	10	0	13	7
Total	100	100	100	100
Mean	51	50	50	47

Table 9. Distribution of respondents according to level of education achieved, 1974 survey.

Level of Education	High Practitioners 1972 Panel % of 38	High Practitioners 1974 Panel % of 38	Random Sample 1972 Panel % of 30	Random Sample 1974 Panel % of 55
8th grade or less	13	11	20	9
Some high school	3	5	17	11
High school	45	62	53	65
Some college	21	11	7	9
College	15	11	3	4
Post-graduate	3	0	0	2
Total	100	100	100	100
Mean	12	12	11	12

indicates that about three-fourths of the respondents had completed high school. More than 20 percent had some college. The average number of years of formal schooling of the entire population was 11 years.

Orientations

The predisposition orientation variables measured in this study can be put into two categories: (1) those related to various orientations toward action and decision-making in general would be put into a single measure (ATTIND1); and (2) those related to various behavior patterns, attitudes, beliefs and knowledge.

Variable X-6: general orientation toward action and decision-making (ATTIND1)

General orientation toward action and decision-making was constructed from the variables: GOALTIME, ACTION and OPTIONS. These variables were measured by scales taken from Steyn (1972). Respondents were asked each statement in terms of strongly disagree; disagree; don't know; agree; or strongly agree.

GOALTIME is a summation of the scores assigned to the following statements:

1. There are so many unpredictables in farming that a farmer wastes his time planning for the future. (-)[1]

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[1]A minus sign after the statement (-) indicates that the farmer's disagreement received the highest score. The scores assigned to the responses were: strongly disagree, 6 points; disagree, 4 points; don't know, 3 points; agree, 2 points; strongly disagree, 0 points. Scoring for responses to items followed by a plus sign (+) was just the opposite.

2. It is better to live pretty much for today and let tomorrow take care of itself. (-)

3. With the rapid changes in the agricultural situation, setting long range goals is hardly worth the effort. (-)

4. The best approach to farm management is to take each season as it comes. (-)

The possible range for this scale is 0-24. In essence the GOALTIME scale represents a personality dimension of future orientation.

ACTION is a summation of the scores assigned to the following statements:

1. I'm really only interested in new ways of doing things when the old ways aren't working too well. (-)

2. The best time to find out about new equipment is when you have to replace something. (-)

3. A farmer should continuously seek information about new farm developments even if he isn't sure he can use it at the moment. (+)

4. I really enjoy learning about new farming practices and technologies even if I can't use them right away. (+)

5. Generally, extension clinics and short courses are only worthwhile when they deal with a problem which a farmer has on his farm. (-)

The possible range for this scale is 0-30. The ACTION scale represents a generalized information seeking value position.

The six items comprising the range of alternatives considered scale (OPTIONS) and their assigned scale directions are:

1. When replacing a piece of equipment a farmer is smart to just get the same thing again since he knows it works. (-)

2. A farmer should give serious consideration to any useful new practice even if adopting it might require other changes in his operation. (+)

3. It is very important to consider different ways of doing a job before deciding which one to use. (+)

4. In making farm decisions it's a good idea to consider advice gotten from many people and different sources. (+)

5. Farmers really don't have to think much about what they are going to do on their farms since this is largely decided for them by their land and the practices generally followed in the neighborhood. (-)

6. When faced with a farm management decision, the smart farmer only considers those choices which will pay off within a year or so. (-)

The possible range for this scale is 0-36. The OPTION scale is a measure of openness to consideration of alternative courses of action.

The farmer's general orientation toward action and decision-making (ATTIND1) was formed by summing the standardized scores for the three variables. The index appears to measure the interrelated personality dimensions of future orientation, generalized information seeking, and openness to consideration of alternative courses of action. Table 10 shows the distribution of respondents' general orientation toward action and decision-making index. Possible scores on the index ranged from 0 to 90. Examination of this table indicates that most of the respondents' attitudinal index scores were between 46 to 75 with about three-fourths of them falling in the 46 to 60 category. The respondents' average attitudinal score was 57. In short, most of the farmers studied profess a strong value preference for a rational approach to action and decision-making. The reliability coefficient for the ATTIND1 is .814.

Table 10. Distribution of respondents' predispositional orientation toward action and decision-making index, 1974 survey.

Category	High Practitioners 1972 Panel % of 38	High Practitioners 1974 Panel % of 38	Random Sample 1972 Panel % of 30	Random Sample 1974 Panel % of 55
0 to 15	0	0	0	0
16 to 30	0	0	0	0
31 to 45	0	0	10	9
46 to 60	79	60	80	67
61 to 75	21	37	10	24
76 to 90	0	3	0	0
Total	100	100	100	100
Mean	58	60	56	56

Environmental and conservation beliefs/knowledge

Environmental and conservation beliefs/knowledge are operationally defined by 3 indices. Each of these indices is used to measure the extent to which the individual's beliefs and knowledge may have an effect on his actions and decisions in adopting environment-pollution control practices.

Variable X-7: general concern about pollution (GENENVIR) Eight items included in variable GENENVIR appear to measure general concern about environmental quality and reaction to the "environmentalist" position. The items in the scale and their assigned scale directions are:

1. Although small amounts of agricultural chemicals are found in foods, these present no hazard to human health. (-)
2. Environmentalists often use scare tactics in arguing for more pollution controls. (-)
3. The strict restrictions on DDT use really are not justified. (-)
4. We must proceed slowly in working against pollution, otherwise we will interfere with our production of food and goods at reasonable prices. (-)
5. If one remembers that man has been changing his environment throughout history, all the recent fuss over environmental quality seems pretty exaggerated. (-)
6. It really seems idiotic that man keeps pouring tons of chemicals into the air, soil and water with almost no idea of where they will all end up. (+)
7. I'm pretty skeptical about most of the problems and harmful effects that environmentalists talk about. (-)
8. The big metropolitan areas which have most of the pollution problems are forcing overly strict regulations on the rest of the country. (-)

The possible range for this scale is 0 - 48. The variable GENENVIR is the summation of the standardized scores. Table 11 shows the distribution of the respondents' general concern about pollution by category. The range was from 0 to 48. Examination of this table shows that more than three-fourths of the respondents' general concern was between 17 to 24. The average GENENVIR score for the entire population was 21. In other words, the level of concern was relatively low. Steyn (1972) found that the reliability coefficient for GENENVIR was .80.

<u>Variable X-8</u>: <u>knowledge of agriculture and environment interaction (KNOWSC)</u> Fourteen questions were asked to measure the respondents' knowledge about factors affecting soil erosion, erosion control measure and the consequences of soil erosion. Six of the questions had 4-part multiple choice responses. They were scored (2) for a correct answer and (0) for an incorrect answer. The variable KNOWSC was obtained by summing the individual item scores. The individual knowledge items are presented in Appendix B, question numbers 70, 71 and 73-77 of the questionnaire. Table 12 shows the distribution of the respondents' knowledge of agriculture and environment interaction by category. The possible range was from 0 to 20. Examination of this table indicates that above three-fourths of the respondents' knowledge of agriculture-environment interaction was between 9 to 16. The average knowledge score for the entire population was 12.

<u>Variable X-9</u>: <u>perception of seriousness of erosion problem (EROSION)</u> The variable EROSION was measured by asking the respondents, "How important or unimportant a problem do you think soil erosion

Table 11. Distribution of respondents' general concern about pollution by category, 1974 survey.

Category	High Practitioners 1972 Panel % of 38	High Practitioners 1974 Panel % of 38	Random Sample 1972 Panel % of 30	Random Sample 1974 Panel % of 55
0 to 8	0	0	0	0
9 to 16	8	5	3	4
17 to 24	71	74	77	85
25 to 32	21	21	20	11
33 to 40	0	0	0	0
41 to 48	0	0	0	0
Total	100	100	100	100
Mean	21	21	21	21

Table 12. Distribution of respondents' knowledge of agriculture and environment interaction by category, 1974 survey.

Category	High Practitioners 1972 Panel % of 38	High Practitioners 1974 Panel % of 38	Random Sample 1972 Panel % of 30	Random Sample 1974 Panel % of 55
0 to 4	0	0	0	4
5 to 8	5	11	10	22
9 to 12	18	39	43	34
13 to 16	68	34	43	33
17 to 20	8	16	3	7
Total	99	100	99	100
Mean	13	12	11	11

is on this farm?" The interviewer explained that the question referred to erosion problems in the absence of any conservation practices presently used on the farm. Table 13 shows the distribution of the respondents' perception of erosion problem by category. Examination of this table indicates that about three-fourths of the entire respondents perceived erosion to be a problem on their farm. For the entire population the mean score was 3.5.

Environmental and conservation attitudes

Environmental and conservation attitudes are operationally defined by three indices. Each of these indices is used to measure the extent to which the individual's attitudes may have an effect on his actions and decisions in adopting environment-pollution control practices.

Variable X-10: attitudes about who is responsible for erosion control (WHOPAYEN) The five items comprising the variable WHOPAYEN and their assigned scale directions are:

1. Industries which pollute our air and water are really getting something for nothing. (+)
2. Factories should be required to clean up their waste products before releasing them into the air and water. (+)
3. Sediments from soil erosion cost the taxpayers money in maintaining streams, drainage ditches, lakes and reservoirs. (+)
4. Generally, those causing serious pollution should pay to clean it up. (+)
5. Strip-mining companies should be required to regrade and replant an area after mining it. (+)

The total score, WHOPAYEN, was obtained by summing the individual item scores. In essence the WHOPAYEN scale is a measure of attitudes

Table 13. Distribution of respondents' perception of erosion problem by category, 1974 survey.

Category	High Practitioners 1972 Panel % of 38	 1974 Panel % of 38	Random Sample 1972 Panel % of 30	 1974 Panel % of 55
Very unimportant problem	5	3	0	13
Unimportant problem	16	16	16	25
Somewhat of a problem	42	20	37	18
Important problem	13	24	27	27
Very important problem	24	37	20	16
Total	100	100	100	99
Mean	3.5	4.1	3.7	3.1

about who -- public or private sources -- should be responsible for controlling pollution and paying for pollution control. Table 14 shows the respondents distribution of who is responsible for erosion control. The range was from 0 to 30. Examination of this table indicates that more than three-fourths of the respondents agreed that those who pollute should be responsible for controlling it and pay for its control. The average WHOPAYEN score for the entire population was 20. Steyn (1972) found that the reliability coefficient for WHOPAYEN was .66.

Variable X-11: attitudes about land ownership rights (LANDRGTS) The variable LANDRGTS includes three scale items which are related to land ownership. These items and their assigned scale directions are:

1. Land owners have a moral obligation to use their land wisely and maintain its productivity. (+)
2. A landowner should be free to use his land just about any way he wants to. (-)
3. A landowner is really only a passing tenant with society as a whole holding the basic rights in land. (+)

The total score, LANDRGTS, was obtained by summing the number of points for each of the three items.

Table 15 shows the distribution of respondents' attitudes about land ownership rights. The respondents' attitudes score ranged from 0 to 18. Examination of this table indicates that nearly all respondents agreed that the landowners have limited rights over their lands. The average attitude score for the entire population was 11. Steyn (1972) found that the reliability coefficient for LANDRGTS was .41.

Table 14. Distribution of who is responsible for erosion control by category, 1974 survey.

Category	High Practitioners 1972 Panel % of 38	High Practitioners 1974 Panel % of 38	Random Sample 1972 Panel % of 30	Random Sample 1974 Panel % of 55
0 to 5	0	0	0	0
6 to 10	0	0	0	0
11 to 15	0	0	7	2
16 to 20	68	63	70	80
21 to 25	32	32	20	14
26 to 30	0	5	3	4
Total	100	100	100	100
Mean	20	20	19	20

Table 15. Distribution of respondents' attitudes about land ownership rights by category, 1974 survey.

Category	High Practitioners 1972 Panel % of 38	High Practitioners 1974 Panel % of 38	Random Sample 1972 Panel % of 30	Random Sample 1974 Panel % of 55
0 to 3	0	0	0	0
4 to 6	0	0	0	2
7 to 9	8	16	13	16
10 to 12	74	55	60	75
13 to 15	18	29	27	5
16 to 18	0	0	0	0
Total	100	100	100	100
Mean	11	11	11	11

Variable X-12: willingness to adopt erosion control practices (ADOPTSC) The variable ADOPTSC was structured to assess a farmer's willingness to adopt erosion control practices hypothesized to have different "pay-off" times. The respondents were first asked:

> Suppose the local Soil Conservation Service technician recommended that you should adopt certain erosion control practices on your farm. He estimates that the practices would completely pay for themselves after 20 years. Considering your present situation, would you be more likely to adopt or to reject the recommended practices?

If a farmer said he would be likely to reject or didn't know, the same question was asked except that the pay-off time was reduced to 10 years. If the farmer still rejected or didn't know, the question was asked again with a 5-year pay-off time.

Table 16 shows the distribution of respondents' willingness to adopt erosion control. The respondents' willingness to adopt erosion control ranged from not adopt to 20-year pay-off. Examination of this table shows that more than half of the respondents reported that they would likely adopt the recommended practices for 20-year pay-off. Based upon the entire population, the average ADOPTSC score was 3.1.

Prior Behavior

The prior behavior variables measured in this study can be put into four categories: (1) those related to organizational participation, (2) use of specialized information sources, (3) funds received from ACP, and (4) adoption of pollution abatement innovations.

Table 16. Distribution of respondents' willingness to adopt erosion control by category, 1974 survey.

Category	High Practitioners 1972 Panel % of 38	High Practitioners 1974 Panel % of 33	Random Sample 1972 Panel % of 30	Random Sample 1974 Panel % of 55
Not adopt	3	3	7	9
Don't know	3	0	3	5
5-year pay off	8	13	23	7
10-year pay off	18	26	23	22
20-year pay off	68	58	43	56
Total	100	100	99	99
Mean	3.4	3.3	2.8	3.0

Organizational participation

Social participation as indicated by organizational membership would perhaps increase a person's exposure to new ideas and information, widen his understanding of problems in his situation, and possibly provide means of solving his problems. Membership in various organizations might not directly concern soil conservation and probably has a small direct influence on the use of conservation practices. However, indirect effects through exposure to information and other ideas are possible.

Organizational participation is operationally defined by two indices: organizational participation index and participation in soil conservation program index. Interest in each of these indices is with the extent to which prior behavior may have an effect on an individual's actions and decisions on the adoption of conservation practices.

Variable X-13: organization participation index (GNORGIND) The variable GNORGIND was obtained by summing the standardized scores[1] of variables OFFICE, FMOFF and NONFMORG. OFFICE represents the scores from the following question: "Please estimate how many times you have ever served on any local or county agencies such as the school board, hospital board, Extension Council, welfare board, civic fund-raising committees, etc." The response categories and scoring were as follows:

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[1]Summated standard scores for variables GNORGIN, COMMIND, and SCPRACSC were obtained with the following general formula:

$$\sum_{i=1}^{n}(Xi-\bar{X}i)/S.D.$$

1 = Never
2 = 1 or 2 times
3 = 3 or 4 time
4 = 5 or more times

FMOFF represents the scores from the following question: "In which if any of these organizations: Farm Bureau, NFO, Grange, Farmer's Union, ASCS Committee, Soil Conservation Board, Cooperative Board, and Commodity Association (unspecified); have you ever held an office or served on committees? The variable FMOFF was scored as the total number of different farm organizations in which a respondent had served in an office or on a committee.

NONFMORG represents the scores from the question: "Besides farm organizations, to how many formal organizations do you presently belong? Such things as church, service organizations, lodge. . . ?" The variable NONFMORG was scored as the actual number of non-farm organizations to which a respondent presently belonged.

Table 17 shows the distribution of respondents organization participation index. By definition, the average standard score for the entire group is 0.

Variable X-14: participation in soil conservation programs index (SCPART) The composite index SCPART was obtained by equally weighing and summing the variables, PROPLAN, SCDCOOP and YRSACP. One important task of the SCS is to work out farm plans designed to produce the optional operation of a farm unit consistent with good conservation practices. If a farmer had such a plan, the variable PROPLAN was scored 1. If he had no plan, PROPLAN was scored 0.

Table 17. Distribution of the respondents' organization participation index, 1974 survey.

Summated Standardized Scores	High Practitioners 1972 Panel % of 38	High Practitioners 1974 Panel % of 38	Random Sample 1972 Panel % of 30	Random Sample 1974 Panel % of 55
-2.99 to -1.5	11	21	40	51
-1.49 to 0	18	13	30	25
.01 to 1.5	21	29	17	16
1.51 to 3.0	24	24	10	7
3.01 to 4.5	18	8	3	0
4.51 to 6.0	5	5	0	0
6.01 and above	3	0	0	0
Total	100	100	100	99
Mean	1.4	.8	-.75	-1.09

SCDCOOP represents the scores from the following question: "Are you now a cooperator in your local Soil Conservation District?" If the respondent was a cooperator, the variable SCDCOOP was scored 1. If he was not a cooperator, SCDCOOP was scored 0.

YRSACP represents the scale assigned to the following question: "Do you recall how many different years you have participated in these cost-sharing conservation programs during the past 10 years?" Table 18 shows the distribution of respondents' participation in soil conservation. The index ranged from no participation to high participation. Examination of this table shows that over 80 percent of the respondents were participants of soil conservation programs. The average respondent's SCPART score was 1.7.

Variable X-15: use of specialized information sources (COMMIND)

The composite index, COMMIND was obtained by summing the standardized scores of seven variables. The seven variables measuring various types of communication behavior include EXTEN1, EXTEN2, COURSES, SFARMMG, EXTEN3, EXTEN4 and TRAVEL.

EXTEN1 and EXTEN2 represent the scores from the following questions. Respondents were asked to estimate how many times during the past year they had attended (1) a meeting at which the County Extension Director presented information (EXTEN1) or (2) a meeting at which State or Area Extension Specialists presented information (EXTEN2). Total number of meetings attended in each category were scored.

The variable COURSES represents the scores from the question: During the past year did you attend any short courses, clinics, or agricultural

Table 18. Distribution of respondents' participation in soil conservation program index, 1974 survey.

	High Practitioners		Random Sample	
Category	1972 Panel % of 38	1974 Panel % of 38	1972 Panel % of 30	1974 Panel % of 55
No participation	5	5	30	36
Low participation	13	8	13	20
Moderate participation	34	39	37	29
High participation	47	47	20	15
Total	99	99	100	100
Mean	2.2	2.3	1.4	1.2

conferences sponsored by the Extension Serice or a commercial firm?" If the response were affirmative, the farmer was asked to recall the general subject of the meetings. The variable COURSES was scored as the total number of such meetings attended during the past year.

The variable SFARMMG represents the scores for the responses given by respondents when asked to indicate which specialized farm magazines they usually read. Magazines in this category included National Hog Farmer, Beef Magazine, The Soybean Farmer, Crops and Soils, Hog Farm Management, Feed & Nutrition Review, and various others which farmers indicated they read. Considering the ones which they read as a group, the respondents estimated how thoroughly they read this type of farm magazine. The response categories and scoring were as follows:

1 = Hardly look at
2 = Skim through, read a few things
3 = Read about one-half
4 = Read about three-fourths
5 = Read cover-to-cover

The variable SFARMMG was obtained by multiplying the number of magazines read by the extent of coverage score.

EXTEN3 represents the total number of Extension bulletins or other publications which a respondent had received during the past year.

EXTEN4 represents the number of times a farmer had visited or talked with a member of the County Extension Staff during the past year.

The variable TRAVEL represents the summation of the scores for the question: "During the past year, did you travel to any other farm to look at a new practice or piece of equipment which you were considering trying out yourself?" Respondents were scored as (1) for "no" and

(2) for "yes." Table 19 shows the distributions of respondents' use of specialized information sources index. The index ranged from -6.9 to 14.01 and above. The definition, the average COMMIND score was 0.

Variable X-16: funds received from ACP (ACPFUNDS)

Respondents were asked, "During the past 10 years, about how much money altogether have you received from the Agricultural Conservation Program?" The variable ACPFUNDS score represents the estimated number of dollars received.

Table 20 shows the distribution of funds received from ACP. The funds received ranged from 0 to 5,001. Examination of this table indicates that over one-fourth of the entire respondents did not receive any ACP funds. Less than one-fourth of the respondents received between $1 to 1,000 and 1,001 to 2,000 respectively. Examination of this table shows that above 70 percent of the respondents received funds from ACP. The average money received was $3,301.

Variable X-17: adoption of pollution abatement innovations (SCPRACSC)

The variable SCPRACSC was measured by asking the respondents to indicate to what extent they used each of 11 different conservation/ pollution abatement practices. The list of practices was compiled from previous studies (Blase, 1960), and included the following: terraces (acres served); grassed waterways (acres served); permanent cover (acres); contour farming (acres); permanent open drainage (acres served); winter cover (acres served); diversion terraces, ditches or dikes (number);

Table 19. Distribution of respondents'use of specialized information sources index, 1974 survey.

Category	High Practitioners 1972 Panel % of 38	High Practitioners 1974 Panel % of 38	Random Sample 1972 Panel % of 30	Random Sample 1974 Panel % of 55
-6.9 to - 3.5	0	3	23	16
-3.59 to 0	34	37	37	53
.01 to 3.5	55	47	30	24
3.51 to 7	8	5	0	7
7.01 to 10.50	3	3	7	0
10.51 to 14.00	0	0	0	0
14.01 to Hi	0	4	3	0
Total	100	100	100	100
Mean	.96	1.65	-1.65	- .85

Table 20. Distribution of funds received from ACP by category, 1974 survey.

Category	High Practitioners 1972 Panel % of 38	High Practitioners 1974 Panel % of 38	Random Sample 1972 Panel % of 30	Random Sample 1974 Panel % of 55
0	11	11	37	55
1 to 1,000	26	26	17	7
1,001 to 2,000	16	26	17	7
2,001 to 3,000	13	16	0	11
3,001 to 4,000	5	0	10	4
4,001 to 5,000	5	13	3	11
5,001 and over	24	10	3	5
Total	100	100	100	100
Mean	$4206	$3514	$1454	$3516

sod-based rotations (acres); erosion control dams, pits, or ponds (number); underground tile drainage (acres served); and contour strip-cropping (acres).

For those practices measured in terms of acres or acres served, the estimate for each practice was divided by the total cropland acreage to control for differences in farm size.

The variable SCPRACSC was calculated in this manner to combine measurements taken in different units and to provide an overall index of conservation practice. The scores were standardized separately for each county, thereby taking into account the rather marked differences in conservation needs from one county to another. However, it does not account for differences in need among farms within a county. It is important to note that SCPRACSC is a relative measure. Farmers with high values on SCPRACSC may or may not practice much conservation in terms of their actual needs.

Table 21 shows the distribution of the respondents adoption of pollution abatement innovation index. The index ranged from -6 to 6.01. By definition, the average SCPRACSC score is 0.

Summary of Predispositional Findings

Examination of the data indicates that three general conclusions may be drawn from the predispositional variables examined in this chapter.

(1) Generally there was considerable variance among the farmers studied.

Table 21. Distribution of respondents' soil conservation practices by category, 1974 survey.

Category	High Practitioners 1972 Panel % of 38	High Practitioners 1974 Panel % of 38	Random Sample 1972 Panel % of 30	Random Sample 1974 Panel % of 55
-2.99 to -1.5	3	8	3	11
-1.49 to 0	50	39	33	58
.01 to 1.5	44	31	50	25
1.51 to 3.0	3	11	10	4
3.01 to 4.5	0	11	3	2
4.51 to 6.0	0	0	0	0
6.01 and above	0	0	0	0
Total	100	100	99	100
Mean	.02	1.53	1.25	-1.71

(2) The variance was not as great on measures of cognitive and affective orientations. In other words, the farmers studied tend to be relatively homogeneous in their beliefs, attitudes and values in the area of conservation/pollution abatement.

(3) It is also apparent that high practitioners differed from members of the random sample on most characteristics studied. However, these differences were not the concern of this chapter. They will be analyzed in some detail in the chapters that follow.

On a more specific level, the finding of analysis of the farmer's position prior to introduction of the "Agriculture and the Environment" program in 1974 were as follows:

There was considerable variance in situational attributes of the farmers studied. Net farm income ranged from $2,500 to more than $40,000. The median net income was between $10,000 to $14,999. Total acres farmed by respondents ranged from 80 to 2,500. The average total acres of farmland owned was 443 acres. About two-thirds of the respondents farmed more than 320 acres. The percentage of land owned ranged from 0 to 100. Two-thirds of the farmers owned at least part of the land they farmed. The average percentage of land owned was 65.

Respondents' ages ranged from 22 to 82. The average age is 49 and most of the farmers were between 45 and 64 years of age. Years of formal schooling ranged from 8 to 17 years. The average education was 12 years. The majority of the farmers had completed high school. About 12 percent had some college training.

The farmers studied were relatively homogeneous in terms of orientation measures. However, one can only conclude that, overall, they have ambivalent beliefs, attitudes and values concerning the issues of conservation/pollution abatement. On certain scale dimensions they reflect a pro-environmental stance. On other issues they are somewhat opposed to the environmentalist viewpoint.

Nearly all the respondents had rational values regarding farm decision-making and action. Possible scores on the ATTIND scale ranged from 0 to 90 and an average of 57. More than 60 percent of the respondents scored between 46 to 60. Despite their rational value positions, respondents feel little concern about environmental pollution caused by agricultural practices. On a scale measuring general concern about environmental pollution with a possible range of 0 to 48 points (the high score equaled high concern) over three-fourths of the respondents had scores in the 17 to 24 point range. The mean score was 21. Knowledge of soil conservation principles, on the other hand, was adequate for most of the farmers (although a number had considerable misinformation). About 45 percent of the respondents' scales were within the 13 to 16 category on a scale with a possible range from 0 to 20. The average score was 12. Most of the respondents perceived that erosion would be a serious threat on their farms in the absence of control practices. The possible score ranged from 0 to 6; the average score was 3.5. Nearly all respondents agreed that those who pollute should pay, but they are somewhat less likely to see this criteria as applying to farmers. The possible scale ranged from 0 to 30 with an average score of 20. Nearly all farmers agreed that landowners have only limited rights over their lands. Sixty-six percent of the farmers' scales are within the 10 to 12 category on a scale with a possible range of 0 to 18; the average score was 11. Finally, a majority of the farmers were willing to adopt conservation/ pollution abatement practices even if 20 years were required for payoff. An additional 10 percent were willing to adopt if payoff were within 10 years.

The chapter also examined a number of behaviors of farmers, some of which are indicators of conservation/pollution abatement action; some of which are behaviors that might logically be expected to be related to attention to and acceptance of the experimental information program. Considerable variation among the farmers was found on these measures.

While most farmers made some use of specialized information sources such as attending short courses, field days, using extension bulletins or reading specialized farm magazines, the extent of use varied markedly from farmer to farmer.

In a similar vein, while most farmers belong to at least one farm organization, and many belong to non-farm organizations, the degree of participation varies widely.

A majority of the respondents had participated in some way in a soil conservation program, but the extent of their participation varied widely. For example, the amount of cost-sharing funds receiving ACP ranged from $75 to more than $80,000 during the previous 10 years.

Nearly every farmer was already using at least one soil conserving practice on his farm, but, again, the extent of use varied widely.

CHAPTER 6: ATTENTION FINDINGS

Attention was defined as the process by which an individual selects stimuli from his environment upon which he will focus. Attention given to the information series was operationally defined by an attention index. The attention index was used to measure the degree of attention (or inattention) an individual gives to "Agriculture and the Environment."

Variable Y-1: Attention Index (ATTENML)

The attention index consisted of a five-point scale summarizing degree of awareness of programs and level of reading of each of 19 articles.

Summary: responses to three awareness questions

Eighty-one percent of 177 respondents could recall receiving the materials when given only the title and source of the communication program (see Table 22). Ninety-one percent of the respondents reported they were aware of the program when recall was aided with examples from the mailing packet, an increase of 10 percent. Eighty-nine percent of the respondents said they were aware of the program when shown the notebook included in the first mailing. This is a gain of 8 percent over those who recalled the mailings when given only the title and source of the communication program. Combining the positive responses from all three questions, 93 percent of 177 respondents said they recalled the communication program.

This is a very high level of attention when compared to other communication programs.

Table 22. Responses to questions measuring awareness of "Agriculture and the Environment" communication program, 1975 survey.

	Pretested Respondents		New Respondents	
Question and Code	High Practitioner % of 48	Random Sample % of 56	High Practitioner % of 29	Random Sample % of 44
During the past 10 months, 5 issues of an information program concerning conservation and the environment has been mailed to some farmers in this county. Are you in any way familiar with, or have you heard anything about this?				
1 = No	15	23	14	16
2 = Don't know	0	2	0	2
3 = Yes	85	75	86	82
Here's an example of the way one of the mailings looked, with examples of five of the 19 articles. Do you recall receiving anything similar to this? (Show mailing envelope)				
1 = No	6	13	3	9
2 = Don't know	0	4	0	0
3 - Yes	94	84	97	91
In the first mailing, a notebook similar to this (they came in several colors), was mailed so the farmer could accumulate and file the 19 articles. Do you recall receiving anything like this? (Show cover of notebook)				
1 = No	6	13	7	11
2 = Don't know	0	2	0	5
3 = Yes	94	86	93	84

Summary: responses to article readership questions

To determine whether those aware had read the program materials received they were given a copy of the completed notebook and asked to look at each article and to respond in terms of how thoroughly they had read each article. A score of 0 was assigned if the respondent said he didn't remember seeing the article; 1 was assigned for the response "only briefly glanced at it"; 2 was assigned for the response "skimmed most of it, read none thoroughly"; 3 was assigned for "skimmed most of it, read some parts thoroughly"; and 4 was assigned for "read most parts of it thoroughly."

The distribution of responses for each of the 19 articles is given in Table 23. In general these data show a relatively high level of attention as compared with that found in similar information programs.

Indexing procedures

The index of the individual's attention response to the "Agriculture and the Environment" program is based upon both his overall awareness of the program, and, if aware, the extent to which he read each of the 19 articles. A diagram of the overall indexing procedure is presented in Figure 7. If the respondent answered "no" to all three awareness questions, he was assigned a score of 0 and was classified as "unaware." If the respondent was aware, but answered "don't recall seeing it" or "only briefly glanced at it" for all 19 articles, he was classified as "aware, not read" and received a score of 1. Further readership scores were

Table 23. Responses to questions measuring level of exposure and degree of attention given to each of the 19 articles (aware respondents only), 1975 survey.

	Pretested Respondents		New Respondents	
Article and Code	High Practitioner % of 46	Random Sample % of 49	High Practitioner % of 28	Random Sample % of 41
Pesticides, pollution, and the food production push				
0 = Don't remember seeing this article	4	12	11	15
1 = Only briefly glanced at it	33	35	39	32
2 - Skimmed most, read none thoroughly	15	20	21	12
3 = Skimmed most, read some thoroughly	13	14	11	24
4 = Read most parts thoroughly	35	18	18	17
5 = Mean response score	2.31	1.68	1.79	1.84
Soil erosion costs money -- on and off the farm				
0 = Don't remember seeing this article	4	6	18	10
1 = Only briefly glanced at it	30	35	21	35
2 = Skimmed most, read none thoroughly	15	16	29	18
3 = Skimmed most, read some thoroughly	17	22	14	20
4 = Read most parts thoroughly	33	20	18	18
5 = Mean response score	2.33	1.89	1.86	1.82
Conservation views: farmers and conservation specialists				
0 = Don't remember seeing this article	13	27	18	28
1 = Only briefly glanced at it	24	31	32	28
2 = Skimmed most, read none thoroughly	11	14	18	23
3 = Skimmed most, read some thoroughly	18	16	21	15
4 = Read most parts thoroughly	33	12	11	8
5 = Mean response score	2.19	1.38	1.69	1.34

Table 23. (continued)

Question and Code	Pretested Respondents High Practitioner % of 46	Pretested Respondents Random Sample % of 49	New Respondents High Practitioner % of 28	New Respondents Random Sample % of 41
Landowners cooperate in watershed development				
0 = Don't remember seeing this article	16	27	18	23
1 = Only briefly glanced at it	24	27	32	25
2 - Skimmed most, read none thoroughly	27	12	14	25
3 = Skimmed most read some thoroughly	9	12	29	13
4 = Read most parts thoroughly	24	22	7	15
5 = Mean response score	1.90	1.55	1.69	1.57
Communities cooperate in RC&D projects				
0 = Don't remember seeing this article	29	43	21	25
1 = Only briefly glanced at it	40	20	32	43
2 = Skimmed most, read none thoroughly	16	16	29	20
3 = Skimmed most, read some thoroughly	7	10	7	8
4 = Read most parts thoroughly	9	10	11	5
5 = Mean response score	1.19	1.09	1.48	1.14
Who pollutes				
0 = Don't remember seeing this article	11	25	21	20
1 = Only briefly glanced at it	22	25	29	23
2 = Skimmed most, read none thoroughly	20	12	21	20
3 = Skimmed most, read some thoroughly	20	20	14	20
4 = Read most parts thoroughly	27	18	14	18
5 = Mean response score	2.15	1.51	1.66	1.75

Table 23. (continued)

	Pretested Respondents		New Respondents	
Question and Code	High Practitioner % of 46	Random Sample % of 49	High Practitioner % of 28	Random Sample % of 41
Soil loss regulations				
0 = Don't remember seeing this article	16	16	14	13
1 = Only briefly glanced at it	16	31	21	26
2 = Skimmed most, read none thoroughly	16	22	25	26
3 = Skimmed most, read some thoroughly	24	16	18	13
4 = Read most parts thoroughly	29	14	21	23
5 = Mean response score	2.21	1.69	2.03	1.84
Livestock and pollution: your legal duties				
0 = Don't remember seeing this article	13	22	11	13
1 = Only briefly glanced at it	24	16	18	30
2 = Skimmed most, read none thoroughly	18	20	29	20
3 = Skimmed most, read some thoroughly	24	14	21	13
4 = Read most parts thoroughly	20	27	21	25
5 = Mean response score	2.00	1.80	2.17	1.89
New pesticide regulations -- some duties; some help				
0 = Don't remember seeing this article	20	27	21	18
1 = Only briefly glanced at it	24	31	29	28
2 = Skimmed most, read none thoroughly	13	12	14	21
3 = Skimmed most, read some thoroughly	18	18	14	13
4 = Read most parts thoroughly	24	12	21	15
5 = Mean response score	1.90	1.39	1.79	1.64

Table 23. (continued)

Question and Code	Pretested Respondents High Practitioner % of 46	Pretested Respondents Random Sample % of 49	New Respondents High Practitioner % of 28	New Respondents Random Sample % of 41
Concerned about pesticide safety				
0 = Don't remember seeing this article	9	22	18	15
1 = Only briefly glanced at it	18	29	39	33
2 = Skimmed most, read none thoroughly	9	12	11	18
3 = Skimmed most, read some thoroughly	33	18	14	23
4 = Read most parts thoroughly	31	18	18	13
5 = Mean response score	2.44	1.59	1.69	1.68
'75 fertilizer outlook -- what's new/what you can do				
0 = Don't remember seeing this article	14	22	11	18
1 = Only briefly glanced at it	18	27	21	30
2 = Skimmed most, read none thoroughly	11	10	11	18
3 = Skimmed most, read some thoroughly	18	14	32	18
4 = Read most parts thoroughly	39	27	25	18
5 = Mean response score	2.29	1.71	2.31	1.71
Changes in corn rootworm treatment				
0 = Don't remember seeing this article	11	22	21	28
1 = Only briefly glanced at it	22	22	25	25
2 = Skimmed most, read none thoroughly	16	16	18	20
3 = Skimmed most, read some thoroughly	20	16	18	18
4 = Read most parts thoroughly	31	22	18	10
5 = Mean response score	2.23	1.70	1.79	1.43

Table 23. (continued)

Question and Code	Pretested Respondents: High Practitioner % of 46	Pretested Respondents: Random Sample % of 49	New Respondents: High Practitioner % of 28	New Respondents: Random Sample % of 41
Minimum tillage: conservation plus				
0 = Don't remember seeing this article	7	12	7	18
1 = Only briefly glanced at it	13	25	18	28
2 = Skimmed most, read none thoroughly	18	12	14	10
3 = Skimmed most, read some thoroughly	22	16	43	20
4 = Read most parts thoroughly	40	35	18	25
5 = Mean response score	2.58	2.07	2.38	1.89
Problem-solving with grassed waterways				
0 = Don't remember seeing this article	13	20	11	18
1 = Only briefly glanced at it	36	20	21	33
2 = Skimmed most, read none thoroughly	18	14	25	20
3 = Skimmed most, read some thoroughly	11	20	25	10
4 = Read most parts thoroughly	22	25	18	20
5 = Mean response score	1.81	1.82	2.10	1.66
Terraces protect the land, protect farming investments				
0 = Don't remember seeing this article	18	20	14	18
1 = Only briefly glanced at it	27	31	25	38
2 = Skimmed most, read none thoroughly	18	10	25	15
3 = Skimmed most, read some thoroughly	20	16	18	20
4 = Read most parts thoroughly	18	22	18	10
5 = Mean response score	1.81	1.66	1.93	1.52

Table 23. (continued)

Question and Code	Pretested Respondents: High Practitioner % of 46	Pretested Respondents: Random Sample % of 49	New Respondents: High Practitioner % of 28	New Respondents: Random Sample % of 41
Conservation cost-sharing				
0 = Don't remember seeing this article	9	20	18	18
1 = Only briefly glanced at it	22	27	25	28
2 = Skimmed most, read none thoroughly	22	10	18	18
3 = Skimmed most, read some thoroughly	29	18	21	18
4 = Read most parts thoroughly	18	25	18	20
5 = Mean response score	2.10	1.75	1.90	1.77
Old funds about gone -- new monies debated				
0 = Don't remember seeing this article	24	39	18	33
1 = Only briefly glanced at it	36	22	36	23
2 = Skimmed most, read none thoroughly	16	16	29	18
3 = Skimmed most, read some thoroughly	22	12	11	8
4 = Read most parts thoroughly	2	10	7	20
5 = Mean response score	1.33	1.16	1.48	1.46
Conservation programs seem confusing				
0 = Don't remember seeing this article	33	39	29	38
1 = Only briefly glanced at it	31	20	32	25
2 = Skimmed most, read none thoroughly	18	12	21	18
3 = Skimmed most, read some thoroughly	7	20	4	10
4 = Read most parts thoroughly	11	8	14	10
5 = Mean response score	1.23	1.21	1.38	1.18

Table 23. (continued)

	Pretested Respondents		New Respondents	
Question and Code	High Practitioner % of 46	Random Sample % of 49	High Practitioner % of 28	Random Sample % of 41
Information directory				
0 = Don't remember seeing this article	20	35	29	30
1 = Only briefly glanced at it	46	29	39	40
2 = Skimmed most, read none thoroughly	22	18	11	15
3 = Skimmed most, read some thoroughly	11	8	11	5
4 = Read most parts thoroughly	2	10	11	10
5 = Mean response score	1.25	1.14	1.31	1.14

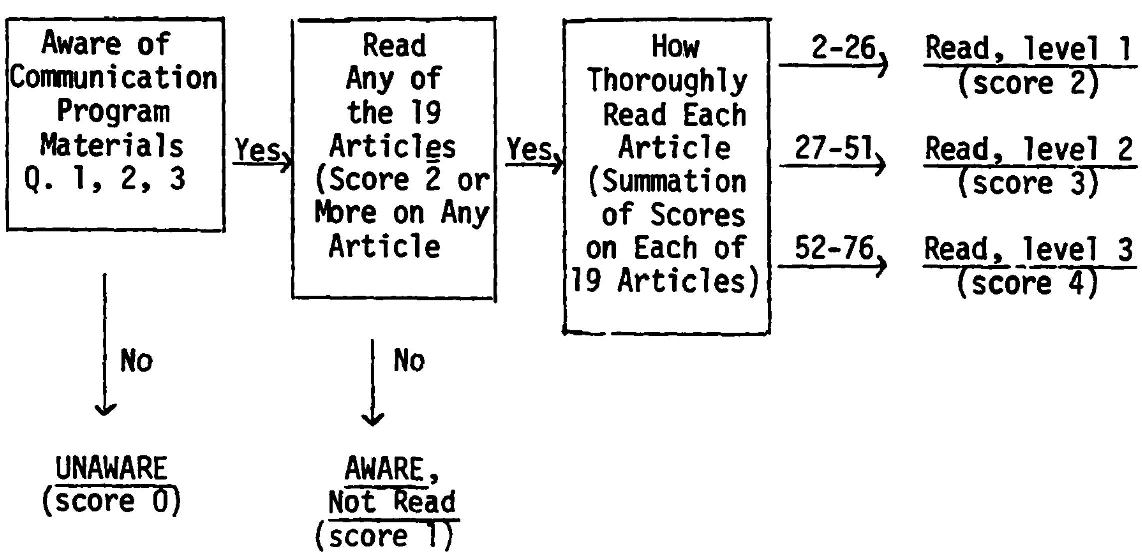

Figure 7. Scoring procedure for overall attention index.

limited to those who had indicated minimal readership of at least one article. For this group reading scores were summed and divided into three groups of equal interval: those with a summated reading score of 2 to 26 points received an overall attention score of 2. Those with a summated reading score of 27 to 51 points received an overall attention score of 3. Those with a summated reading score of 52 to 76 points received an overall attention score of 4. The minimal summated reading score of 2 indicated that the respondent had read only one article and that only at the level of "skimmed most of it, read none thoroughly." The maximum summated reading score of 76 indicated that the respondent had read each of the 19 articles at the level of "read most parts of it thoroughly."

Table 24 presents the distribution of summary attention scores.

Comparative Attention

Attention was evaluated by comparing the "Agriculture and the Environment" program to other programs that used attention as one of their measures. The hypothesis tested was this:

> General Hypothesis 1: Overall attention given the "Agriculture and the Environment" program will rank among the top third of a variety of specialized communication programs.

In Chapter 3 five technical information programs were described in terms of the degree to which they met a number of theoretical criteria for attention power. As a baseline, the theoretical attention power of an average newspaper article was also described. On the basis of these criteria it was concluded that the "Agriculture and the Environment"

Table 24. Summary of total responses of exposure and degree of attention paid to the nineteen articles, 1975 survey.

	TREATMENT			
	High Practitioner		Random Sample	
Category	Pretest % of 48	No Pretest % of 56	Pretest % of 29	No Pretest % of 44
Unaware	4	12	3	7
Aware, not read	8	16	17	21
Read low	12	21	14	18
Read moderately	56	32	48	39
Read high	19	18	17	16
Total	99	99	99	100
Mean	2.8	2.6	2.3	2.4

program should have high attention power. On this basis the following empirical hypothesis is derived from General Hypothesis 1.

> Empirical Hypothesis 1a: The "Agriculture and the Environment" program will rank above other programs examined except the HFPS and ENP.

Five of the information programs could be placed on a scale comparable with the "Agriculture and the Environment" program. The programs and the scales are presented in Table 25. Examination of the table indicates that our hypothesis with regard to the "Agriculture and the Environment" program was supported.

The experimental program ranked above all other programs except the Expanded Nutrition Newsletter (ENP) and was comparable to responses to the first phase of the Home Fallout Protection Survey (HFPS).

Available data on readership of the newspaper articles could not be placed on a scale comparable to readership scores for those obtained in the present study. However, the most recent national newspaper readership study (1973) shows that the average daily newspaper article is read by 25 percent of subscribers. The average "Agriculture and the Environment" article was read by 53 percent of those in the treatment group.

Experimental Design Factors and Attention Response

> General Hypothesis 2: Attention given the "Agriculture and the Environment" program will be partly a function of experimentally introduced "message-like" manipulations and audience selection factors.

The sender's experimental design manipulations including pretesting some respondents and the introduction of two samples (high practitioners

Table 25. Comparable attention given six programs.

			CSP				
	AG/ENV	ENP	H-14	MAPS	HFPS	CORN	TENCO
0 = Read None	22	25	55	63	43	18	50
1 = Read Some	60	23	42	31	20	77	48
2 = Read High or All	18	52	3	6	37	5	2
Mean	.96	1.27	.48	.43	.94	.87	.52

and a randomly drawn sample) were hypothesized to influence the respondents' level of attention given to the "Agriculture and the Environment" program. Based on this assumption two empirical hypotheses were derived from the General Hypothesis 2 to test these effects.

> Empirical Hypothesis 2a: The pretested group will give more attention to the "Agriculture and the Environment" program than will the unpretested group when the effects of sample are statistically controlled.

> Empirical Hypothesis 2b: The high practitioner group will give more attention to the "Agriculture and the Environment" program than will the random group when the effects of pretest are statistically controlled.

A 3 x 2 analysis of variance test was performed to test three hypotheses. As shown in Table 26, only the hypothesis related to sample selection was supported. Identified high practitioners gave more attention to the program than did the random sample of farmers. The number of pretest surveys a respondent had participated in prior to the program did not significantly influence attention and there was no significant interaction of pretests and sample selection regarding the attention response.

Table 26. Analysis of variance for effects of experimental methodology on level of attention given to the mailings.

Source	Mean Square	F Ratio	Level of Significance	Conclusion
Pretest	3.621	2.032	.132	Rejected
Sample	7.865	6.096	.014	Supported-Moderate
Interaction	2.827	2.191	.113	Rejected

Effects of Predispositions Upon Attention

An individual brings into the communication situation a number of factors. These factors are considered as predispositions and can influence the way the receiver responds to the message. The receiver can be favorably or unfavorably predisposed toward the message.

> General Hypothesis 13: Those people who are more favorably predisposed will give greater attention to the "Agriculture and the Environment" program.

Based upon the theoretical arguments presented in Chapters 3 and 5 regarding the nature of relevant predispositions in the case of the program the following three sub-hypotheses can be stated:

> Sub-Hypothesis 13a: Respondents who possess the situational attributes of operating larger farming units and being younger and better educated will give greater attention to the information program.

> Sub-Hypothesis 13b: Respondents whose general and issue-related orientations (beliefs, attitudes and values) are more pro-environmental will give greater attention to the information program.

> Sub-Hypothesis 13c: Respondents who have taken prior actions which are compatible with the techniques and goals of the information program will give greater attention to it.

Each of these sub-hypotheses is further operationalized by several empirical measures. Each is directional in nature. They are stated in summary form in column two of Table 27. Pearsonian zero-order correlation coefficients were calculated for each empirical hypothesis and the level of significance of these coefficients were used as a test of the hypothesized relationship.

If the level of significance was less than .05 and the 4 value is in the direction predicted, the empirical hypothesis was accepted. In addition, the conclusion includes a comment on the relative strength of the relationship. Correlation coefficients between .16 and .35 were considered to provide weak support for the hypothesis. Those between .36 and .50 were said to provide moderate support, and coefficients over .50 are concluded to provide strong support for the hypothesis. It should be noted, however, that even those labeled as "strong" may account for as little as 25 percent of the variance between independent and dependent variables.

Findings: predispositional effects

There was relatively little impact of predispositions upon the level of attention given to the mailings. In the cases where significant correlations occurred, they were found to be weak when viewed in terms of percent variation in attention explained.

Of the five measures of situational attributes, only NETINC was found to have a significant correlation. Those farmers who had higher net incomes gave more attention to the mailings.

Of the seven orientation measures only three had statistically significant correlations with attention. Farmers who had rational orientations toward action and decision-making, who were more knowledgeable about erosion, and who had positive attitudes about land ownership rights gave

Table 27. Hypothesized direction of relationships between predispositional variable (1974 survey) and attention response (1975 survey).

Independent Variables (Predispositions)	Dependent Variable: ATTENML Index			
	Hypothesized Relationship	r	Level of Significance	Conclusion
Attributes of the Firm:				
TOTACRES	r > o	.10	.168	Rejected
NETINC	r > o	.16	.050	Supported-weak
PCTOWNED	r > o	-.06	.280	Rejected
Personal Characteristics:				
AGE	r < o	.00	.500	Rejected
YRSEDUC	r > o	.04	.331	Rejected
Orientations:				
ATTIND1	r > o	.23	.009	Supported-weak
Environmental and Conservation Beliefs/Knowledge and Attitudes:				
GENENVIR	r > o	-.03	.395	Rejected
KNOWSC	r > o	.19	.024	Supported-weak
EROSION	r > o	.02	.424	Rejected
WHOPAYEN	r > o	.12	.110	Rejected
LANDRGTS	r > o	.22	.012	Supported-weak
ADOPTSC	r > o	.10	.156	Rejected
Organizational Participation:				
GNORGIND	r > o	.12	.123	Rejected
SCPART	r > o	.13	.090	Rejected
Use of Specialized Information Sources:				
COMMIND	r > o	.03	.370	Rejected
Funds Received From ACP:				
ACPFUNDS	r > o	.09	.196	Rejected
Adoption of Pollution Abatement Innovations:				
STPRACSC	r > o	-.09	.84	Rejected

more attention to the mailings. Farmers' concern about pollution, perception or erosion as a problem on their farm, attitudes formed about who is responsible for erosion control, and their willingness to adopt erosion control did not make any significant difference in the level of attention that they gave to the mailings.

The prior program-related behaviors of respondents were not significantly related to attention responses. This included participation in voluntary associations and the Soil Conservation Program, receipt of ACP funds, use of technically competent information sources, and adoption of pollution abatement practices.

The rejection of most predispositional hypotheses may be interpreted as a positive attribute of the program. Many researchers have noted the phenomena of audiences' selective exposure to messages. This leads to what Steyn (1972) called "the problem of redundant success" in communications, i.e., messages tend to impact the same already-convinced group. Such was not the case in the "Agriculture and the Environment" program. Audience members, for the most part, attended regardless of their predispositions.

Additional Attention Analysis

Effects of message variations

The responses given to questions about the 19 articles included in the communication program can also be discussed in terms of message factors related to exposure. For a message to be effective it must gain the attention of some members of the potential audience. The individual audience member, however, usually decides what content, if any, he will attend. He will also select the time he will "tune-in" to the message's content. Thus the message factors that might be related to this communication program are: (1) sequence in mailing; (when were the program materials received?); (2) seasonability (how available was farmer?); and (3) content.

Sequence in mailing Sequence in mailing refers to the order in which the mailings are connected or related in time. Sequence in mailing was expected to affect the degree of exposure and readership rate of the program materials. Since the program was unique, first mailed articles were expected to have the highest readership.

Seasonality The availability of the farmers was considered as a factor that could affect the degree of exposure and readership of the 19 articles. As shown in Figure 8, generally farmers have less work to do during the months of January and February, when crops are harvested, marketed, and there is no tilling to do. Therefore, the program materials sent during this time of the year would be expected to receive more attention by the farmers. Program materials sent in April would be expected to receive moderate exposure and readership. Farmers at this time of the year would be moderately busy getting their equipment ready in preparation for tillage and planting. In June, the amount of exposure and readership would be close to zero. A farmer would be very busy with cultivation of his land -- in the field both days and nights, with little time for extra activity. The readership in August was expected to be moderately high. The farmer's main activity would be going on a vacation, or preparing to harvest his crops. Thus he would have a moderate amount of time to read the materials.

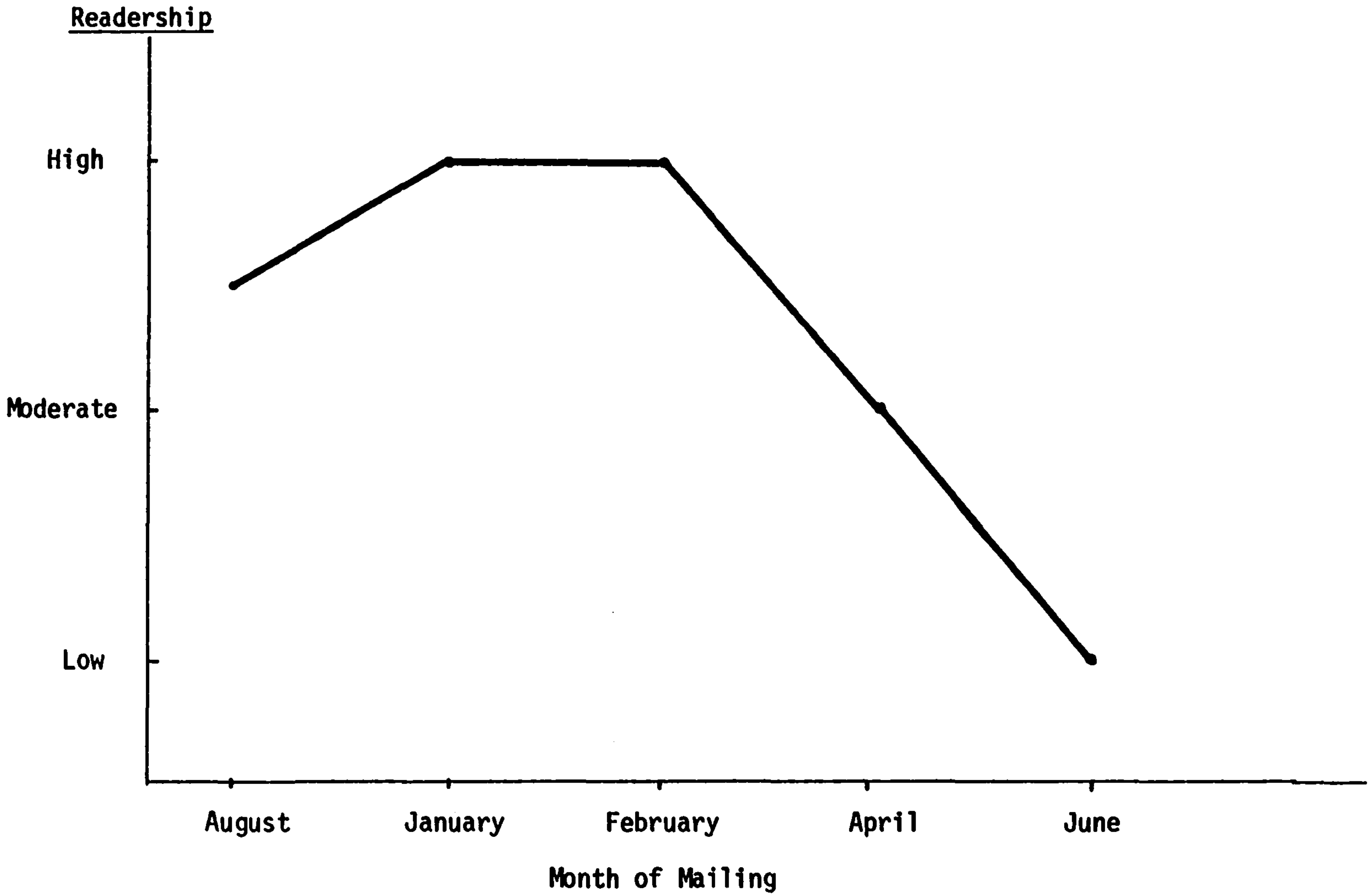

Figure 8. Seasonality and theoretical availability of farmers.

<u>Message content</u> Content is the substance of a message. Relevant content can raise or lower the degree of exposure by an individual to that message. Communication success depends partly upon how wisely and carefully the sender selects and combines the elements that make up the content of his message.

In Chapter 2 the 19 articles were classified into categories of content following Bloom's (1956) taxonomy of levels of knowledge. It might be expected that the lower the level of content, the higher would be the readership. A question we seek to answer in the present case is, was that so, especially when the factors of mailing sequence and seasonability are controlled.

<u>Findings</u> Figure 9 shows the average readership of articles by month of mailing and level of content. The data indicate that there may have been a sequence effect since articles in the first mailing (August) received greater readership than did subsequent articles. Seasonality definitely appears to have an effect. Readership during the two busy months, April and June, were considerably lower than during other months. The most interesting and unexpected finding, however, was that the more abstract content tended to have the highest readership. This was especially true during June when available time for farmers was lowest. Since much of the specific fact information was included for the purpose of building farmers' interest in the program, it appears that the senders underestimated the level of interest of their audience. In a more positive vein, the data indicate that one can communicate relatively complex and abstract information to farmers.

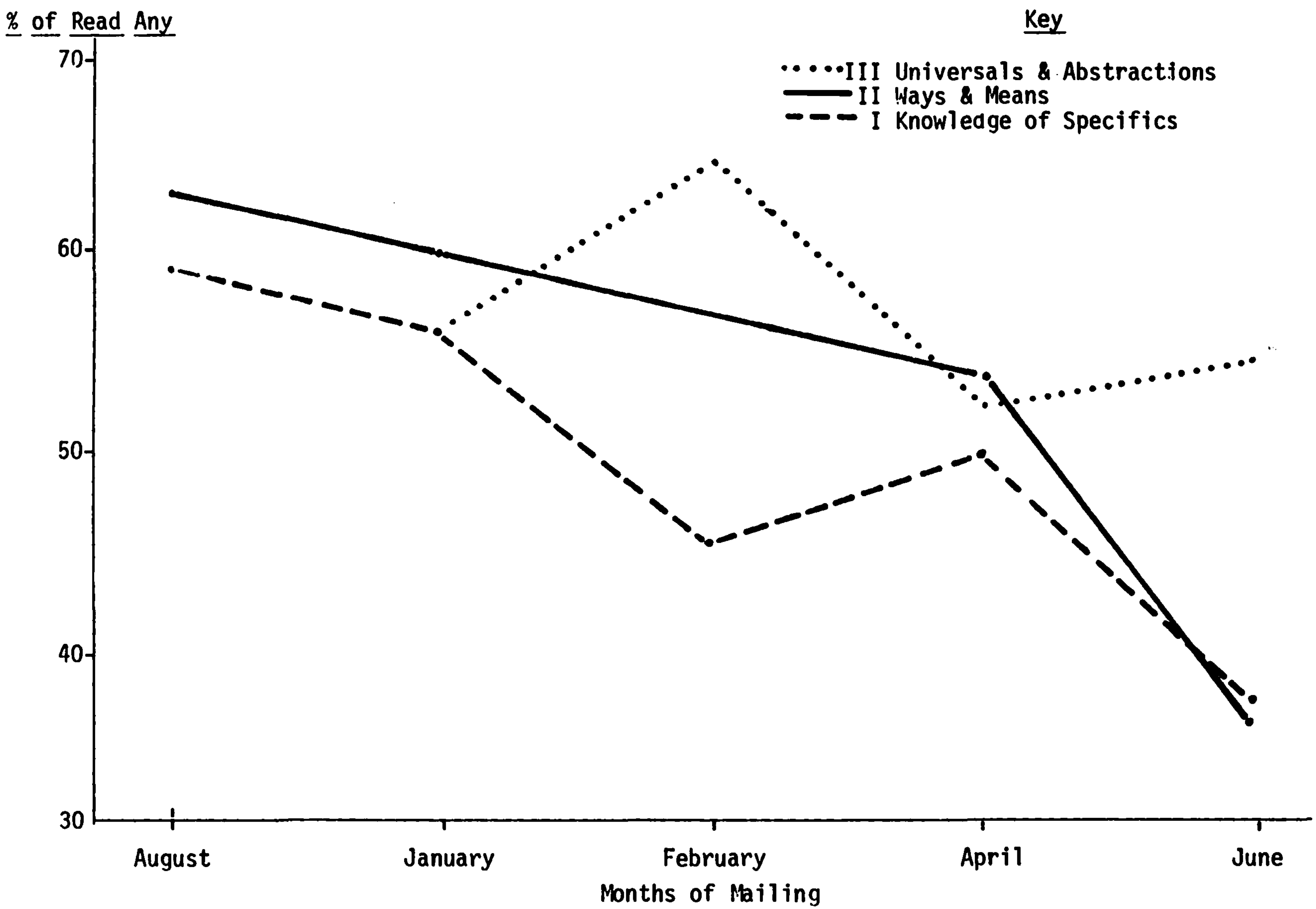

Figure 9. Average readership of articles by month of mailing and level of content.

Retention of program materials and use of notebook

We are not only interested in the respondents' awareness of the articles but also want to know whether or not the farmers kept the articles. The farmers were expected to refer to the articles for at least the ten month duration of the program. Accumulation of materials in this manner might add to the farmers' perception of the program's importance. Questions and responses regarding retention and notebook use are presented in Table 28. Nearly all farmers kept some articles, most kept the entire set.

Table 29 presents the distribution of respondents' notebook usage. Examination of this table indicates that about 66 percent of the respondents used the notebooks. The pretested high practitioner group was especially likely to make such use.

Table 28. Responses to questions measuring retention of program materials (aware respondents only), 1975 survey.

Question and Code	Pretested Respondents: High Practitioner % of 46	Pretested Respondents: Random Sample % of 49	New Respondents: High Practitioner % of 29	New Respondents: Random Sample % of 41
Approximately how many of the 19 articles have you kept -- all, about three-fourths, about half, about one-fourth or none				
0 = None	2	2	7	13
1 = About one-fourth	0	2	7	10
2 = About half	17	6	0	8
3 = About three-fourths	4	8	0	3
4 = All	76	81	86	68
Did you use the notebook to assemble the separate articles				
1 = No	9	28	24	34
2 = Yes	91	72	76	66
Did you find the notebook useful enough to recommend that it be used again if the information program is made available to other Iowa farmers				
1 = Definitely should	48	35	35	42
2 = Probably should	38	43	35	42
3 = Don't know	0	11	5	8
4 = Probably should not	12	11	25	4
5 = Definitely should not	2	0	0	4

Table 29. Distribution of respondents' retention of materials and the use of notebook by category, 1975 survey.

Category	Treatment: High Practitioner Pretest % of 48	High Practitioner No Pretest % of 56	Random Sample Pretest % of 29	Random Sample No Pretest % of 44
Unaware of the program	4	12	3	7
Aware. Don't recall receiving notebook	2	4	10	14
Received. Didn't use	8	23	21	27
Received and used	85	61	66	52
Total	99	100	100	100

CHAPTER 7: INTERACTION WITH REFERENT GROUPS' FINDINGS

Referent group interaction involved any conversations the receiver had with others regarding the message. Referent groups are important in the development of the individual's value system. They are also important because such interaction might include looking for more information on a topic. The use of additional senses can make the message better remembered. Unintentional exposure to more information on a topic can reinforce it as well. For example, talking about conservation practices with relatives, neighbors, friends, or an agent may generate interest and make the farmers remember more about the topic.

Variable Y-2: Number of Persons Talked To (TALKTOT)

Number of persons the respondents talked to about "Agriculture and the Environment" was measured by answers to the following two questions:

1. Did you talk with anyone, or did anyone talk with you about this "Agriculture and the Environment" information series? Your conversations may have been either in person or by telephone, and might have included someone in your immediate family, another relative, friends, business associates, or a county, district or state official.

The response categories and scoring were 1 = No, 2 = Yes. If the answer was "yes" the respondent was asked to state the relationship to himself of three persons he talked with. Up to three responses were allowed.

2. Who are the persons you talked with about the information program? (Record name and/or relation). The response categories and scoring were as follows:

1 = Immediate family
2 = Other relative
3 = Neighbor, friend
4 = Business associate
5 = Official

From responses to these questions a variable was developed summarizing the number of persons with whom conversations were held. These data are presented in Table 30.

Responses ranged from "talked with no one" to "talked with three persons." Examination of Table 30 indicates that more than three-fourths of the farmers did not talk with anyone. Twenty-three percent of the farmers included in the samples studied, reported talking with one person. Four percent talked with two persons and about two percent reported talking with three persons. In general these data show a relatively low level of interaction as compared with that found in similar information programs.

Comparative Interaction With Referent Groups

Interaction with referent groups was evaluated by comparing the "Agriculture and the Environment" program to other programs that need interaction as a measure. Interaction with referent groups was relatively infrequent in this program. This might be expected, given the nature of the program. The program gave no encouragement or requirement to talk with others. Furthermore, relatively few among members of the social system received the message (approximately 10 percent of farmers in the counties studied.) This lowered the possibility of their talking with others about the program.

Table 30. Distribution of respondents according to the number of persons they talked to about the information program, 1975 survey.

Number of Persons	High Practitioner Pretest % of 48	High Practitioner No Pretest % of 56	Random Sample Pretest % of 29	Random Sample No Pretest % of 44
Talk to no one	52	79	76	82
Talk to one person	42	16	17	16
Talk to two persons	2	4	7	2
Talk to three persons	4	2	0	0
Total	100	100	100	100
Mean	.58	.31	.29	.21

A previous study (Yarbrough, et al., 1972) compared patterns of interpersonal Community Shelter Planning (CSP) information with discussion about the Home Fallout Protection Survey (HFPS) and found that talking with others was lower for CSP receivers than HFPS receivers. The CSP was not meant to solve individual problems while HFPS was designed to provide family solutions to shelter problems.

It is assumed that a program that poses a problem requiring individual or group solutions would generate more bases for discussion than a program which does not pose such a problem. Such problems were not present here.

From the theoretical arguments presented in Chapter 3 and the preceding discussions a General Hypothesis was stated in the following manner:

> General Hypothesis 3: Interaction with referent groups about the "Agriculture and the Environment" program will rank among the lower third of a variety of specialized communication programs.

In Chapter 3, six technical information programs were described in terms of the degree to which they met a number of theoretical criteria for interaction. On the basis of these criteria it was concluded that the "Agriculture and the Environment" program should have low interaction ability. On this basis the following empirical hypothesis is derived from General Hypothesis 3.

> Empirical Hypothesis 3a: The "Agriculture and the Environment" program will rank among the lower two of the specialized programs examined.

Four of the information programs could be compared with "Agriculture and the Environment" program. The programs and percentage responses are presented in Table 31. Examination of this table indicates that our

Table 31. Comparison of referent group interaction in five programs.

Program	Percent talking with others about program
HFPS	60
TENCO	48
ENP	41
AG/ENV	28
CSP	26

hypothesis with regard to "Agriculture and the Environment" program was supported.

The experimental program ranked lower than Home Fallout Protection Survey (HFPS), Expanded Nutrition Program newsletter (ENP), and the Ten Counties area development newsletter (TENCO), and was comparable to interaction in the Community Shelter Planning (CSP) information program.

Experimental Design Factors and Interaction Response

> General Hypothesis 4: Interaction with referent groups about the "Agriculture and the Environment" program is partly a function of experimentally introduced "message-like" manipulation and audience selection factors.

The sender's experimental design manipulations including pretesting some respondents and the introduction of two samples (high practitioners and a randomly drawn sample) were hypothesized to influence the respondents' level of interaction about the "Agriculture and the Environment" program. Based on this assumption two empirical hypotheses were derived from the General Hypothesis 4 to test these effects.

Empirical Hypothesis 4a: The pretested group will talk with more persons about "Agriculture and the Environment" program than will the unpretested group when the effects of sample are statistically controlled.

Empirical Hypothesis 4b: The high practitioner group will talk with more persons about "Agriculture and the Environment" program than will the random group when the effects of pretest are statistically controlled.

A 3 x 2 analysis of variance test was performed to test these hypotheses. As indicated in Table 32 only the hypothesis related to sample selection was supported. Identified high practitioners talked to more persons about the program than did the random group of farmers. The number of pretest surveys a respondent had participated in prior to the program did not significantly impact interaction and there was no significant interaction of pretests and sample selection regarding the referent group interaction response.

Table 32. Analysis of variance for referent group interaction.

Source	Mean Square	F Ratio	Level of Significance	Conclusion
Pretest	.567	1.460	.234	Rejected
Sample	2.103	5.418	.020	Supported-Moderate
Interaction	.233	.600	.999	Rejected

Effects of Predispositions upon Referent Group

An individual brings into the communication situation a number of factors. These factors are considered as predispositions and can affect the way the receiver responds to the message. The receiver can be favorably or unfavorably predisposed toward the message. This is one reason for variations in responses to a message by different receivers.

General Hypothesis 14: Those people who are favorably predisposed will be more likely to interact with referent groups about "Agriculture and the Environment" program.

Based upon the theoretical discussions presented in Chapters 3 and 5 regarding the nature of relevant predispositions and other programs' responses in the case of the program the following four sub-hypotheses can be stated:

Sub-Hypothesis 14a: Respondents who possess the situational attributes of operating larger farming units and being younger and better educated will interact with more persons about the information program.

Sub-Hypothesis 14b: Respondents whose general and issue-related orientations (beliefs, attitudes and values) are more pro-environmental will interact with more persons about the information program.

Sub-Hypothesis 14c: Respondents who have taken prior actions which are compatible with the techniques and goals of the information program will interact with more persons about the information program.

Sub-Hypothesis 14d: Respondents who responded favorably to the other aspects of the program will interact with more persons about the information program.

Each of these sub-hypotheses is further operationalized by several empirical measures. Each is directional in nature. They are stated in summary form in column two of Table 33. Personian zero-order correlation coefficients were calculated for each empirical hypothesis and the level of significance of these coefficients were used as a test of the hypothesized relationship.

Table 33. Relationships between predispositional variables (1974 survey), other program response (1975 survey) and number of persons with whom respondents talked (1975 survey).

Independent Variables (Predispositions)	Dependent Variable: TALKTOT			
	Hypothesized Relationship	r	Level of Significance	Conclusion
Attributes of the Firm:				
TOTACRES	r > o	.14	.079	Rejected
NETINC	r > o	.12	.120	Rejected
PCTOWNED	r > o	.08	.209	Rejected
Personal Characteristics:				
AGE	r < o	.07	.246	Rejected
YRSEDUC	r > o	-.05	.299	Rejected
General Orientations:				
ATTINDT	r > o	.10	.165	Rejected
Environmental and Conservation Beliefs/Knowledge and Attitudes:				
GENENVIR	r > o	-.02	.433	Rejected
KNOWSC	r > o	.08	.211	Rejected
EROSION	r > o	.12	.111	Rejected
Independent Variable:				
WHOPAYEN	r > o	-.09	.187	Rejected
LANDRGTS	r > o	.05	.316	Rejected
ADOPTSC	r > o	.19	.030	Supported-Weak
Organizational Participation:				
GNORGIND	r > o	.21	.018	Supported-Weak
SCPART	r > o	.45	.001	Supported-Moderate
Use of Specialized Information Sources:				
COMMIND	r > o	.10	.168	Rejected
Funds Received from ACP:				
ACPFUNDS	r > o	-.03	.381	Rejected
Adoption of Pollution Abatement Innovations:				
STPRACSC	r > o	.21	.017	Supported
Other Program Responses:				
ATTENML	r > o	.38	.001	Supported-Moderate

Findings: predispositions and attention response

Few of the hypotheses concerning the variables were supported. Participation in organizations and attention to the program materials were found to be major predictors of the number of persons that farmers talked with about the communication program. Farmers who participated more in formal organizations talked more.

The farmers who had professional farm plans were good conservation practitioners, were conservation district cooperators, and had been in agriculture conservation programs for some time, were found to talk with others about the program more than other farmers.

Farmers who gave more attention to the program were more likely to talk with others about it.

Attitudinal variables had relatively little influence. Only one variable, ADOPTSC, had a relationship with talking to others. The relationship was weak (r = .19) though significant.

Attributes of the firm, personal characteristics, general orientations, use of specialized information sources, and funds received from ACP, showed no significant linear relationship with the amount of talking with others about the "Agriculture and Environment" communication programs.

Additional Analysis: With Whom Did Respondents Talk?

Earlier in this chapter respondents were asked to give the number of persons they talked with about the information program. It might be expected that the level of interaction would be low since the program did not pose any problem to which respondents should provide an answer. A question we seek to answer in the present analysis is with whom did respondents talk.

Table 34 shows the conversation partners and their relations. The data indicate that most respondents who reported talking did so with their immediate family members. Respondents also reported frequent conversations with their neighbors and friends. Officials were the least frequent conversation partners.

Table 34. Distribution of respondents' conversation partners and relation (respondents who talked only), 1975 survey.

	TREATMENT			
	High Practitioner		Random Sample	
Relation of Partner	Pretest % of 28	No Pretest % of 9	Pretest % of 16	No Pretest % of 9
Immediate family	46	22	50	44
Other relative	7	11	6	11
Neighbor; friend	32	11	25	33
Business associate	4	11	13	11
Official	11	44	6	0
Total	100	99	100	99

CHAPTER 8: COMPREHENSION FINDINGS

Comprehension was defined as the process by which an individual receiver transforms sensory stimuli into meanings. In decoding the symbols of the message the receiver's comprehension is measured as the degree to which he assigns the same meanings to symbols as the sender had assigned to them. Past research indicates that some respondents are likely to comprehend much of the meaning intended by the sender while others are likely to make quite different interpretations. Three general hypotheses were developed regarding the effects of the experiment.

> General Hypothesis 5: The treatment group will have more accurate comprehension of emphasized concepts than will the control group.

> General Hypothesis 6: Comprehension of the "Agriculture and the Environment" concepts is partly a function of experimentally introduced "message-like" manipulation and audience selection factors.

> General Hypothesis 15: Those people who are more favorably predisposed will likely have more accurate comprehension of emphasized concepts in the "Agriculture and the Environment" program.

Variable Y-3: Total Comprehension (COMPTOT)

The total comprehension score is a summation of correct responses to 38 questions that were asked regarding 7 of the 19 articles included in the information program. In the following section the questions asked about each of these articles and the responses obtained are summarized.

Comprehension of the article "Pesticides, Pollution and the Food Production Push" was measured by "disagree" response to the statement, "For a fast knock down of pests attacking livestock, one should use a combination spray made up of all the recommended livestock pesticides." A summary of the percentage of respondents correctly answering this question is presented in Table 35.

Comprehension of the article "Soil Erosion Costs Money On and Off the Farm" was measured by questions on these dimensions: (1) the agricultural factor with the greatest influence on water pollution, (2, 3) farming practices with the greatest and least influence on soil erosion, (4) knowledge that new terrace systems eliminate bothersome point rows, and (5) correct definition of sheet erosion. These dimensions were measured, respectively, by questions in Part II numbers 29, 31, 32, 35f, and 35g of the questionnaire (see Appendix B). A summary of the percentage of respondents correctly answering each question is presented in Table 36.

Comprehension of the article "Who Pollutes?" was measured by questions on these dimensions: (1) substances with the most effect on water pollution, and (2) the agricultural factor with the greatest influence on water pollution.[1] These dimensions were measured respectively by questions in Part II numbers 28 and 29 of the questionnaire (see Appendix B). A summary of the percentage of respondents correctly answering each question is presented in Table 37.

Comprehension of the article "Soil Loss Regulations" was measured by questions on these dimensions: (1) familiarity with the Iowa Conservation

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[1]Some questions measured response to more than one item. The total score, however, counts this response only once.

Table 35. Percentage of respondents correctly answering specific questions on "Pesticides, Pollution and the Food Production Push" (1975 survey).

Question and Correct Response	Treatment				Control			
	High Practitioner		Random Sample		High Practitioner		Random Sample	
	Pretest % of 47	No Pretest % of 28	Pretest % of 52	No Pretest % of 15	Pretest % of 27	No Pretest % of 41	Pretest % of 29	No Pretest % of 23
Do you agree or disagree that a combination spray made up of all the recommended livestock insecticides is needed to knock down pests attacking livestock (Disagree = Correct)	89	86	83	87	78	83	76	74

Table 36. Percentage of respondents correctly answering specific questions on comprehension of "Soil Erosion Costs Money -- On and Off the Farm" (1975 survey).

Question and Correct Response	Treatment				Control			
	High Practitioner		Random Sample		High Practitioner		Random Sample	
	Pretest % of 47	No Pretest % of 28	Pretest % of 52	No Pretest % of 15	Pretest % of 27	No Pretest % of 41	Pretest % of 29	No Pretest % of 23
The agricultural factor with the greatest influence on water pollution is sediments from soil erosion	57	46	40	47	56	15	24	30
The farming practice with the most effective influence on soil erosion is tillage practice	94	89	92	100	96	83	97	91
The farming practice with the least effect on soil erosion is nitrogen level in soil	77	71	60	67	78	51	72	61
Do you agree or disagree that all terraces are associated with many point rows (Disagree = Correct)	55	36	33	33	33	22	31	26
Do you agree or disagree that sheet erosion is a process by which plants' nutrients and minerals are washed from the soil as water drains through it (Disagree = Correct)	72	61	44	53	59	34	24	26

Table 37. Percentage of respondents correctly answering specific questions on comprehension of "Who Pollutes" (1975 survey).

Question and Correct Response	Treatment				Control			
	High Practitioner		Random Sample		High Practitioner		Random Sample	
	Pretest % of 47	No Pretest % of 28	Pretest % of 52	No Pretest % of 15	Pretest % of 27	No Pretest % of 41	Pretest % of 29	No Pretest % of 23
Sediments from soil erosion is the substance that contributes the most to water pollution in the U.S. (Agree = Correct)	30	14	21	27	37	7	10	4
The agricultural factor with the greatest influence on water pollution is sediments from soil erosion (Agree = Correct)	57	46	40	47	56	15	24	30

Act passed by the 1971 Legislature, (2) familiarity with soil loss limit regulations set by the state of Iowa, (3) the soil loss factor on agriculture lands, (4) penalties for violation of soil loss limit regulations by the land owners, (5) amount of cost-sharing assistance, (6) familiarity with U.S. Environmental Protection Agency (EPA) regulations about agricultural pollution, (7) main provisions of EPA regulations, (8) EPA guidelines relating to row cropping and soil management, and (9) effects of EPA guidelines on farmers. These dimensions were measured respectively by questions in Part I numbers 27, 28, 29, 30, 31, 33, 34, 35 and 36 of the questionnaire (see Appendix B). A summary of the percentage of respondents correctly answering each question is presented in Table 38.

Comprehension of the article "Livestock Pollution. Your Legal Duties" was measured by questions on these dimensions: (1) proposed federal and Iowa government regulations regarding pollution control in feedlot operations, (2) comparing strictness of federal regulations on feedlots with the state regulations, (3, 4) regulations for large and small size of livestock operation, and (5) cut-off point of size of livestock which requires no permit or registration. These dimensions were measured respectively by questions in Part I numbers 39, 40, 41, 42 and 43 of the questionnaire (see Appendix B). A summary of the percentage of respondents correctly answering each question is presented in Table 39.

Comprehension of the article "Minimum Tillage: A Conservation Plus" was measured by questions on these dimensions: (1) correct definition of

Table 38. Percentage of respondents correctly answering specific questions on comprehension of "Soil Loss Regulations" (1975 survey).

Question and Correct Response	Treatment: High Practitioner Pretest % of 48	Treatment: High Practitioner No Pretest % of 29	Treatment: Random Sample Pretest % of 56	Treatment: Random Sample No Pretest % of 15	Control: High Practitioner Pretest % of 28	Control: High Practitioner No Pretest % of 44	Control: Random Sample Pretest % of 29	Control: Random Sample No Pretest % of 24
Are you familiar with the Iowa Conservancy Act passed by the 1971 Legislature (Yes = Correct)	42	34	29	27	46	9	24	4
Are you familiar with the "Soil Loss Limit Regulations" set by the State of Iowa (Yes = Correct)	69	55	45	47	61	36	45	25
In Iowa soil loss on agricultural lands cannot exceed ______ per acre, per year (5 tons = Correct)	29	28	18	27	36	20	21	12
In Iowa a landowner in violation is allowed ______ to complete the erosion control practices (12 months = Correct)	23	28	5	20	18	7	17	0
Iowa Conservancy Act provides cost-sharing assistance for ______ of the cost of the permanent conservation practice (75 percent = Correct)	29	21	14	13	36	14	17	8

Are you familiar with the regulations set by U.S. Environmental Protection Agency (EPA) (Yes = Correct).								
	77	59	61	58	75	45	45	29
Give two main provisions of EPA regulations. EPA provisions include feedlot and pesticide regulations. Three chances were allowed								
First response	60	41	43	20	46	27	24	17
Second response	6	3	7	7	14	18	3	12
Third response	2	3	0	0	0	0	0	0
Have you heard about the proposed EPA row cropping and soil management guidelines (Yes = Correct)								
	27	31	25	27	32	32	21	17
The effect of the proposed EPA row cropping guidelines is ______ (Similar to State = Correct)								
	19	24	13	27	18	11	7	17

Table 39. Percentage of respondents correctly answering specific questions on comprehension of Livestock & Pollution. Your Legal Duties" (1975 survey).

Question and Correct Response	Treatment				Control			
	High Practitioner		Random Sample		High Practitioner		Random Sample	
	Pretest % of 48	No Pretest % of 29	Pretest % of 56	No Pretest % of 15	Pretest % of 28	No Pretest % of 44	Pretest % of 29	No Pretest % of 24
Which feedlot pollution regulations will be in effect for the coming year (Both state & federal = Correct)	27	21	18	27	18	11	24	8
Federal feedlot regulations are as ______ as the state (Strict = Correct)	35	17	23	0	21	9	28	17
A farmer whose livestock operation is ______ animal units or larger needs permit (1,000 = Correct)	60	28	23	53	57	23	31	21
Permission of a farmer whose livestock operation is less than 1,000 animal units depends on ______ (Nearness of a Stream = Correct)	42	41	46	33	32	41	34	38
A farmer whose livestock operation is below ______ animal units requires no permission (100 = Correct)	31	17	12	20	14	27	7	21

minimum tillage, (2) correct definition of conservation tillage, (3) advantages and disadvantages of minimum tillage, conservation tillage or reduced tillage, (4, 5) farming practices with the least influence and likely to increase soil erosion, and (6) correct definition of ridge planting. These dimensions were measured respectively by questions in Part II numbers 22, 23, 25, 32, 33 and 35c of the questionnaire (see Appendix B). A summary of the percentage of respondents correctly answering each question is presented in Table 40.

Comprehension of the article "Terraces Protect the Land, Protect Farming Investments" was measured by "disagree" response to the statement, "One disadvantage of all terraces is that many point rows are usually formed." A summary of the percentage of respondents correctly answering the question is presented in Table 41.

Impacts of the Experimental Program

Table 42 shows the distribution scores of the respondents' total comprehension by category. Comprehension ranged from 0 to 36 for the seven articles. Examination of this table indicates that nearly all respondents had moderate comprehension of program materials. The overall average comprehension was 19.2. However, comprehension was nearly as high for the control groups as for the treatment groups.

The sender-manipulated variables -- treatment, pretest, and sample -- are assumed to be applicable to the total comprehension of the concepts emphasized in the program. Three empirical hypotheses testing the level of comprehension of the emphasized program's concepts are derived from the General Hypotheses 5 and 6.

Table 40. Percentage of respondents correctly answering specific questions on comprehension of "Minimum Tillage: A Conservation Plus" (1975 survey).

Question and Correct Response	Treatment				Control			
	High Practitioner		Random Sample		High Practitioner		Random Sample	
	Pretest % of 47	No Pretest % of 28	Pretest % of 52	No Pretest % of 15	Pretest % of 27	No Pretest % of 41	Pretest % of 29	No Pretest % of 23
Correct definition of minimum tillage includes fewest trips, least tillage, conservation, no moldboard plow, and leave residue on surface. List three concepts								
First response (Yes = Correct)	91	93	77	93	81	71	83	83
Second response (Yes = Correct)	25	46	15	40	30	12	14	13
Third response (Yes = Correct)	4	7	10	7	0	2	3	4
Correct definition of conservation tillage includes two concepts: conservation and leave residue on surface. List the concepts								
First response (Yes = Correct)	68	61	54	67	67	80	86	65
Second response (Yes = Correct)	96	86	96	93	96	93	90	87
List three advantages of minimum tillage (or conservation tillage or reduced tillage). Advantages include the following: saves fuel, saves time and labor, saves soil, saves water, saves money and less soil compaction.								
First response (Yes = Correct)	85	93	71	87	85	68	90	78
Second response (Yes = Correct)	64	50	60	53	59	51	62	52
Third response (Yes = Correct)	23	25	19	27	33	20	45	35

List three disadvantages of minimum tillage (or conservation tillage, or reduced tillage). Disadvantages include the following: less flexible, need careful timing, equipment not available, and fertilizer and chemical application are harder, weed or pest control								
First response (Yes = Correct)	60	50	54	47	67	41	45	39
Second response (Yes = Correct)	6	14	6	0	4	5	10	9
Third response (Yes = Correct)	0	4	0	0	0	0	3	4
The farming practice with the least effect on soil erosion is _____ (Nitrogen level in soil = Correct)	77	71	60	67	78	51	72	61
Soil type which is most likely to increase soil erosion is _____ (Well-pulverized smooth soil surface = Correct)	94	93	86	80	89	88	83	83
State whether you agree or disagree that ridge planting is a good erosion control and high water intaker (Agree = Correct)	55	57	61	73	52	54	62	52

Table 41. Percentage of respondents correctly answering specific questions on comprehension of "Terraces Protect the Land, Protect Farming Investments" (1975 survey).

Question and Correct Response	Treatment				Control			
	High Practitioner		Random Sample		High Practitioner		Random Sample	
	Pretest % of 47	No Pretest % of 28	Pretest % of 52	No Pretest % of 15	Pretest % of 27	No Pretest % of 41	Pretest % of 29	No Pretest % of 23
State whether you agree or disagree with the following statement: All terraces have a disadvantage of forming many point rows (Disagree = Correct)								
	55	36	33	33	33	22	31	26

Table 42. Distribution of respondents total comprehension of the "Agriculture and the Environment" program by category, 1975 survey.

Category	Treatment				Control			
	High Practitioner		Random Sample		High Practitioner		Random Sample	
	Pretest % of 47	No Pretest % of 28	Pretest % of 52	No Pretest % of 41	Pretest % of 27	No Pretest % of 15	Pretest % of 29	No Pretest % of 23
0 to 5	0	0	6	5	4	0	7	9
6 to 11	9	29	27	34	11	13	31	48
12 to 17	32	29	33	42	37	47	34	26
18 to 23	32	29	25	17	26	27	24	17
24 to 29	26	14	8	2	19	13	3	0
30 to 36	2	0	2	0	4	0	0	0
Total	100	100	100	100	100	100	99	100
Mean	21.8	20.0	18.9	17.5	20.9	19.5	17.7	16.4

Empirical Hypothesis 1: The treatment group will have more accurate comprehension of the emphasized concepts in the "Agriculture and the Environment" program than will the control group when the effects of pretest and sample are statistically controlled.

Empirical Hypothesis 2: Pretested group will have more accurate comprehension of the emphasized concepts in the "Agriculture and the Environment" program than will the unpretested group when the effects of treatment and sample are statistically controlled.

Empirical Hypothesis 3: The high practitioner group will have more accurate comprehension of the emphasized concepts in the "Agriculture and the Environment" program than will the random group when the effects of treatment and pretest are statistically controlled.

The analysis of data presented in Table 43 indicates that the overall level of comprehension was statistically greater for the treatment

Table 43. Analysis of variance for comprehension of seven articles' concepts.

Source	Mean Square	F Ratio	Level of Significance	Conclusion
Treatment	60.269	4.08	.042	Supported-Moderate
Pretest	75.424	5.11	.007	Supported-Strong
Sample	553.278	37.50	.001	Supported-Strong
Interaction	2.831	.19	.999	Rejected

group. Pretest and sample also had effects upon the level of respondents' comprehension of the concepts of the "Agriculture and the Environment" program. The farmers who were pretested showed more accurate comprehension than unpretested farmers. The high practitioners showed more accurate comprehension than the random group. Thus all three hypotheses regarding effects of the experimental information program were supported. Those who received program materials did learn, however, the magnitude of this learning was not great.

Effects of Predispositions and Other Program Responses upon Total Comprehension

Based upon the theoretical arguments presented in Chapters 3 and 5 regarding the nature of relevant predispositions and other program responses in the case of this program, four sub-hypotheses were derived from the General Hypothesis 15.

> Sub-Hypothesis 15a: Respondents who possess the situational attributes of operating larger farming units and being younger and better educated will have more accurate comprehension of emphasized concepts in the "Agriculture and the Environment" program.
>
> Sub-Hypothesis 15b: Respondents whose general and issue-related orientations (beliefs, attitudes and values) are more pro-environmental will have more accurate comprehension of emphasized concepts in the "Agriculture and the Environment" program.
>
> Sub-Hypothesis 15c: Respondents who have taken prior actions which are compatible with the techniques and goals of the information program will have more accurate comprehension of emphasized concepts in the "Agriculture and the Environment" program.
>
> Sub-Hypothesis 15d: Respondents who responded favorably to other aspects of the program will have more accurate comprehension of emphasized concepts in the "Agriculture and the Environment" program.

Each of these sub-hypotheses is further operationalized by several empirical measures. Each is directional in nature. They are stated in summary form in column two of Table 44. Personian zero-order correlation coefficients were calculated for each empirical hypothesis and the level

Table 44. Relationship between predispositional variables (1974 survey) other program responses (1975 survey) and total comprehension (1975 survey).

Independent Variables (Predispositions)	Dependent Variable: COMPTOT Hypothesized Relationship	r	Level of Significance	Conclusion
Attributes of the Firm:				
TOTACRES	r > o	.28	.003	Supported-Weak
NETINC	r > o	.26	.006	Supported-Weak
PCTOWNED	r > o	-.09	.182	Rejected
Personal Characteristics:				
AGE	r < o	-.14	.077	Rejected
YRSEDUC	r > o	.24	.008	Supported-Weak
Orientations:				
ATTIND1	r > o	.40	.001	Supported-Moderate
Environmental and Conservation Beliefs/Knowledge and Attitudes:				
GENENVIR	r > o	.05	.300	Rejected
KNOWSC	r > o	.49	.001	Supported-Moderate
WHOPAYEN	r > o	.02	.314	Rejected
LANDRGTS	r > o	.41	.001	Supported-Moderate
ADOPTSC	r > o	.16	.062	Rejected
Organizational Participation:				
GNORGIND	r > o	.31	.001	Supported-Weak
SCPART	r > o	.39	.001	Supported-Moderate
Use of Specialized Information Sources:				
COMMIND	r > o	.31	.001	Supported-Weak

Funds Received from ACP:				
ACPFUNDS	r > o	-.02	.414	Rejected
Adoption of Pollution Abatement Innovations:				
STPRACSC	r > o	.07	.262	Rejected
Other Program Responses:				
ATTENML	r > o	.31	.001	Supported-Weak
TALKTOT	r > o	.30	.001	Supported-Weak

of significance of these coefficients were used as a test of the hypothesized relationship.

Eleven of the 19 empirical hypotheses for comprehension were supported. Thus we can conclude that levels of comprehension were largely determined by characteristics that receivers brought to the communication event. More specifically our findings were these:

Two out of the three variables used to measure attributes of the firm had significant relation with the comprehension. Farmers who had large farms and had high net income comprehended more of the concepts of the articles in the information program. In both cases the relationships were significant but weak.

The level of education also had a weak, but significant, relation. This correlation indicates that the higher the level of education of the farmers the more adequately they comprehend the concepts of the articles.

Farmers who had a rational orientation toward action and decision-making were the ones who comprehended more of the concepts of the articles.

Environmental and conservation beliefs/knowledge and attitudes did not have a great impact upon the respondents' comprehension of the concepts of the articles. Only two (KNOWSC, and LANDRGTS) of six measures showed significant relationships. Those farmers who were knowledgeable about conservation/pollution abatement concepts prior to the program and who perceived limited rights over their lands were the ones who comprehended more of the concepts in the information program.

Farmers who participated in voluntary organizations and participated in soil conservation programs comprehended more of the concepts of the articles than those who did not participate in such programs.

The use of specialized information sources influenced significantly the comprehension of the concepts of the articles. Farmers who used specialized information sources understood more and thus comprehended more of the concepts of the articles.

Funds received from ACP did not have a significant correlation. This is an indication that farmers did not have to receive such funds before they comprehend the concepts of the articles. Nor did prior adoption of soil conservation practices show a significant correlation with the total comprehension.

Farmers who gave greater attention to the programs and talked with others about "Agriculture and the Environment" comprehended more of the concepts.

CHAPTER 9: COGNITIVE ACCEPTANCE: ENVIRONMENTAL/ CONSERVATION BELIEFS AND KNOWLEDGE

Cognitive acceptance is defined as the degree of validity which a receiver assigns to the concepts being communicated; that is, the degree to which he accepts the meanings he comprehends as being valid, factual, correct or true. Environmental and conservation cognitive acceptance was operationally defined by three indices. Each of these indices was used to measure the extent to which an individual's cognitive acceptance may have an effect on his actions and decision in adopting environment-pollution control practices. Three general hypotheses were developed regarding the effects of the experiment.

> General Hypothesis 7: The treatment group will have greater cognitive acceptance of the sender's position than will the control group.

> General Hypothesis 8: Cognitive acceptance given to the "Agriculture and the Environment" program is partly a function of experimentally introduced "message-like" manipulation and audience selection factors.

> General Hypothesis 16: Those people who are more favorably predisposed will have more favorable cognitive acceptance of the "Agriculture and the Environment" recommended practices.

We will explore the findings associated with these hypotheses. Three variables are used to measure environmental and conservation cognitive acceptance. The variables are GENENVIR, KNOWSC, and EROSION. The measures for each variable have been developed and described as predispositions in Chapter 5. The same variables measured after completion of the program may be used as gauges of cognitive response to the program. The distributions of responses for each of the variables after the program (1975 survey) will be presented in this chapter. The procedures of discussing the variables are as follows: (1) present the variable and the respondents' distributions for the variable, (2) discussion about the impacts of the experimental program upon the variable, (3) effects of predispositions and other program responses upon the variable, and (4) predispositional and other program influence upon the variable.

Variable Y-4: General Concern About Pollution (GENENVIR)

Table 45 shows the distributions of respondents' general concern about pollution. Examination of this table indicates that more than half of the respondents scored in the 17 to 24 category. The general concern scale ranged from 0 to 48 with an average of 21.5. In other words, the level of concern was relatively low.

Impact of the Experimental Program Upon GENENVIR

The sender's manipulated variables are assumed to be applicable to the respondents' general concern about pollution. Three empirical hypotheses relating to the level of concern about pollution are derived from the General Hypothesis 7 and 8.

> Empirical Hypothesis 1: The treatment group will be more concerned about pollution than will the control group when the effects of pretest and sample are statistically controlled.
>
> Empirical Hypothesis 2: The pretested group will be more concerned about pollution than will the unpretested group when the effects of treatment and sample are statistically controlled.
>
> Empirical Hypothesis 3: The high practitioner group will be more concerned about pollution than will the random group when the effects of treatment and pretest are statistically controlled.

Table 45. Distribution of respondents' general concern about pollution by category, 1975.

Category	Treatment				Control			
	High Practitioner		Random Sample		High Practitioner		Random Sample	
	Pretest % of 47	No Pretest % of 28	Pretest % of 52	No Pretest % of 41	Pretest % of 27	No Pretest % of 15	Pretest % of 29	No Pretest % of 23
0 to 8	2	0	0	2	4	7	0	0
9 to 16	11	4	6	15	11	7	3	4
17 to 24	68	71	75	71	59	60	76	74
25 to 32	17	25	17	12	25	26	21	17
33 to 40	2	0	2	0	0	0	0	0
41 to 48	0	0	0	0	0	0	0	4
Total	100	100	100	100	100	100	100	100
Mean	21.8	22.3	22.0	21.0	20.7	19.7	21.5	22.3

The analysis of data presented in Table 46 indicates that none of the hypotheses were supported. The treatment did not significantly influence respondents' concern about pollution. The number of pretest surveys respondents had participated in prior to the program did not significantly influence respondents' concern about pollution, and the identified high practitioners did not show significantly greater concern than the random sample of farmers. There was no significant interaction of treatment, pretest, and sample selection regarding concern about pollution.

Table 46. Analysis of variance for the level of concern about pollution.

Source	Mean Square	F Ratio	Level of Significance	Conclusion
Treatment	19.344	.856	.999	Rejected
Pretest	2.714	.119	.999	Rejected
Sample	7.407	.327	.999	Rejected
Interaction	12.967	.565	.999	Rejected

Effects of Predispositions and Other Program Responses Upon Level of Concern About Pollution

Based upon the theoretical arguments presented in Chapters 3 and 5 regarding the nature of relevant predispositions and other program responses, four sub-hypotheses are derived from the General Hypothesis 16.

Sub-Hypothesis 16a: Respondents who possess the situational attributes of operating larger farming units and being younger and better educated will have greater cognitive acceptance of "Agriculture and the Environment's" recommended practices.

Sub-Hypothesis 16b: Respondents whose general and issue-related orientations (beliefs, attitudes, and values) are more pro-environmental will have greater cognitive acceptance of "Agriculture and the Environment's" recommended practices.

Sub-Hypothesis 16c: Respondents who have taken prior actions which are compatible with the techniques and goals of "Agriculture and the Environment" program will have greater cognitive acceptance of recommended practices.

Sub-Hypothesis 16d: Respondents who responded favorably to other aspects of the program will have greater cognitive acceptance of "Agriculture and the Environment's" recommended practices.

Each of these sub-hypotheses is further operationalized by several empirical measures. Each is directional in nature. They are stated in summary form in column two of Table 47. Personian zero-order correlation coefficients were calculated for each empirical hypothesis and the level of significance of these coefficients was used as a test of the hypothesized relationships.

The impact of individual's predispositions upon his general concern about pollution was weak. This weak relationship might be an indication that probably other factors different from predispositions are needed to generate a significant amount of concern about pollution.

The only significant and predicted correlation was between the before general concern and after general concern. The correlation was moderately significant ($r = .48$, $P < .001$). Correlations with variables measuring interaction and comprehension were significant, but were opposite the predicted direction.

Variable Y-5: Knowledge of Agriculture and Environment Interactions (KNOWSC)

Table 48 presents distributions of respondents' knowledge of agriculture and environment interactions. Examination of Table 48 indicates that more than three-fourths of the respondents had knowledge of agriculture

Table 47. Relationships between predispositional variables (1974 survey), other program responses (1975 survey) and general concern about pollution (1975 survey).

Independent Variables (Predispositions)	Hypothesized Relationship	r	Level of Significance	Conclusion
	Dependent Variable: GENENVIR			
Attributes of the Firm:				
TOTACRES	r > o	-.06	.289	Rejected
NETINC	r > o	-.10	.163	Rejected
PCTOWNED	r > o	.02	.443	Rejected
Personal Characteristics:				
AGE	r < o	-.11	.136	Rejected
YRSEDUC	r > o	.10	.163	Rejected
Orientations:				
ATTINDIIND	r > o	.08	.213	Rejected
Environmental and Conservation Beliefs/Knowledge and Attitudes:				
GENENVIR	r > o	.48	.001	Supported-Strong
KNOWSC	r > o	-.04	.350	Rejected
EROSION	r > o	.15	.064	Rejected
WHOPAYEN	r > o	.07	.256	Rejected
LANDRGTS	r > o	-.07	.237	Rejected
ADOPTSC	r > o	.05	.316	Rejected
Organizational Participation:				
GNORGIND	r > o	-.13	.094	Rejected
SCPART	r > o	.01	.446	Rejected
Use of Specialized Information Sources:				
COMMIND	r > o	-.16	.063	Rejected

Funds Received from ACP:				
ACPFUNDS	r > o	.00	.493	Rejected
Adoption of Pollution Abatement Innovations:				
STPRACSC	r > o	.09	.178	Rejected
Other Program Responses:				
ATENMLIND	r > o	-.09	.184	Rejected
TALKTOT	r > o	-.19	.033	Rejected[a]
COMPTOT	r > o	-.22	.016	Rejected[a]

[a]The correlations are significant but in opposite directions hypothesized.

Table 48. Distribution of respondents' knowledge of agriculture-environment interactions by category, 1975 survey.

Category	Treatment				Control			
	High Practitioner		Random Sample		High Practitioner		Random Sample	
	Pretest % of 47	No Pretest % of 28	Pretest % of 52	No Pretest % of 41	Pretest % of 27	No Pretest % of 15	Pretest % of 29	No Pretest % of 23
0 to 4	0	0	6	5	0	0	0	4
5 to 8	2	4	4	10	0	0	14	9
9 to 12	9	11	15	22	7	13	10	22
13 to 16	17	11	27	37	26	27	38	30
17 to 20	36	54	23	27	41	33	24	30
21 to 24	32	18	19	0	22	27	10	0
25 to 28	4	4	6	0	4	0	3	4
Total	100	100	100	100	100	100	99	99
Mean	13.2	12.3	11.2	9.2	12.8	12.3	10.5	9.8

and environment interactions. The knowledge categories ranged from 0 to 28 with an average of 11.4. The knowledge of agriculture and environment interactions was relatively moderate.

Impacts of the Experimental Program Upon KNOWSC

The sender's manipulated variables are assumed to be applicable to the respondents' knowledge of agriculture and environment interactions. Three empirical hypotheses relating to the respondents' knowledge are derived from the General Hypotheses 7 and 8.

> Empirical Hypothesis 1: The treatment group will have more knowledge of agriculture and environment interactions than will the control group when the effects of pretest and sample are statistically controlled.

> Empirical Hypothesis 2: The pretested group will have more knowledge of agriculture and environment interactions than will the unpretested group when the effects of treatment and sample are statistically controlled.

> Empirical Hypothesis 3: The high practitioner group will have more knowledge of agriculture and interactions than will the random group when the effects of treatment and pretest are statistically controlled.

The analysis of data presented in Table 49 indicates that hypotheses related to pretest and sample selection were supported. The number of pretest surveys the respondents had participated in prior to the program positively influence the farmers' knowledge of agriculture and environment interactions. The identified high practitioner farmers showed a significant knowledge of agriculture and environment interactions than did the random selected farmers. The treatment, however, did not significantly influence knowledge of agriculture and environment interactions, and there was no significant interaction of treatment, pretest, and sample selection regarding knowledge of agriculture and environment interactions.

Table 49. Analysis of variance for level of knowledge about agriculture and environment interactions.

Source	Mean Square	F Ratio	Level of Significance	Conclusion
Treatment	1.768	.139	.999	Rejected
Pretest	49.881	4.071	.018	Supported-Moderate
Sample	370.025	30.173	.001	Supported-Strong
Interaction	4.819	.390	.999	Rejected

Effects of Predispositions and Other Program Responses upon Knowledge of Agriculture and Environment Interactions

Based upon the theoretical arguments presented in Chapters 3 and 5 regarding the nature of relevant predispositions and other program responses, four sub-hypotheses are derived from the General Hypothesis 16.

Sub-Hypothesis 16e: Respondents who possess the situational attributes of operating larger farming units and being younger and better educated will have more knowledge of agriculture and environment interactions.

Sub-Hypothesis 16f: Respondents whose general and issue-related orientations (beliefs, attitudes, and values) are more pro-environmental will have more knowledge of agriculture and environment interactions.

Sub-Hypothesis 16g: Respondents who have taken prior actions which are compatible with the techniques and goals of "Agriculture and the Environment" program will have more knowledge of agriculture and environment interactions.

Sub-Hypothesis 16h: Respondents who responded favorably to other aspects of the program will have more knowledge of agriculture and environment interactions.

Each of these sub-hypotheses is further operationalized by several empirical measures. Each is directional in nature. They are stated in summary form in column two of Table 50. Personian zero-order correlation coefficients were calculated for each empirical hypothesis and the level of significance of these coefficients was used as a test of the hypothesized relationship.

Overall prediction of knowledge of agriculture and environment interaction was relatively weak.

The attributes of the firm were measured by three variables, TOTACRES, NETINC, and PCTOWNED. Two showed significant relation to level of knowledge, but correlations were weak. The farmers who had acres of farm land were found to have greater knowledge of agriculture and environment interaction. Those who had net farm income were found to be more knowledgeable about agriculture and environment interactions.

Personal characteristics of the respondents had impacts upon knowledge of agriculture and environment interaction. Farmers who were older showed a greater knowledge. The correlation was weak. The farmers' level of education also had a significant positive relation with the level of knowledge. The correlation was moderate.

Orientations had a moderate influence in predicting the level of knowledge. The farmers who were oriented toward action and decision-making were also found to be knowledgeable about agriculture and environment interaction.

Three of the six variables (KNOWSC, LANDRGTS, and ADOPTSC) used to measure environmental and conservation beliefs/knowledge and attitudes

Table 50. Relationships between predispositional variables (1974 survey), other program responses (1975 survey) and knowledge of agriculture and environment interaction (1975 survey).

Independent Variables (Predispositions)	Dependent Variable: KNOWSC			
	Hypothesized Relationship	r	Level of Significance	Conclusion
Attributes of the Firm:				
TOTACRES	r > o	.28	.003	Supported-Weak
NETINC	r > o	.24	.009	Supported-Weak
PCTOWNED	r > o	-.22	.016	Rejected[a]
Personal Characteristics:				
AGE	r < o	-.30	.001	Supported-Weak
YRSEDUC	r > o	.41	.001	Supported-Moderate
Orientation:				
ATTIND	r > o	.50	.001	Supported-Moderate
Environmental and Conservation Beliefs/Knowledge and Attitudes:				
GENENVIR	r > o	.02	.442	Rejected
KNOWSC	r > o	.65	.001	Supported-Strong
EROSION	r > o	.01	.477	Rejected
WHOPAYEN	r > o	-.06	.282	Rejected
LANDRGTS	r > o	.26	.005	Supported-Weak
ADOPTSC	r > o	.26	.005	Supported-Weak
Organizational Participation:				
GNORGIND	r > o	.24	.009	Supported-Weak
SCPARTIND	r > o	.28	.003	Supported-Weak
Use of Specialized Information Sources:				
COMMIND	r > o	.16	.060	Rejected

Funds Received from ACP:				
ACPFUNDS	r > o	.08	.214	Rejected
Adoption of Pollution Abatement Innovations:				
STPRACSC	r > o	.09	.188	Rejected
Other Program Responses:				
ATTENML	r > o	.26	.005	Supported-Weak
TALKTOT	r > o	.21	.017	Supported-Weak
COMPTOT	r > o	.69	.001	Supported-Strong
GENENVIR	r > o	-.02	.421	Rejected

[a]The correlation was significant but in opposite direction hypothesized.

predicted some level of knowledge.

As expected, the before knowledge had a highly significant relationship with the after knowledge of agriculture and environment interaction. The correlation was strong (r = .65). The farmers who perceived limited rights over their lands were found to have a greater level of knowledge. Likewise, the farmers who were willing to adopt erosion control practices were also more knowledgeable. In both cases, the correlations were weak. GENENVIR, EROSION and WHOPAYEN showed no significant relationship.

The farmers who participated in formal organizations and participants of soil conservation program showed a significantly greater knowledge of agriculture and environment interaction. The correlations were weak in both cases.

These farmers who attended to, comprehended and talked to others about the "Agriculture and the Environment" program showed a significant level of knowledge of agriculture and environment interaction. ATTENML and TALKTOT had weak correlation while COMPTOT had a strong correlation (r = .69).

The use of specialized information sources by the farmers did not predict a significant level of knowledge of agriculture and environment interaction.

Farmers who received more ACP funds showed no significantly greater knowledge than did those who had none or fewer such funds.

At the same time farmers who have adopted soil conservation practices did not show any significant level of knowledge about agriculture and environment interaction.

Variable Y-6: Perception of Erosion As a Serious Problem (EROSION)

Table 51 presents distributions of respondents' perception of erosion as a serious problem. Examination of this table indicates that more than three-fourths of the respondents perceived erosion to be a problem on their farms. The categories of erosion as a problem ranged from very unimportant problem to very important problem with an average of 3.8.

Impacts of the Experimental Program upon EROSION

The sender's manipulated variables: treatment, pretest and sample selection are assumed to be applicable to the respondents' perceptions about erosion. Three empirical hypotheses relating to the respondents' perception of erosion are derived from the General Hypotheses 7 and 8.

> Empirical Hypothesis 1: The treatment group will have a greater perception of erosion as a problem than will the control group when the effects of pretest and sample are statistically controlled.

> Empirical Hypothesis 2: The pretested group will have a greater perception of erosion as a problem than will the unpretested group when the effects of treatment and sample are statistically controlled.

> Empirical Hypothesis 3: The high practitioner group will have a greater perception of erosion as a problem than will the random group when the effects of treatment and pretest are statistically controlled.

The analysis of data presented in Table 52 indicates that only the hypothesis related to the sample selection was supported. The identified high practitioner farmers perceived erosion as a more serious problem on their farms than did the random sample of farmers. The treatment did not significantly influence respondents' perception of erosion as a problem. The number of pretest surveys the respondents had participated in

Table 51. Distribution of respondents' perception of seriousness of erosion problem by category, 1975 survey.

Category	Treatment				Control			
	High Practitioner		Random Sample		High Practitioner		Random Sample	
	Pretest % of 47	No Pretest % of 28	Pretest % of 52	No Pretest % of 41	Pretest % of 27	No Pretest % of 15	Pretest % of 29	No Pretest % of 23
Very Unimportant Problem	2	0	6	10	0	0	0	4
Unimportant Problem	10	14	13	10	11	26	14	22
Somewhat of a Problem	30	36	31	39	30	20	31	26
Important Problem	28	10	27	27	18	27	34	26
Very Important Problem	30	39	23	14	41	27	21	22
Total	100	100	100	100	100	100	100	100
Mean	4.0	4.1	3.7	3.3	4.3	3.8	3.8	3.6

prior to the program did not significantly influence respondents' perception of erosion as a problem, and there was no significant interaction of treatment, pretest, and sample selection regarding perception of erosion as a serious problem on the farm.

Table 52. Analysis of variance for perception of erosion as a serious problem on the farms.

Source	Mean Square	F Ratio	Level of Significance	Conclusion
Treatment	1.043	.441	.999	Rejected
Pretest	3.447	1.453	.235	Rejected
Sample	16.775	7.074	.008	Supported-Strong
Interaction	1.511	.642	.999	Rejected

Effects of Predispositions and Other Program Responses upon Perception of Erosion as a Problem on the Farm

In Chapters 3 and 5 the theoretical arguments regarding the nature of relevant predispositions and other programs' responses were presented. Based upon these theoretical arguments four sub-hypotheses were derived from the General Hypothesis 16.

> Sub-Hypothesis 16i: Respondents who possess the situational attributes of operating larger farming units and being younger and better educated will have greater perception of erosion as a serious problem.

> Sub-Hypothesis 16j: Respondents whose general and issue-related orientations (beliefs, attitudes, and values) are more pro-environmental will have greater perception of erosion as a serious problem.

Sub-Hypothesis 16k: Respondents who have taken prior actions which are compatible with the techniques and goals of the "Agriculture and the Environment" program will have greater perception of erosion as a serious problem.

Sub-Hypothesis 16l: Respondents who responded favorably to other aspects of the program will have greater perception of erosion as a serious problem.

Each of these sub-hypotheses is further operationalized by several empirical measures. Each is directional in nature. They are stated in summary form in column two of Table 53. Personian zero-order correlation coefficients were calculated for each empirical hypothesis and the level of significance of these coefficients were used as a test of the hypothesized relationship.

The respondents' perception of erosion as a problem was poorly predicted by the predisposition variables. Organizational participation can be considered as the major predictor of perception of erosion problems. The two variables GNORGIND and SCPART were found to have significant correlation but the correlations were weak. They are, however, indications that farmers who participate in various organizations and participate in soil conservation programs are more likely to perceive erosion to be a problem on their own farm.

Of the six variables used to measure environmental and conservation beliefs/knowledge and attitudes, only the before perception of erosion problems had a significant relation with the after score. The correlation was moderate.

Attributes of the firm, personal characteristics, orientation, use of specialized information sources, funds received from ACP, adoption of

Table 53. Relationships between predispositional variables (1974 survey), other program responses (1975 survey) and perception of erosion problems (1975 survey).

Independent Variables (Predispositions)	Dependent Variables: EROSION			
	Hypothesized Relationship	r	Level of Significance	Conclusion
Attributes of the Firm:				
TOTACRES	r > o	.08	.203	Rejected
NETINC	r > o	-.14	.087	Rejected
PCTOWNED	r > o	.15	.072	Rejected
Personal Characteristics:				
AGE	r < o	-.08	.232	Rejected
YRSEDUC	r > o	.03	.401	Rejected
Orientation:				
ATTIND	r > o	.14	.091	Rejected
Environmental and Conservation Beliefs/Knowledge and Attitudes:				
GENENVIR	r > o	-.13	.104	Rejected
KNOWSC	r > o	.09	.182	Rejected
EROSION	r > o	.50	.001	Supported-Moderate
WHOPAYEN	r > o	.11	.150	Rejected
LANDRGTS	r > o	.12	.130	Rejected
ADOPTSC	r > o	.01	.448	Rejected
Organizational Participation:				
GNORGIND	r > o	.18	.039	Supported-Weak
SCPART	r > o	.25	.007	Supported-Weak
Use of Specialized Information Sources:				
COMMIND	r > o	.05	.315	Rejected

<u>Funds Received from ACP</u>:				
ACPFUNDS	r > o	.05	.320	Rejected
<u>Adoption of Pollution Abatement Innovations</u>:				
STPRACSCIND	r > o	.16	.055	Rejected
<u>Other Program Responses</u>:				
ATTENMLIND	r > o	.07	.246	Rejected
TALKTOT	r > o	.13	.094	Rejected
COMPTOT	r > o	.07	.236	Rejected
GENENVIR	r > o	.12	.126	Rejected
KNOWSC	r > o	.12	.121	Rejected

pollution abatement innovations, and intervening variables were not very good predictors of the respondents' perception of erosion as a problem.

CHAPTER 10: AFFECTIVE ACCEPTANCE: ENVIRONMENTAL/CONSERVATION ATTITUDES

Affective acceptance is defined as the receiver's acceptance (or rejection) of the sender's conclusions as being desirable. The receiver makes judgments of the message in terms of good-bad, desirable-undesirable. Environmental and conservation attitudes were operationally defined by three indices. Each of these indices was used to measure the extent to which respondents' attitudes may have an effect on their adoption of environment-pollution control practices. Three general hypotheses were developed regarding the effects of the experiment.

> General Hypothesis 9: The treatment group will have greater affective acceptance of the sender's position than will the control group.

> General Hypothesis 10: Affective acceptance of the "Agriculture and the Environment" practices is partly a function of experimentally introduced "message-like" manipulation and audience selection factors.

> General Hypothesis 17: Those people who are more favorably predisposed will have more favorable affective acceptance of "Agriculture and the Environment" practice recommendations.

Three variables regarding environmental and conservation attitudes were developed in Chapter 5. The description of measures for each of the variables will not be repeated here; however, the distributions of respondents on each of the variables in 1975 will be presented in this chapter. The procedures of discussing the variables are as follows: (1) present the variable and the respondents' distributions for the variable, (2) discuss the impacts of the experimental program upon the variable, and (3) analyze effects of predispositions and other program responses upon the variable.

Variable Y-7: Who Is Responsible for Pollution Control (WHOPAYEN)

In Chapter 5 the details for the measure of this variable were presented. Table 54 shows the distributions of the respondents' attitudes about who is responsible for erosion control. Examination of this table indicates that nearly all the respondents reflected the general attitude that those who pollute must pay to clean it up. The possible scores ranged from 0 to 30 with an average of 20.

Findings: experimental effects

The sender's manipulated variables were assumed to affect respondent's attitudes about who is responsible for pollution control. Three empirical hypotheses regarding attitudes were derived from the General Hypotheses 9 and 10.

> Empirical Hypothesis 1: The treatment group will be more likely to feel that those who pollute must pay than will the control group when the effects of pretest and sample are statistically controlled.

> Empirical Hypothesis 2: The pretested group will be more likely to feel that those who pollute must pay than will the unpretested group when the effects of treatment and sample are statistically controlled.

> Empirical Hypothesis 3: The high practitioner group will be more likely to feel that those who pollute must pay than will the random group when the effects of treatment and pretest are statistically controlled.

The analysis of data presented in Table 55 indicates that sender's manipulated variables had no statistically significant influence upon the respondents' attitudes about who is responsible for pollution control.

Table 54. Distribution of respondents' attitudes about who is responsible for pollution control by category, 1975 survey.

Category	Treatment				Control			
	High Practitioner		Random Sample		High Practitioner		Random Sample	
	Pretest % of 47	No Pretest % of 28	Pretest % of 52	No Pretest % of 41	Pretest % of 27	No Pretest % of 15	Pretest % of 29	No Pretest % of 23
0 to 5 Those who pollute should <u>not</u> pay	0	0	0	0	0	0	0	0
6 to 10	0	0	0	0	0	0	0	0
11 to 15	2	0	2	2	0	0	0	0
16 to 20	68	71	75	66	70	73	66	78
21 to 25	28	21	23	29	26	27	31	13
26 to 30 Those who pollute should pay	2	7	0	2	4	0	3	9
Total	100	99	100	99	100	100	100	100
Mean	19.9	20.4	19.4	20.4	20.1	19.9	20.2	20.0

Table 55. Analysis of variance for attitude about who is responsible for pollution control.

Source	Mean Square	F Ratio	Level of Significance	Conclusion
Treatment	.549	.095	.999	Rejected
Pretest	8.867	1.532	.217	Rejected
Sample	1.686	.291	.999	Rejected
Interaction	4.034	.697	.999	Rejected

Treatment, number of pretest surveys a respondent had participated in prior to the program, and identification of some farmers as high practitioners did not make any difference. Nor was there a significant interaction of teatment, pretest, and sample selection.

Effects of predispositions and other programs' responses upon attitudes about who is responsible for pollution control

Respondents' predispositions and responses to other programs are considered as factors that can influence an individual's response to a message. Based upon the theoretical arguments presented in Chapters 3 and 5, four sub-hypotheses are derived from the General Hypothesis 17.

> Sub-Hypothesis 17a: Respondents who possess the situational attributes of operating larger farming units and being younger and better educated will be more likely to feel that those who pollute must pay.

> Sub-Hypothesis 17b: Respondents whose general and issue-related orientations (beliefs, attitudes and values) are more pro-environmental will be more likely to feel that those who pollute must pay.

> Sub-Hypothesis 17c: Respondents who have taken prior actions which are compatible with the techniques and goals of the information program will be more likely to feel that those who pollute must pay.

> Sub-Hypothesis 17d: Respondents who responded favorably to other programs will be more likely to feel that those who pollute must pay.

Each of these sub-hypotheses is further operationalized by several empirical measures. Each is directional in nature. They are stated in summary form in column two of Table 56. Personian zero-order correlation coefficients were calculated for each empirical hypothesis and the level of significance of these coefficients was used as a test of the hypothesized relationship.

Findings: predispositional and other programs' responses effects

Overall prediction of attitudes about who is responsible for pollution control by the predispositional factors is relatively low.

Two of the environmental and conservation beliefs/knowledge and attitudes variables, WHOPAYEN and LANDRGTS, showed significant but weak correlations. The farmers who agreed that paying costs of pollution was the responsibility of polluters participated more in the soil conservation program and adopted more soil conservation practices. Other predispositional measures were not significantly correlated with WHOPAYEN.

The WHOPAYEN attitude was only weakly associated with other program responses. The farmers who agreed that those who pollute should pay had adequate comprehension of the concepts of the articles included in the information program. But attention given to the program, talking to others about it, general environmental concern, knowledge about erosion principles, and perception of erosion problems after the program did not correlate significantly with WHOPAYEN.

Table 56. Relationships between predispositional variables (1974 survey), other program responses (1975 survey) and who is responsible for pollution control (1975 survey).

Independent Variables (Predispositions)	Dependent Variable: WHOPAYEN			
	Hypothesized Relationship	r	Level of Significance	Conclusion
Attributes of the Firm:				
TOTACRES	r > o	-.20	.024	Rejected[a]
NETINC	r > o	-.10	.173	Rejected
PCTOWNED	r > o	.07	.261	Rejected
Personal Characteristics:				
AGE	r < o	.13	.109	Rejected
YRSEDUC	r > c	-.02	.439	Rejected
Orientation:				
ATTINDI	r > o	.08	.226	Rejected
Environmental and Conservation Beliefs/Knowledge and Attitudes:				
GENENVIR	r > o	.13	.104	Rejected
KNOWSC	r > o	.08	.230	Rejected
EROSION	r > o	-.02	.405	Rejected
WHOPAYEN	r > o	.31	.001	Supported-Weak
LANDRGTS	r > o	.18	.035	Supported Weak
ADOPTSC	r > o	.03	.403	Rejected
Organizational Participation				
GNORGIND	r > o	.00	.494	Rejected
SCPART	r > o	.18	.041	Supported-Weak
Use of Specialized Information Sources:				
COMMIND	r > o	.01	.462	Rejected

<u>Funds Received from ACP</u>:				
ACPFUNDS	r > o	.08	.219	Rejected
<u>Adoption of Pollution Abatement Innovations</u>:				
STPRACSC	r > o	.16	.062	Rejected
<u>Other Program Responses</u>:				
ATTENML	r > o	-.02	.422	Rejected
TALKTOT	r > o	-.11	.131	Rejected
COMPTOT	r > o	.15	.068	Rejected
GENENVIR	r > o	.38	.001	Supported-Moderate
KNOWSC	r > o	.28	.002	Supported-Weak
EROSION	r > o	.01	.475	Rejected
WHOPAYEN	r > o	.30	.001	Supported-Weak

Variable Y-8: Attitudes About Land Ownership Rights (LANDRGTS)

In Chapter 5 the measure for the variable, LANDRGTS, has been discussed in detail. Table 57 shows the distribution of respondents' attitudes about land ownership rights. Examination of this table indicates that nearly all farmers felt that land ownership rights were limited. About three-fourths of the respondents' attitudes were in the 10 to 12 category. The possible scores ranged from 0 to 18 with an average of 10.6.

The sender's manipulated variables were expected to influence respondents' attitudes about land ownership rights. Three empirical hypotheses relating to attitudes about land ownership rights were derived from the General Hypotheses 9 and 10.

> Empirical Hypothesis 1: The treatment group will feel that land ownership rights are more limited than will the control group when the effects of pretest and sample are statistically controlled.

> Empirical Hypothesis 2: The pretested group will feel that land ownership rights are more limited than will the unpretested group when the effects of treatment and sample are statistically controlled.

> Empirical Hypothesis 3: The high practitioner group will feel that land ownership rights are more limited than will the random group when the effects of pretest and treatment are statistically controlled.

Analysis of data presented in Table 58 indicates that none of the hypotheses were supported. The treatment did not significantly influence respondents' attitudes, the number of pretest surveys respondents had participated in prior to the program did not significantly influence respondents' attitudes, and the identified high practitioners did not show any more favorable attitudes than the random sample of farmers.

Table 57. Distribution of respondents' attitudes about land ownership rights by category, 1975 survey.

Category	Treatment				Control			
	High Practitioner		Random Sample		High Practitioner		Random Sample	
	Pretest % of 47	No Pretest % of 28	Pretest % of 52	No Pretest % of 41	Pretest % of 27	No Pretest % of 15	Pretest % of 29	No Pretest % of 23
0 to 3 Owner has exclusive rights	0	0	0	2	0	0	0	0
4 to 6	4	4	6	0	4	0	0	4
7 to 9	15	7	19	24	18	7	10	22
10 to 12	64	64	65	66	70	67	72	70
13 to 15	17	25	10	7	4	13	17	4
16 to 18 Owner has restricted rights	0	0	0	0	4	13	0	0
Total	100	100	100	99	100	100	99	100
Mean	10.6	11.3	10.3	10.3	10.6	11.5	11.2	10.0

There was no significant interaction of treatment, pretest, and sample selection regarding attitudes about land ownership rights.

Table 58. Analysis of variance for attitudes about land ownership rights.

Source	Mean Square	F Ratio	Level of Significance	Conclusion
Treatment	1.783	.409	.999	Rejected
Pretest	.468	.107	.999	Rejected
Sample	12.619	2.895	.086	Rejected
Interaction	6.033	1.384	.230	Rejected

Effects of predispositions and other programs' responses upon attitudes about land ownership rights

Predispositions and responses to other programs are expected to be factors that can influence respondents' attitudes about a message. These predispositions are also assumed to be factors that aid respondents in their decisions to accept or reject the sender's ideas. Based upon these theoretical arguments, four sub-hypotheses are derived from the General Hypothesis 17.

> Sub-Hypothesis 17e: Respondents who possess the situational attributes of operating larger farming units and being younger and better educated will feel that landowners have limited rights over the use of their land.

> Sub-Hypothesis 17f: Respondents whose general and issue-related orientations (beliefs, attitudes, and values) are more pro-environmental will feel that landowners have limited rights over the use of their land.

> Sub-Hypothesis 17g: Respondents who have taken prior actions which are compatible with the techniques and goals of the information program will feel that landowners have limited rights over the use of their land.

Sub-Hypothesis 17h: Respondents who responded favorably to other aspects of the program will feel that landowners have limited rights over the use of their land.

Each of these sub-hypotheses is further operationalized by several empirical measures. Each is directional in nature. They are stated in summary form in column two of Table 59. Personian zero-order correlation coefficients were calculated for each empirical hypothesis and the level of significance of these coefficients was used as a test of the hypothesized relationship.

Findings: predispositional and other program responses effects

The overall impact of predispositions upon attitudes formed about land ownership rights was very low. Across the variables the correlations were found to be weak.

Those farmers who had a more rational orientation toward action and decision-making felt the landowner had fewer rights over the use of his land.

Three beliefs/knowledge and attitudes variables influenced the LANDRGTS. The variables are KNOWSC, WHOPAYEN, and LANDRGTS. Farmers who felt they had fewer rights over their land were more knowledgeable about the "Agriculture and the Environment" program. They were the ones who also felt that pollution control is the responsibility of the polluter. Before and after LANDRGTS scores also were correlated. In all three cases the correlations were weak.

General concern about pollution, perception of erosion as a problem and adoption of erosion control did not influence attitudes about land ownership rights. Attributes of the firm did not have a significant

Table 59. Relationships between predispositional variables (1974 survey), other program responses (1975 survey) and attitudes about land ownership rights (1975 survey).

Independent Variables (Predispositions)	Dependent Variable: LANDRGTS Hypothesized Relationship	r	Level of Significance	Conclusion
Attributes of the Firm:				
TOTACRES	r > o	-.05	.306	Rejected
NETINC	r > o	.01	.463	Rejected
PCTOWNED	r > o	.03	.397	Rejected
Personal Characteristics:				
AGE	r < o	.03	.400	Rejected
YRSEDUC	r > o	.07	.241	Rejected
Orientation:				
ATTIND1	r > o	.20	.022	Supported-Weak
Environmental and Conservation Beliefs/Knowledge and Attitudes:				
GENENVIR	r > o	.14	.081	Rejected
KNOWSC	r > o	.27	.003	Supported-Weak
EROSION	r > o	.05	.299	Rejected
WHOPAYEN	r > o	.19	.029	Supported-Weak
LANDRGTS	r > o	.33	.001	Supported-Weak
ADOPTSC	r > o	-.04	.367	Rejected
Organizational Participation:				
GNORGIND	r > o	.05	.303	Rejected
SCPART	r > o	.16	.063	Rejected
Use of Specialized Information Sources:				
COMMIND	r > o	-.17	.051	Rejected

Funds Received from ACP:				
ACPFUNDS	r > o	-.03	.380	Rejected
Adoption of Pollution Abatement Innovations:				
STPRACSC	r > o	.24	.009	Supported-Weak
Other Program Responses:				
ATTENML	r > o	-.06	.291	Rejected
TALKTOT	r > o	-.03	.387	Rejected
COMPTOT	r > o	.18	.041	Supported-Weak
GENENVIR	r > o	.09	.200	Rejected
KNOWSC	r > o	.06	.277	Rejected
EROSION	r > o	-.05	.325	Rejected

[a]The correlation was significant but in opposite direction hypothesized.

influence upon LANDRGTS. Nor did personal characterisitcs show significant correlations with LANDRGTS.

Participation in organizations, soil conservation program participation, the use of specialized information sources, and funds received from ACP did not have a significant correlation with LANDRGTS, and prior adoption of soil conservation practices showed no correlation with LANDRGTS scores.

Like the predispositional variables, the impact of other program response variables on LANDRGTS was low.

Farmers who felt fewer rights over their lands were generally more concerned about pollution. Knowledge about erosion also had a significant positive correlation, and those farmers who felt that they had fewer land rights also agreed that pollution control was the responsibility of the polluter.

Attention given to, talking to others, comprehension and perception of erosion as a problem did not influence the attitudes about land ownership rights.

Variable Y-9: Willingness to Adopt Erosion Control (ADOPTSC)

The measures for variable ADOPTSC were discussed in Chapter 5. Table 60 shows the distribution of respondents' willingness to adopt erosion control. Examination of this table indicates that three-fourths of the respondents were willing to adopt erosion control measures under very long payoff conditions. Forty-three percent indicated that they would adopt even if there were a 20-year payoff time.

Table 60. Distribution of respondents' willingness to adopt erosion control by category, 1975 survey.

Would adopt if time to payoff is _____	Treatment: High Practitioner Pretest % of 48	Treatment: High Practitioner No Pretest % of 29	Treatment: Random Sample Pretest % of 56	Treatment: Random Sample No Pretest % of 44	Control: High Practitioner Pretest % of 28	Control: High Practitioner No Pretest % of 15	Control: Random Sample Pretest % of 29	Control: Random Sample No Pretest % of 24
0 = Not adopt	2	0	9	11	0	7	14	21
1 = Don't know	0	3	2	14	0	0	0	4
2 = 5-year payoff	0	10	12	14	4	0	10	8
3 = 10-year payoff	15	10	16	18	28	20	21	17
4 = 20-year payoff	83	76	61	43	68	73	55	50
Total	100	99	100	100	100	100	100	100
Mean	3.8	3.7	3.2	2.7	3.6	3.5	3.0	2.7

The related sender's manipulated variables -- treatment, pretest, and sample -- are assumed to influence respondents' willingness to adopt erosion control. Three empirical hypotheses associated with the test of willingness to adopt erosion control are derived from the General Hypotheses 9 and 10.

Empirical Hypothesis 1: The treatment group will be more willing to adopt erosion control practices than will the control group when the effects of pretest and sample are statistically controlled.

Empirical Hypothesis 2: The pretested group will be more willing to adopt erosion control practices than will the unpretested group when the effects of treatment and sample are statistically controlled.

Empirical Hypothesis 3: The high practitioner group will be more willing to adopt erosion control practices than will the random sample when the effects of treatment and pre-test are statistically controlled.

The analysis of data presented in Table 61 indicates that only the hypothesis related to sample selection was supported. The high practitioners were more willing to adopt erosion control practices than the

Table 61. Analysis of variance for willingness to adopt erosion control.

Source	Mean Square	F Ratio	Level of Significance	Conclusion
Treatment	.449	.331	.999	Rejected
Pretest	3.787	2.793	.061	Rejected
Sample	31.827	23.476	.001	Supported-Strong
Interaction	.547	.404	.999	Rejected

random sample of farmers. The treatment did not significantly influence respondents' willingness to adopt. The number of pretest surveys the respondents had participated in prior to the program did not significantly influence willingness to adopt, and there was no significant interaction of treatment, pretest, and sample selection regarding willingness to adopt erosion control practices.

Effects of predispositions and other programs' responses upon willingness to adopt erosion control practices

Based upon the theoretical arguments presented in Chapters 3 and 5 regarding the nature of relevant predispositions and other program responses in the case of the erosion control practices, four sub-hypotheses were derived from the General Hypothesis 17.

> Sub-Hypothesis 17i: Respondents who possess the situational attributes of operating larger farming units and being younger and better educated will be more willing to adopt erosion control practices.

> Sub-Hypothesis 17j: Respondents whose general and issue-related orientations (beliefs, attitudes, and values) are more pro-environmental will be more willing to adopt erosion control practices.

> Sub-Hypothesis 17k: Respondents who have taken prior actions which are compatible with the techniques and goals of the "Agriculture and the Environment" program will be more willing to adopt erosion control practices.

> Sub-Hypothesis 17l: Respondents who responded favorably to other program will be more willing to adopt erosion control practices.

Each of these sub-hypotheses is further operationalized by several empirical measures. Each is directional in nature. They are stated in summary form in column two of Table 62. Personian zero-order correlation

Table 62. Relationships between predispositional variables (1974 survey), other program responses (1975 survey) and willingness to adopt erosion (1975 survey).

Independent Variables (Predispositions)	Dependent Variables: ADOPTSC Hypothesized Relationship	r	Level of Significance	Conclusion
Attributes of the Firm:				
TOTACRES	r > o	.10	.148	Rejected
NETINC	r > o	.01	.459	Rejected
PCTOWNED	r > o	-.05	.314	Rejected
Personal Characteristics:				
AGE	r < o	-.25	.006	Supported-Weak
YRSEDUC	r > o	.09	.172	Rejected
Orientation:				
ATTIND1	r > o	.14	.073	Rejected
Environmental and Conservation Beliefs/Knowledge and Attitudes:				
GENENVIR	r > o	.15	.066	Rejected
KNOWSC	r > o	.32	.001	Supported-Weak
EROSION	r > o	.21	.018	Supported-Weak
WHOPAYEN	r > o	.02	.427	Rejected
LANDRGTS	r > o	.09	.174	Rejected
ADOPTSC	r > o	.20	.023	Supported-Weak
Organizational Participation:				
GNORGIND	r > o	.09	.189	Rejected
SCPART	r > o	.18	.031	Supported-Weak
Use of Specialized Information Sources:				
COMMIND	r > o	-.11	.140	Rejected

Funds Received from ACP:				
ACPFUNDS	r > o	.07	.228	Rejected
Adoption of Pollution Abatement Innovations:				
STPRACSC	r > o	.17	.043	Supported-Weak
Other Program Responses:				
ATTENML	r > o	.02	.423	Rejected
TALKTOT	r > o	.20	.022	Supported-Weak
COMPTOT	r > o	.08	.206	Rejected
GENENVIR	r > o	.14	.079	Rejected
KNOWSC	r > o	.28	.003	Supported-Weak
EROSION	r > o	.11	.150	Rejected
WHOPAYEN	r > o	-.05	.306	Rejected
LANDRGTS	r > o	.25	.007	Supported-Weak

coefficients were calculated for each empirical hypothesis and the level of significance of these coefficients was used as a test of the hypothesized relationship.

Findings: Predispositional and Other Program Responses Effects

Farmers' willingness to adopt erosion control (ADOPTSC) was poorly predicted by predispositional factors. In cases where correlations were reported, they were usually weak.

From two variables used to measure personal characteristics, age was found to have a significant relationship with ADOPTSC. The younger the farmers the more they were willing to adopt erosion control. The correlation was weak.

Environmental and conservation beliefs/knowledge and attitudes were measured by six variables. Three of them indicated a significant correlation with ADOPTSC. In each case the correlation was weak. The variables that had significant correlations are KNOWSC, EROSION, and ADOPTSC. These correlations mean that farmers who had knowledge about erosion, perceived erosion as a problem, and had previous favorable attitudes toward the adoption of erosion control were the ones who were willing to adopt more erosion control after the information program.

Participation in the soil conservation program had a significant correlation with ADOPTSC. The more the farmers participate in the soil conservation program the more they are willing to adopt erosion control. Again the correlation was weak.

The farmers who practice soil conservation also had favorable attitudes toward the adoption of erosion control practices. None of the other predispositional variables was significantly correlated with willingness to adopt scores.

The prediction of adoption of erosion control by other program responses was also found to be weak.

The farmers who talked to others about "Agriculture and the Environment," who had knowledge about "Agriculture and the Environment," and felt that they had fewer rights over their lands were more willing to adopt erosion control.

ATTENML, COMPTOT, GENENVIR, EROSION, and WHOPAYEN indicated no significant correlation with ADOPTSC.

CHAPTER 11: OVERT ACTION: ADOPTION OF POLLUTION ABATEMENT INNOVATIONS

Overt action was defined as positive behaviors taken by the receivers which are beyond the attending, comprehension and cognitive and affective acceptance (or rejection) processes. Overt action about "Agriculture and the Environment" was operationally defined by an index which measured the extent of an individual's actual adoption of pollution abatement. Three general hypotheses were developed regarding the effects of the experiment.

General Hypothesis 11: The treatment group will have adopted more of the recommended pollution abatement practices than will the control group.

General Hypothesis 12: The adoption of the recommended pollution abatement practices is partly a function of experimentally introduced "message-like" manipulation and audience selection factors.

General Hypothesis 18: Those who are more favorably predisposed will have favorably adopted "Agriculture and the Environment" practices.

Variable Y-10: Adoption of Pollution Abatement Innovations (STPRACSC)

The measures for this variable have been described in Chapter 5. The respondents' distributions on the variable after the information program is presented here.

Impact of the Experimental Program upon Overt Action

Table 63 shows the distribution of the respondents' soil conservation practice index. The index ranged from -6 to 6.01. By definition, the average STPRACSC score is 0.

Table 63. Distribution of respondents' soil conservation practices by category, 1975 survey.

Category	Treatment				Control			
	High Practitioner		Random Sample		High Practitioner		Random Sample	
	Pretest % of 48	No Pretest % of 29	Pretest % of 56	No Pretest % of 44	Pretest % of 28	No Pretest % of 15	Pretest % of 29	No Pretest % of 24
- 2.99 to -1.5	4	10	5	11	4	0	7	21
- 1.49 to 0	48	31	52	70	53	40	59	50
.01 to 1.5	42	41	29	14	25	47	31	29
1.51 to 3.0	4	10	14	2	18	13	3	0
3.01 to 4.5	2	3	0	2	0	0	0	0
4.51 to 6.0	0	3	0	0	0	0	0	0
Total	100	98	100	99	100	100	100	100
Mean	.23	2.2	.04	- 1.7	.66	1.6	- 1.06	- 2.08

The sender-manipulated variables -- treatment, pretest, and sample -- are assumed to be applicable to the positive behaviors about "Agriculture and the Environment" practices. Three empirical hypotheses testing the degree of soil conservation practices are derived from General Hypotheses 11 and 12.

> Empirical Hypothesis 1: The treatment group will adopt more soil conservation practices than will the control group when the effects of pretest and sample are statistically controlled.
>
> Empirical Hypothesis 2: The pretested group will adopt more soil conservation practices than will the unpretested group when the effects of treatment and sample are statistically controlled.
>
> Empirical Hypothesis 3: The high practitioner group will adopt more soil conservation practices than will the random group when the effects of treatment and pretest are statistically controlled.

The analysis of data presented in Table 64 indicates that the hypothesis related to sample was supported. Identified high practitioners adopted more soil conservation practices than did the random sample

Table 64. Analysis of variance for adoption of soil conservation practices.

Source	Mean Square	F Ratio	Level of Significance	Conclusion
Treatment	12.457	.646	.999	Rejected
Pretest	10.230	.531	.999	Rejected
Sample	238.395	12.364	.001	Supported-Strong
Interaction	57.823	2.999	.012	Supported-Moderate
Pretest Sample	137.319	7.122	.001	Supported-Strong

of farmers. Treatment and the number of pretest surveys a respondent had participated in prior to the program did not significantly influence level of adoption of soil conservation practices. There was a significant interaction of treatment, pretests and sample selection regarding the adoption of soil conservation practices.

Effects of Predispositions and Other Program Responses on Adoption of Soil Conservation Practices

In Chapters 3 and 5 predispositions and responses to other programs have been confirmed theoretically as factors that affect an individual's response to a message. Based upon these theoretical arguments, four sub-hypotheses were derived from the General Hypothesis 18 in the case of "Agriculture and the Environment" program.

> Sub-Hypothesis 18a: Respondents who possess the situational attributes of operating larger farming units and being younger and better educated will adopt more soil conservation practices.

> Sub-Hypothesis 18b: Respondents whose general and issue-related orientations (beliefs, attitudes and values) are more pro-environmental will adopt more soil conservation practices.

> Sub-Hypothesis 18c: Respondents who have taken prior actions which are compatible with the techniques and goals of the information program will adopt more soil conservation practices.

> Sub-Hypothesis 18d: Respondents who responded favorably to other programs will adopt more soil conservation practices.

Each of these sub-hypotheses is further operationalized by several empirical measures. Each is directional in nature. They are stated in summary form in column two of Table 65. Personian zero-order correlation coefficients were calculated for each empirical hypothesis and the level

Table 65. Relationships between predispositional variables (1974 survey), other program responses (1975 survey) and use of soil conservation practices (1975 survey).

Independent Variables (Predispositions)	Dependent Variable: STPRACSC Hypothesized Relationship	r	Level of Significance	Conclusion
Attributes of the Firm:				
TOTACRES	r > o	.02	.433	Rejected
NETINC	r > o	-.05	.313	Rejected
PCTOWNED	r > o	.12	.112	Rejected
Personal Characteristics:				
AGE	r < o	.01	.479	Rejected
YRSEDUC	r > o	.09	.188	Rejected
Orientations:				
ATTIND1	r > o	.12	.108	Rejected
Environmental and Conservation Beliefs/Knowledge and Attitudes:				
GENENVIR	r > o	.18	.031	Supported-Weak
KNOWSC	r > o	.23	.009	Supported-Weak
EROSION	r > o	.15	.060	Rejected
WHOPAYEN	r > o	.08	.204	Rejected
LANDRGTS	r > o	.15	.066	Rejected
ADOPTSC	r > o	-.01	.452	Rejected
Organizational Participation:				
GNORGIND	r > o	.30	.001	Supported-Weak
SCPART	r > o	.35	.001	Supported-Weak
Use of Specialized Information Sources:				
COMMIND	r > o	.15	.067	Rejected

Funds Received from ACP:				
ACPFUNDS	r > o	.08	.205	Rejected
Adoption of Pollution Abatement Innovations:				
STPRACSC	r > o	.83	.001	Supported-Strong
Other Program Responses:				
ATTENML	r > o	.06	.280	Rejected
TALKTOT	r > o	.28	.002	Supported-Weak
COMPTOT	r > o	.14	.085	Rejected
GENENVIR	r > o	-.03	.384	Rejected
KNOWSC	r > o	.12	.114	Rejected
EROSION	r > o	.09	.198	Rejected
WHOPAYEN	r > o	.22	.016	Supported-Weak
LANDRGTS	r > o	.16	.056	Rejected
ADOPTSC	r > o	.16	.056	Rejected

of significance of these coefficients were used as a test of the hypothesized relationship.

Findings: Predispositional and Other Program Responses Effects

Predispositions did not strongly predict the adoption of soil conservation practices.

The strongest predictor (based on Table 65) was the before STPRACSC score. This indicates that those who had adopted soil conservation before still practiced more of it ($r = .83$).

The organizational participation variables were also found to be a factor. Those farmers who participated in various organizations and have been in soil conservation program for a length of time were found to be practicing more of the soil conservation practices. In both cases, the relationships are weak.

Two of the six variables (GENENVIR and KNOWSC) used to measure environmental and conservation beliefs/knowledge and attitudes were found to predict adoption of soil conservation practices. The farmers who are most concerned about pollution, and those who are knowledgeable about environmental problems adopted more soil conservation practices. As reported in the table, the correlations are weak.

The attributes of the firm variables are not good predictors of adoption of soil conservation practices. The three variables, TOTACRES, NETINC, and PCTOWNED, did not show any significant correlation with the adoption of soil conservation practices.

Personal characteristics, AGE, and YRSEDUC did not afffect the level of adoption. Those farmers who were rationally oriented toward action and decision-making were not necessarily the ones to adopt soil conservation practices. Prior use of specialized information sources and use of ACP funds did not influence the level of adoption.

Other program responses had little influence on the level of adoption of soil conservation. TALKTOT and WHOPAYEN were significantly related to adoption. The farmers who talked with others and who agree that the persons who polluted should pay for pollution control adopted more soil conservation practices. Other program responses variables did not impact the level of adoption significantly.

CHAPTER 12: SUMMARY AND IMPLICATIONS

The central problem of this study has been how to teach a new set of concepts to the farmers so that they would be able to deal efficiently with changing conservation/pollution abatement programs and to understand the rationales for their being asked to comply with environmental protection programs. This dissertation has investigated a generalized model which will account for individual's response to these communication messages. It also investigated the degree to which certain predispositions affect receiver responses to the communication messages. The dissertation had five specific objectives. The first objective was to examine the problems of changing attitudes and behavior by imparting knowledge. Attention was given to a review of related research on the use of mass communication in this effort. The second objective was to describe how the "Agriculture and the Environment" information program was organized in attempt to overcome limitations found in previous communication programs. A third objective was to develop a model to analyze audience responses to "Agriculture and the Environment" program. Fourth, the dissertation sought to test under field experimental conditions the hypotheses generated from the evaluation model. The fifth objective was to discuss the findings of these tests and to draw implications for future communication programs.

The "Agriculture and the Environment" program studied attempted to teach new concepts through messages conveyed in a modified newsletter format. Five "newsletter" packets were mailed between August

1974 and June 1975 to 177 respondents selected as a treatment group. Ninety-six respondents were in the control group receiving no newsletters.

Framework for Analysis

The evaluation of "Agriculture and the Environment" program was considered within the framework of the generalized model of a receiver's response to a message as outlined in Figure 10. The model has been successfully applied by researchers in various purposive communication programs ranging from homemaker response to a newsletter to long-term civil defense information campaigns. The model has gone through several stages of evolution. The most recent version (Yarbrough and Gillespie, 1976) was used in the framework for this information program. The model, which guided the rationale construction, consisted of six major concepts:

> Sender Inputs. The message which is prepared by change agents and communicators and sent to target audiences(s). These include the overall communication strategy as well as the physical information inputs such as booklets, brochures, and news releases. The sender inputs also include source identification, message content, message treatment, channel selection, and situation.

Each newsletter packet contained three to five separate articles under these classifications: basic environmental concepts, environmental regulations, cultural practices, conservation structures, funding assistance, and information sources. The articles ranged in length from one to six pages. In all, 71 pages of single-spaced typewritten text were produced in the series. Three of the articles included

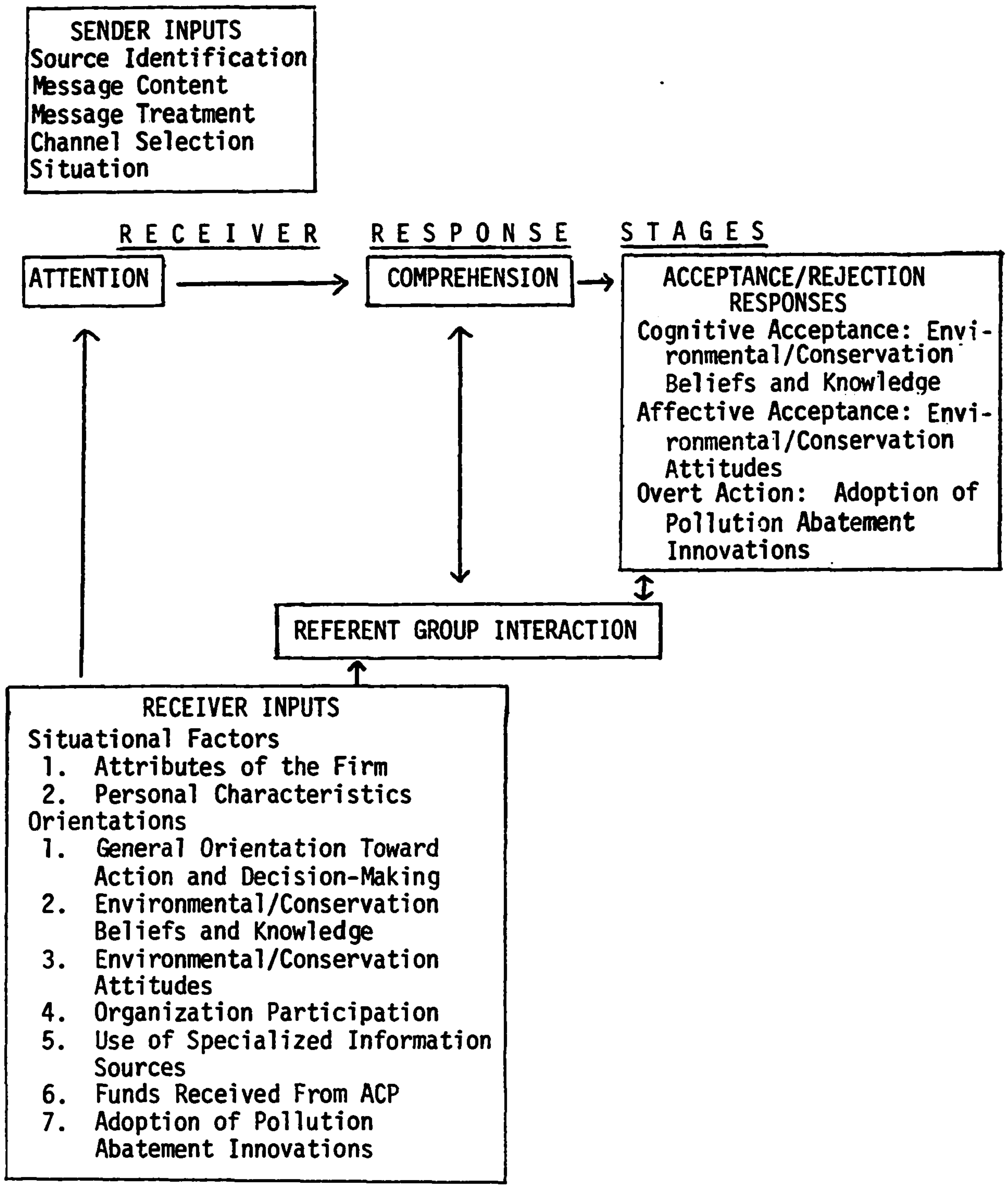

Figure 10. Applying the model to evaluation of the "Agriculture and the Environment" program. (Adopted from Yarbrough and Gillespie, 1976.)

photographs; five included other types of illustrations.

> Receiver Inputs. The skills, beliefs, knowledge, values, and attitudes receivers have before the message is sent to them, the prior actions they have taken, their social status, and other situational factors.

In this study three dimensions of attributes of the firm were investigated: (1) net farm income, (2) total acres of farmland, and (3) percent of land owned.

Two dimensions of personal characteristics were investigated: (1) age, and (2) years of formal education.

Several types of orientations were examined: (1) general attitude index, (2) general concern about pollution, (3) knowledge of agriculture-environment interaction, (4) perception of seriousness of erosion as a problem, (5) who is responsible for pollution control, (6) attitudes about land ownership rights, (7) willingness to adopt erosion control, and (8) adoption of pollution abatement innovations.

> Attention Stage. The processes by which the individual selects the simuli from his environment upon which he will focus.

An attention index which accounted for level of awareness and exposure to parts of the information program was used to measure this responses. The "Agriculture and the Environment" program was further evaluated by comparing it with six other information programs.

> Comprehension. The process by which an individual transforms sensory stimuli into meanings. Once an individual has decided to read or listen to a message, he may proceed to select certain parts of it for special attention, often distorting them, and meanwhile, overlooking other parts entirely.

In this study total comprehension score was used to evaluate how accurately the respondents comprehend the emphasized concepts included in the information program.

> Referent Group Interaction. Any conversations the receiver may have had with others regarding the message. Man's behavior is partly patterned in terms of those referent groups or individuals whose norms he adapts for himself.

In this study, number of persons with whom respondents talked was used as a measure of interaction about information program.

> Acceptance/Rejection Responses. The changes and/or reinforcements of the receiver's knowledge, attitudes, and overt action that result from exposure to the communication.

In this study the acceptance responses and classified into three categories: cognitive, affective, and overt action.

Three dimensions of environment and conservation cognitive acceptance were investigated: (1) general concern about pollution, (2) knowledge of agriculture-environment interactions, and (3) perception of seriousness of erosion as a problem on the farms.

Three dimensions of environment and conservation affective acceptance were investigated: (1) who is responsible for pollution control, (2) attitudes about land ownership rights, and (3) willingness to adopt erosion control.

One dimension of overt action was examined: the adoption of pollution abatement innovations.

Analysis of Impacts

The experimental design utilized is an extension of Solomon's four-fold design (Solomon, 1949). The extended design consists of 12 basic groups with three basic factors: (1) treatment (whether or not the receiver gets an experimental message with "yes" or "no" condition), (2) number of times the groups have been pretested (this has three levels to it), and (3) sample, which is a comparison of two groups of people selected as high practitioners (H.P.) and a random sample (R.S.) from study population.

All data were obtained by using a structured schedule in a personal interview situation at the panel's home. Two panels were initiated prior to the program -- the first in 1972, the second in 1974. Another panel was initiated in 1975 after completion of the information program. The first two panels were re-interviewed in 1975. Respondents came from three Iowa counties: Story, Union, and Woodbury. These counties were selected because they represent different farming patterns and conservation needs. The respondents in 1974 were divided into two samples: random and high practitioners. The total number of cases examined in this analysis is 173. In 1975 the respondents were further randomly divided to include treatment and control groups. The breakdown is necessary to examine the impact of the communication program on the respondents' comprehension, acceptance of environment/conservation practices, and adoption of pollution abatement innovations. The total number of cases analyzed is 273.

Comprehension, acceptance of environment/conservation practices, and adoption of pollution abatement innovations were tested by a 3 x 2 x 2 analysis of variance by considering the number of pretests and sample as well as message presence as experimental manipulations.

Attention to and interaction with referent groups about the "Agriculture and the Environment" program were gauged by comparing this program with six technical information programs which used attention and interaction with referent groups as measures. The effects of methodological biases upon attention and referent group interaction were analyzed using a 2 x 3 ANOVA design which controlled for the effects of number of pretest and sample selection. This analysis involved only the 177 persons in the treatment group.

Predispositional effects upon responses were in terms of 1974 positions with 1975 program responses for those persons interviewed both in 1974 and 1975. The total number of cases is 104.

Effects of Methodology

It was hypothesized in all cases that treatment, pretest and sample would all have effects on all response variables. It was also hypothesized that there would be no interaction. Table 66 presents the summary of the ANOVA findings. In general it was found that the experimental information program itself (treatment) did not influence responses. Identification as a high practitioner of conservation generally meant the farmer would respond more favorably to the program. The number of

Table 66. Summary of ANOVA findings.

Variable	Treatment	Pretest	Sample	Interaction
Attention	Not Tested	Not Significant	High Practitioner	Not Significant
Interaction	Not Tested	Not Significant	High Practitioner	Not Significant
Comprehension	Significant	Significant	High Practitioner	Not Significant
Cognitive Acceptance				
GENENVIR	Not Significant	Not Significant	Not Significant	Not Significant
KNOWSC	Not Significant	Significant	Significant	Not Significant
EROSION	Not Significant	Not Significant	High Practitioner	Not Significant
Affective Acceptance				
WHOPAYEN	Not Significant	Not Significant	Not Significant	Not Significant
LANDRGTS	Not Significant	Not Significant	Not Significant	Not Significant
ADOPTSC	Not Significant	Not Significant	High Practitioner	Not Significant
Overt Action				
STPRACSC	Not Significant	Not Significant	High Practitioner	Significant

pretests individuals received impacted program responses only two of ten dimensions. There was only one significant interaction effect among the variables.

Impact of Program. Predispositions and Other Program Responses

Attention

Finding 1 The attention given to the "Agriculture and the Environment" program ranked favorably well among the five technical information programs examined.

Finding 2 Those farmers who were identified as high practitioners gave more attention to the program than did the random sample of farmers.

Finding 3 Predispositions did not influence strongly the attention given to the information program. Attention given to the articles in the packets compares favorably with other technical information programs. Ninety-three percent were aware, and 78 percent read at least part of it. The average newsletter article was read by more than twice as many audience members (53%) as the average newspaper articles (25%). The lack of relationship of predispositional variables to attention response is taken as a positive attribute of the program. It means that the program was able to gain the attention of those not normally in extension and conservation networks and who are not normally favorable toward conservation/pollution abatement ideas.

> Implications: The direct mail appeal was successful in reaching participants and non-participants in prior conservation programs. The organization of the newsletter packets, the format used and timing of the articles were all judged to be very successful in gaining attention. Based on these findings direct mail should be used in future educational efforts.

Table 67 presents the summary findings of predispositional variables and other program responses upon attention, interaction and comprehension of the information program.

Table 67. Summary findings of predispositional variables and other program responses effects upon attention, interaction and comprehension of the "Agriculture and the Environment" program.

Predispositions	ATTENTION Hypothesized Direction	ATTENTION Finding	INTERACTION Hypothesized Direction	INTERACTION Finding	COMPREHENSION Hypothesized Direction	COMPREHENSION Finding
Attributes of the Firm:						
TOTACRES	r > o	Not Significant	r > o	Not Significant	r > o	Supported-Weak
NETINC	r > o	Supported-Weak	r > o	Not Significant	r > o	Supported-Weak
PCTOWNED	r > o	Not Significant	r > o	Not Significant	r > o	Reversed-Not Significant
Personal Characteristics:						
AGE	r < o	Reversed-Not Significant	r < o	Reversed-Not Significant	r < o	Not Significant
YRSEDUC	r >	Not Significant	r > o	Reversed-Not Significant	r >	Supported-Weak
Orientations:						
ATTIND1	r > o	Supported-Weak	r > o	Not Significant	r > o	Supported-Moderate

Environmental and Conservation Beliefs/Knowledge and Attitudes:						
GENENVIR	r > o	Reversed-Not Significant	r > o	Reversed-Not Significant	r > o	Not Significant
KNOWSC	r > o	Supported-Weak	r > o	Not Significant	r > o	Supported-Weak
EROSION	r > o	Not Significant	r > o	Not Significant	r > o	Not Significant
WHOPAYEN	r > o	Not Significant	r > o	Reversed-Not Significant	r > o	Not Significant
LANDRGTS	r > o	Supported-Weak	r > o	Not Significant	r > o	Supported-Weak
ADOPTSC	r > o	Not Significant	r > o	Supported-Weak	r > o	Not Significant
Organizational Participation						
GNORGIND	r > o	Not Significant	r > o	Supported-Weak	r > o	Supported-Weak
SCPART	r > o	Not Significant	r > o	Supported-Weak	r > o	Supported-Weak
Use of Specialized Information Sources:						
COMMIND	r > o	Not Significant	r > o	Not Significant	r > o	Supported-Weak

Table 57. (continued)

Predispositions	ATTENTION Hypothesized Direction	ATTENTION Finding	INTERACTION Hypothesized Direction	INTERACTION Finding	COMPREHENSION Hypothesized Direction	COMPREHENSION Finding
Funds Received From ACP:						
ACPFUNDS	r > o	Not Significant	r > o	Reversed-Not Significant	r > o	Reversed-Not Significant
Adoption of Pollution Abatement Innovations:						
STPRACSC	r > o	Reversed-Not Significant	r > o	Supported-Weak	r > o	Not Significant
Other Program Responses:						
ATTENML			r > o	Supported-Moderate	r > o	Supported-Weak
TALKTOT					r > o	Supported-Weak

Interaction

Finding 1 Interaction among referent groups generated by this program was lower than HFPS, ENP, and TENCO programs and was comparable to the low level of interaction found in the CSP information program.

Finding 2 Identified high practitioners talked with more persons about "Agriculture and the Environment" program than did the random sample of farmers.

Finding 3 Predispositional variables did not influence interaction about "Agriculture and the Environment" program very much. Level of attention given was associated with level of interactions, however.

The theory of interaction suggests that a response to a message is not completely achieved within an individual. The receiver's evaluations as well as the evaluations of others the receiver highly values are considered. Research also indicates that messages are more likely to be accepted if they provide opportunity (pose problem or suggest solutions to problems) for the receivers to interact with referent groups. The farmers who talked about this information program were low in number.

> Implications: A major weakness of the design of this information program appears to be that it did not demand or allow for much interaction. Only about 10 percent of the farmers in each county received it. Provision for interaction with the senders was made in the program but few used it because it was not required. Future programs should provide more interaction opportunities. The sender can encourage such interaction among referent groups by telling the receivers to talk with others. The sender can design the program in a way that it will pose problem. The sender can also give the same message to all members of the referent group.

Comprehension

Finding 1 The treatment, pretests and sample had effects upon comprehension. The treatment group, pretested group and high practitioners comprehended more accurately the emphasized concepts in the "Agriculture and the Environment" program.

Finding 2 Predispositions and other program responses influenced the level of comprehension of the emphasized concepts in the "Agriculture and the Environment" program.

In this study 19 articles were included in the newsletter packets that were mailed out to the farmers. The concepts that were emphasized in the articles were classified into Bloom's (1956) three types of knowledge. Seven dimensions of the articles were measured. There was much variation in the concepts that respondents comprehended. Comprehension theory holds that communication is effective only when the meanings the receiver attaches to the symbols approximate the meanings which the sender intended. Those concepts which were reinforced most often and which were technical but dealt with knowledge of universals and abstractions were most adequately comprehended.

> Implications: Although the program did impact levels of knowledge about emphasized concepts, the messages in "Agriculture and the Environment" program were not sufficient to make most respondents comprehend most of the concepts. Articles that dealt with the knowledge of universals and abstractions were comprehended more adequately than articles in the other two categories. The concepts that were reinforced were also better understood. Predispositions did significantly limit comprehension. The farmers who were favorably predisposed toward conservation/pollution abatement issues prior to the program were better equipped to comprehend the concepts emphasized in the program.

> Despite this, we concluded that the program often underestimated the ability of farmers to deal with abstract concepts. The program might have been more successful if it had focused more narrowly on a few concepts and explored these in depth with reinforcement from several angles.

Cognitive acceptance

Finding 1 None of the hypotheses concerning program impacts on cognitive acceptance were supported.

Finding 2 Predispositions were found to have small influence on the level of respondents' concern. The only significant predictor was the before general concern score.

Finding 3 Pretest and sample selection had significant effects on the level of respondents' knowledge of agriculture-environment interactions.

Finding 4 Predispositions and other program responses moderately influenced the level of respondents' knowledge of agriculture-environment interactions.

Finding 5 The high practitioners perceived erosion as a more serious problem on the farms than did the random sample of farmers.

Finding 6 Farmers who participated in various organizations, who were participants of soil conservation programs, and who had perceived erosion to be a serious problem before this program were more likely to feel that way after the "Agriculture and the Environment" program.

Table 68 presents the summary findings of predispositional variables and other program responses effects upon cognitive acceptance (GENENVIR, KNOWSC, and EROSION).

Table 68. Summary findings of predispositional variables and other program responses effects upon cognitive acceptance (GENENVIR, KNOWSC, and EROSION).

Predispositions	GENENVIR		KNOWSC		EROSION	
	Hypothesized Direction	Finding	Hypothesized Direction	Finding	Hypothesized Direction	Finding
Attributes of the Firm:						
TOTACRES	$r > o$	Reversed-Not Significant	$r > o$	Supported-Weak	$r > o$	Not Significant
NETINC	$r > o$	Reversed-Not Significant	$r > o$	Supported-Weak	$r > o$	Reversed-Not Significant
PCTOWNED	$r > o$	Not Significant	$r > o$	Reversed-Not Significant		
Personal Characteristics:						
AGE	$r < o$	Not Significant	$r < o$	Supported-Weak	$r < o$	Not Significant
YRSEDUC	$r > o$	Not Significant	$r > o$	Supported-Weak	$r > o$	Not Significant
Orientations:						
ATTIND1	$r > o$	Not Significant	$r > o$	Supported-Moderate	$r > o$	Not Significant

Environmental and Conservation Beliefs/Knowledge and Attitudes:						
GENENVIR	$r > o$	Supported-Strong	$r > o$	Not Significant	$r > o$	Reversed-Not Significant
KNOWSC	$r > o$	Reversed-Not Significant	$r > o$	Supported-Strong	$r > o$	Not Significant
EROSION	$r > o$	Not Significant	$r > o$	Not Significant	$r > o$	Supported-Moderate
WHOPAYEN	$r > o$	Not Significant	$r > o$	Reversed-Not Significant	$r > o$	Not Significant
LANDRGTS	$r > o$	Reversed-Not Significant	$r > o$	Supported-Weak	$r > o$	Not Significant
ADOPTSC	$r > o$	Not Significant	$r > o$	Supported-Weak	$r > o$	Not Significant
Organizational Participation:						
GNORGIND	$r > o$	Reversed-Not Significant	$r > o$	Supported-Weak	$r > o$	Supported-Weak
SCPART	$r > o$	Not Significant	$r > o$	Supported-Weak	$r > o$	Supported-Weak
Use of Specialized Information Sources:						
COMMIND	$r > o$	Reversed-Not Significant	$r > o$	Not Significant	$r > o$	Not Significant

Table 68. (continued)

Predispositions	GENENVIR Hypothesized Direction	GENENVIR Finding	KNOWSC Hypothesized Direction	KNOWSC Finding	EROSION Hypothesized Direction	EROSION Finding
<u>Funds Received From ACP</u>:						
ACPFUNDS	$r > o$	Not Significant	$r > o$	Not Significant	$r > o$	Not Significant
<u>Adoption of Pollution Abatement Innovations</u>:						
STPRACSC	$r >$	Not Significant	$r > o$	Not Significant	$r > o$	Not Significant
<u>Other Program Responses</u>:						
ATTENML	$r > o$	Reversed-Not Significant	$r > o$	Supported-Weak	$r > o$	Not Significant
TALKTOT	$r > o$	Reversed Significant	$r > o$	Supported-Weak	$r > o$	Not Significant
COMPTOT	$r > o$	Reversed Significant	$r > o$	Supported-Strong	$r > o$	Not Significant
GENENVIR			$r > o$	Reversed-Not Significant	$r > o$	Not Significant
KNOWSC					$r > o$	Not Significant

Affective acceptance

Finding 1 Treatment, pretest and sample did not have a statistically significant influence upon the farmers' attitudes about who is responsible for pollution control.

Finding 2 Farmers who agreed that paying costs of pollution was the responsibility of polluters participated more in the soil conservation program and adopted more soil conservation practices. The farmers who agreed that paying costs of pollution was the responsibility of polluters also felt that landowners had fewer rights over the use of their land. The same farmers were found to have adequate comprehension of the concepts of the articles included in the information program.

Finding 3 Treatment, pretest and sample did not have a statistically significant influence upon respondents' attitudes about land ownership rights.

Finding 4 Predispositions and other program responses are found to be weak predictors of respondents' attitudes about land ownership rights.

Finding 5 The high practitioners were more willing to adopt erosion control practices than the random sample of farmers.

Finding 6 Predispositions as well as other program responses predicted weakly respondents' willingness to adopt erosion control.

Table 69 presents the summary findings of predispositional variables and other program responses effects upon affective acceptance (WHOPAYEN, LANDRGTS and ADOPTSC).

Table 69. Summary findings of predispositional variables and other program responses effects upon affective acceptance (WHOPAYEN, LANDRGTS, and ADOPTSC).

Predispositions	AFFECTIVE ACCEPTANCE					
	WHOPAYEN		LANDRGTS		ADOPTSC	
	Hypothesized Direction	Finding	Hypothesized Direction	Finding	Hypothesized Direction	Finding
Attributes of the Firm:						
TOTACRES	$r > o$	Reversed-Not Significant	$r > o$	Reversed-Not Significant	$r > o$	Not Significant
NETINC	$r > o$	Reversed-Not Significant	$r > o$	Not Significant	$r > o$	Not Significant
PCTOWNED	$r > o$	Not Significant	$r > o$	Not Significant	$r > o$	Reversed-Not Significant
Personal Characteristics:						
AGE	$r < o$	Reversed-Not Significant	$r < o$	Reversed-Not Significant	$r < o$	Supported-Weak
YRSEDUC	$r > o$	Reversed-Not Significant	$r > o$	Not Significant	$r > o$	Not Significant
Orientations:						
ATTIND1	$r > o$	Not Significant	$r > o$	Not Significant	$r > o$	Not Significant

Environmental and Conservation Beliefs/Knowledge and Attitudes:						
GENENVIR	r > o	Not Significant	r > o	Not Significant	r > o	Not Significant
KNOWSC	r > o	Not Significant	r > o	Supported-Weak	r > o	Supported-Weak
EROSION	r > o	Reversed-Not Significant	r > o	Not Significant	r > o	Supported-Weak
WHOPAYEN	r > o	Supported-Weak	r > o	Supported-Weak	r > o	Not Significant
LANDRGTS	r > o	Supported-Weak	r > o	Supported-Weak	r > o	Not Significant
ADOPTSC	r > o	Not Significant	r > o	Reversed-Not Significant	r > o	Supported-Weak
Organizational Participation:						
GNORGIND	r > o	Reversed-Not Significant	r > o	Not Significant	r > o	Not Significant
SCPART	r > o	Supported-Weak	r > o	Not Significant	r > o	Supported-Weak
Use of Specialized Information Sources:						
COMMIND	r > o	Not Significant	r > o	Reversed-Not Significant	r > o	Reversed-Not Significant

Table 69. (continued)

Predispositions	AFFECTIVE ACCEPTANCE					
	WHOPAYEN		LANDRGTS		ADOPTSC	
	Hypothesized Direction	Finding	Hypothesized Direction	Finding	Hypothesized Direction	Finding
Funds Received From ACP:						
ACPFUNDS	$r > o$	Reversed-Not Significant	$r > o$	Reversed-Not Significant	$r > o$	Reversed-Not Significant
Adoption of Pollution Abatement Innovations:						
STPRACSC	$r > o$	Supported-Weak	$r > o$	Not Significant	$r > o$	Supported-Weak
Other Program Responses:						
ATTENML	$r > o$	Reversed-Not Significant	$r > o$	Reversed-Not Significant	$r > o$	Not Significant
TALKTOT	$r > o$	Reversed-Not Significant	$r > o$	Reversed-Not Significant	$r > o$	Supported-Weak
COMPTOT	$r > o$	Supported-Weak	$r > o$	Not Significant	$r > o$	Not Significant
GENENVIR	$r > o$	Not Significant	$r > o$	Supported-Moderate	$r > o$	Not Significant

KNOWSC	r > o	Not Significant	r > o	Supported-Weak	r > o	Supported-Weak
EROSION	r > o	Reversed-Not Significant	r > o	Not Significant	r > o	Not Significant
WHOPAYEN			r > o	Supported-Weak	r > o	Reversed-Not Significant
LANDRGTS					r > o	Supported-Weak

Overt action

Finding 1 Identified high practitioners adopted more soil conservation practices than the random sample of farmers. There was also a significant interaction of treatment, pretest and sample selection regarding the adoption of soil conservation practices.

Finding 2 Predispositions predicted fairly well the respondents' use of soil conservation practices. The strongest correlation was the before practices' score. Those farmers who had soil conservation before still practiced more of it (r = .83). Other program responses had little influence on the level of adoption of soil conservation. Number of persons with whom respondents talked, and attitudes formed about who is responsible for pollution control were significantly related with adoption.

Table 70 presents the summary findings of predispositional variables and other program responses effects upon overt action (STPRACSC).

Some Overall Observations and Implications

High practitioners of soil conservation tend to participate in soil conservation organizations and programs to perceive of erosion as an important problem on their farm; and to know more about erosion and soil conservation. Some of these characteristics are determined, in part, by others, such as net farm income, total farm acres, percentage of farmland owned, age rational attitudes, prior knowledge, adoption, attention, number of persons with whom farmers talked about conservation and environment programs, and comprehension of the emphasized concepts in the program.

Table 70. Summary findings of predispositional variables and other program responses effects upon overt action (STPRACSC).

Predispositions	OVERT ACTION STPRACSC	
	Hypothesized Direction	Finding
Attributes of the Firm:		
TOTACRES	$r > o$	Not Significant
NETINC	$r > o$	Reversed-Not Significant
PCTOWNED	$r > o$	Not Significant
Personal Characteristics:		
AGE	$r < o$	Reversed-Not Significant
YRSEDUC	$r > o$	Not Significant
Orientations:		
ATTIND1	$r > o$	Not Significant
Environmental and Conservation Beliefs/Knowledge and Attitudes:		
GENENVIR	$r > o$	Supported-Weak
KNOWSC	$r > o$	Supported-Weak
EROSION	$r > o$	Not Significant
WHOPAYEN	$r > o$	Not Significant
LANDRGTS	$r > o$	Not Significant

Table 70. (Continued)

Predispositions	OVERT ACTION STPRACSC Hypothesized Direction	Finding
Environmental and Conservation Beliefs/Knowledge and Attitudes:		
ADOPTSC	r > o	Reversed-Not Significant
Organizational Participation:		
GNORGIND	r > o	Supported-Weak
SCPART	r > o	Supported-Weak
Use of Specialized Information Sources:		
COMMIND	r > o	Not Significant
Funds Received From ACP:		
ACPFUNDS	r > o	Not Significant
Adoption of Pollution Abatement Innovations:		
STPRACSC	r > o	Supported-Strong
Other Program Responses:		
ATTENML	r > o	Not Significant
TALKTOT	r > o	Supported-Weak
COMPTOT	r > o	Not Significant

Table 70. (continued)

Predispositions	OVERT ACTION STPRACSC Hypothesized Direction	Finding
Other Program Responses:		
GENENVIR	r > o	Reversed-Not Significant
KNOWSC	r > o	Not Significant
EROSION	r > o	Not Significant
WHOPAYEN	r > o	Supported-Weak
LANDRGTS	r > o	Not Significant
ADOPTSC	r > o	Not Significant

These findings are in accordance with predispositional and other program responses theory and raise questions for the communicators. Since the chance of changing many of these preconditioning factors is small, a communicator must ask whether he should aim his communications to those identified high practitioners who are more likely to respond favorably to his messages. Or should he aim his efforts to those who have adopted only minimal practices and who will be more difficult to convince?

Communicators may want to aim their messages for the potentially responsive audience. This type of audience might have been practicing moderate soil conservation. Increased adoption for this group is possible and desirable. A communication campaign meant for the favorably predisposed audience on soil conservation may sometimes have a small effect on farmers not so predisposed. According to Yarbrough et al. (1972) communication efforts with such unpredisposed audiences -- who have not responded in the past -- must improve their predispositional factors which will allow them to cope with the changes recommended in the information program.

> Implications: Farmers who now practice the most soil conservation could be reached by a communication program which used specialized sources of information (specialized farm magazines, extension meetings, and soil conservation programs). Because of their education and rather extensive use of specialized information sources these farmers attended to, comprehended, and talked to others to acquire basic knowledge about soil conservation problems which could be used and expanded in future communications. Farmers who now practice less soil conservation would probably not be convinced, reached by, nor responsive to the type of communication program utilized here. If this group is to be changed, it may be worthwhile to use different channels, different arguments, and different levels of knowledge. The mass media may be used at the initial stage to reach these farmers since these media are at their daily disposal. In addition to mass media, more specialized and detailed information might be channeled to these farmers through interpersonal communication with other farmers. The cooperation of the farmers who are interested in soil conservation will be needed to serve as opinion leaders. Research in adoption-diffusion indicates that later adopters of innovations often adopt for different reasons than early adopters. Later adopters may respond mainly on the basis of peer group legitimization or through demonstration of an innovation.

The high practitioners of soil conservation tend to be more willing to adopt erosion control practices. Different measures of conservation pose economic problems. Economic considerations probably have differential effects on respondents' willingness to adopt soil conservation practices. However, one can conclude that economic factors are not the only determinants of willingness to adopt conservation practices. Specifically, net farm income and the amount of public cost-sharing funds received did not significantly correlate with ADOPTSC. Based on these results, the farmers who have set for themselves higher objectives and have adopted conservation practices for whatever reasons, have managed over the past years to find ways to pay for conservation practices. Although these farmers may not practice as much conservation as specialists want, they do practice more than other farmers who are less willing to adopt regardless of their income.

In many cases strong economic rationales for willing to adopt soil conservation practices do not exist. However, the economic aspects of soil conservation can not be neglected, their important objectives can be overpowered by the communicators. The commonly accepted belief that erosion control is a great economic burden for farmers may in itself be a greater obstacle for willingness to adopt than the actual economics involved. Communicators should not rely firmly on such belief, but rather counteract it as much as possible. The emphasis on the economic aspects of soil conservation practices by the communicators may decrease the rate of respondents' willingness to adopt erosion control.

> Implications: Motivational messages should integrate theoretical rationales which show the linkage of soil erosion to environmental quality, specifically water quality.

High practitioners of soil conservation tend to use more of conservation practices. The level at which the farmers used soil conservation practices was largely determined by the farmers' previous knowledge, his participation in various social organizations, participation in soil conservation programs, talking to others about soil conservation problems, and by his prior soil conservation practices usage.

In the past the arguments centered around the inconvenience nature of erosion control practices, but it is expected that greater knowledge about the recent control technologies should be a powerful impetus to eradicate those obstacles. In this case the communicators can not control the cost of conservation practices but like any other news or advertisements, they can make the availability and procedures for applications of these practices easily known to the farmers.

Soil conservation practices also have technical characteristics which make them difficult to implement by the farmers themselves. This may be one reason why only the farmers who have made use of the technical assistance tend to practice more conservation. Competent technicians are needed to help farmers plan and to implement soil conservation practices.

> Implications: The communicators should include in messages the characteristics of each practice, why a certain practice is needed more than others, they should try and include advantages and disadvantages of the practices. In addition to the information about conservation practices that require technical plannings, messages should include planning stages, where and when to seek for technical aids and from whom to get the aids.

A Note on Limitations of the Study

One of the conceptual limitations of this study is that there is no precise consensus as to the definition and operationalization of the concepts predispositional factors and receiver response stages. Do the five concepts (1) situational factors, (2) orientations,

(3) attention, (4) comprehension, and (5) acceptance/rejection responses adequately describe the general concepts receiver inputs and receiver response stages, as the researcher has noted? Do the operational measures used adequately describe and measure the sub-concepts as declared by the researcher?

Other limitations in the analysis of data from the study application of correlation statistical tests and in interpretation of the results of the statistical tests. The study examined the message effects and held predispositions constant. The study does not examine individual changes but group changes which may be counteracting. Using zero-order correlation test, the study assumes a linear relationship, which underestimates the true degree of relationship, if in fact the relationship is non-linear. Attitudes change is complex and the attitudes' measures in this study did not relate to one another very well. The lack of correlations may be a function of the ways in which they were measured.

These considerations should be kept in mind when making any generalizations from the data presented: The study is an experimental study. It is experimental and suggestive in nature rather than conclusive.

REFERENCES

American Association for Health, Physical Education, and Recreation.
1967 Health concepts: Guides for health instruction. Washington, D.C.: Government Printing Office.

Barnett, Homer G.
1953 Innovation: The basis of cultural change. New York, N.Y.: McGraw-Hill Book Co., Inc.

Bartz, Karen W.
1966 Homemaking information obtained from mass media by young homemakers in Spokane, Washington. Unpublished M.S. thesis. Pullman, Washington: Library, Washington State University.

Bauer, Raymond A.
1964 The Communicator and the Audience. Pp. 125-140 in L. A. Dexter and D. M. White, eds. People, society and mass communications. New York, N.Y.: The Free Press of Glencoe.

Beal, George M.
1976 Remarks on Communicating Social Change: Campaigns. Discussion paper presented at the Symposium on Public Information in the Prevention of Occupational Cancer, Washington, D.C. (December). Department of Sociology and Anthropology, Iowa State University, Ames, Iowa.

Beal, George M. and Joe M. Bohlen.
1957 The diffusion process. Ames, Iowa: Iowa State Agricultural Extension Service Special Report No. 18.

Beal, George M. and Joe M. Bohlen.
1962 The diffusion process. Iowa State University of Science and Technology Cooperative Extension Service Special Report No. 18.

Beal, George M. and Ronald C. Powers.
1972 Processes of community development. Seminar Papers; Rural Community Development Seminar: Focus on Iowa. Ames, Iowa: Iowa State University Press.

Beal, George M. and Everett M. Rogers.
1960 The adoption of two farm practices in a central Iowa community. Ames, Iowa: Iowa Agricultural and Home Economics Experiment Station Special Report No. 26.

Beal, George M., Robert K. Kern, and Herbert G. Lingren.
1960 Readership and response to an area development newsletter: Summary of situational and predispositional factors. Iowa State University of Science and Technology Cooperative Extension Service Report No. 458.

Beal, George M., Paul Yarbrough, Gerald E. Klonglan, and Joe M. Bohlen.
1964 Social action in civil defense. Iowa State University of Science and Technology Department of Economics and Sociology Rural Sociology Report No. 34.

Beal, George M., Gerald E. Klonglan, Joe M. Bohlen, and Paul Yarbrough.
1967 Communication impact. Iowa State University of Science and Technology Department of Sociology and Anthropology Rural Sociology Report No. 41.

Beal, George M., Richard D. Warren, and William A. Fleischman.
1971 Smoking behavior. Department of Sociology and Anthropology, Iowa State University, Sociology Report No. 88A.

Berelson, Bernard, Paul F. Lazarsfled, and William N. McPhee.
1954 Voting: A study of opinion formation in a presidential campaign. Chicago, Ill.: University of Chicago Press.

Berlo, David K.
1960 The process of communication: An introduction to theory and practice. New York, N.Y.: Holt, Rinehart, and Winston, Inc.

Blaloch, Hubert M.
1960 Social statistics. New York, N.Y.: McGraw-Hill Book Company, Inc.

Blase, Melvin G.
1960 Soil erosion control in western Iowa: problems and progress. Unpublished Ph.D. dissertation. Ames, Iowa: Library, Iowa State University.

Bloom, Benjamin S., ed.
1956 Taxonomy of education objectives: The classification of educational goals. Handbook I: Cognitive domain. New York, N.Y.: David McKay Company, Inc.

Bohlen, Joe M.
1964 The adoption of diffusion of ideas in agriculture. Ames, Iowa: Iowa State University Press.

Bohlen, Joe M.
1967 Needed research on adoption models. Sociologia Ruralis 17:113-129.

Borgatta, Edgar F. and Robert R. Evans, eds.
1968 Smoking, health, and behavior. Chicago, Ill.: Aldine Publishing Co.

Brown, Emory J.
1968 Newsletter. Pennsylvania Agricultural Experiment Station and Cooperative Extension Service Evaluator No. 30.

Brown, Roger.
1965 Social psychology. New York, N.Y.: The Free Press.

Bureau of Dental Health Education.
1971 What have you done for your smile lately? National Children's Dental Health Week. Chicago, Ill.: American Dental Association.

Campbell, Donald T. and Julian Stanley.
1963 Experimental and quasi-experimental designs for research. Chicago, Ill.: Rand McNally & Company.

Campbell, Herbert Lawrence, III.
1959 Factors related to different use of informational sources. Unpublished M.S. thesis. Ames, Iowa: Library, Iowa State University of Science and Technology.

Cohen, Lois K. and Helen Lucye.
1970 A position on school dental health education. Journal of School Health 40:361-365.

Cooper, Eunice and Helen Dinerman.
1951 Analysis of the film 'Don't Be a Sucker': A study in communication. Public Opinion Quarterly 15:243-64.

Corliss, Leland M.
1962 A report of the Denver research project of health interests of children. Journal of School Health 32:355-360.

Coughenour, C. Milton.
1968 Some general problems in diffusion from the perspective of the theory of social action. In Diffusion Research Needs. Missouri Agricultural Experiment Station North Central Regional Research Bulletin 186:5-14.

Cuber, John F. and William F. Kenkel.
1954 Social stratification in the United States. New York, N.Y.: Appleton, Century, Crofts, Inc.

Davis, R. L.
1973 Making health education relevant and exciting in elementary and junior high school. Health Service Reports 88:99-105.

DeFleur, Melvin L.
1966 Theories of Mass Communication. New York, N.Y.: David McKay Company, Inc.

DeFleur, Melvin L. and Otto M. Larsen.
1958 The flow of information: An experiment in mass communication. New York, N.Y.: Harper and Row.

Edwards, Selwyn E.
1969 Predicting innovativeness of Iowa corn-hog-beef farmers through social, psychological and demographic factors. Unpublished M.S. thesis. Ames, Iowa: Library, Iowa State University.

Fearing, Franklin.
1964 Human communication. Pp. 37-68 in L. A. Dexter and D. M. White (eds.), People, society and mass communications. New York, N.Y.: The Free Press of Glencoe.

Festinger, L.
1957 A theory of cognitive dissonance. Evanston, Ill.: Row, Peterson.

Gillespie, A. H.
1975 Design and pretest of a communication system for changing food behavior. Unpublished M.S. thesis. Ames, Iowa: Iowa State University.

Gravelle, H. R., M. Shackelford, and J. T. Lovett.
1967 The oral hygiene of high school students as affected by three different educational programs. Journal of Public Health Dentistry 27:91-99.

Groves, M. P.
1973 Comparative effects on low income homemakers, responses to a nutrition newsletter. Unpublished M.S. thesis. Ames, Iowa: Library, Iowa State University.

Hartley, E. L. and Ruth E. Hartley.
1955 Fundamentals of social psychology. New York, N.Y.: Alfred A. Knopf.

Heider, F.
1946 Attitudes and cognitive organizations. Journal of Psychology 21:107-112.

Held, R. Burnell and Marion Clawson.
1965 Soil conservation in perspective. Baltimore, Md.: Johns Hopkins Press.

Held, R. Burnell, Melvin G. Blase, and John F. Timmons.
1962 Soil erosion and some means for its control. Iowa State University of Science and Technology Agricultural and Home Economics Experiment Station Special Report No. 29.

Hobbs, Daryl J., George M. Beal, and Joe M. Bohlen.
1964 The relation of farm operator values and attitudes to their economic performance. Iowa Agricultural and Home Economics Experiment Station Project 1492. Iowa State University of Science and Technology, Rural Sociology Report No. 33:1-177.

Hovland, Carl I. and Irving L. Janis, eds.
1959 Personality and persuasibility. New Haven, Conn.: Yale University Press.

Hovland, Carl I., Irving L. Janis, and Harold H. Kelly.
1953 Communications and persuasion: Psychological studies of opinion change. New Haven, Conn: Yale University Press.

Hovland, Carl I., Arthur A. Lumsdaine, and Fred D. Sheffield.
1949 Experiments on mass communication, Studies in social psychology in World War II. Vol. III. Princeton, N.F.: Princeton University Press.

Iowa Conservation Needs Committee.
1970 Iowa conservation needs inventory. Des Moines, Iowa: U. S. Department of Agriculture.

James, William.
1892 Psychology -- briefer course. New York, N.Y.: Holt and Company.

Katz, D.
1960 The functional approach to the study of attitudes. Public Opinion Quarterly (A Special Issue) 24:163-204.

Kerlinger, Fred N. and E. J. Pedhazur.
1973 Multiple regression in behavioral research. New York, N.Y.: Holt, Rinehart, and Winston.

Kern, K. Robert, George M. Beal, and Herbert C. Lingren.
1965 Readership and response to an area development newsletter: Summary of communication aspects. Iowa Agricultural Cooperative Extension Service Report No. 45C.

Klapper, Joseph T.
1960 The effects of mass communication. Glencoe, Ill.: The Free Press.

Klonglan, Gerald E. and Walter E. Coward, Jr.
1970 The concept of symbolic adoption: A suggested interpretation. Rural Sociology 35, No. 1:77-83.

Klonglan, Gerald E., George M. Beal, Joe M. Bohlen and E. W. Coward.
1967 A summary of the final report, factors related to adoption process, a 1966 national study of public fallout shelter adoption. Ames, Iowa: Iowa State University, Department of Sociology and Anthropology.

Klonglan, Gerald E., E. Walter Coward, Jr., and George M. Beal.
1968 Constructing types of adoption behavior based on innovation characteristics. Ames, Iowa: Department of Sociology and Anthropology, Iowa State University of Science and Technology.

Krech, D. and R. S. Crutchfield.
1948 Theory and problems of social psychology. New York, N.Y.: McGraw-Hill Book Co., Inc.

Krech, David, Richard S. Crutchfield, and Egerton L. Ballachey.
1962 Individual in society. New York, N.Y.: McGraw-Hill Book Company, Inc.

LaPiere, R. T.
1934 Attitudes and actions. Social Forces 13:230-237.

Lazarsfeld, Paul F., Bernard Berelson, and Hazel Gaudet.
1948 The people's choice. New York, N.Y.: Columbia University Press.

Lazarsfeld, Paul F., Bernard Berelson and Hazel Gaudet.
1966 The people's choice. New York, N.Y.: Columbia University Press.

LeWin, Kurt.
1948 Resolving social conflicts: Selected papers on group dynamics. New York, N.Y.: Harper & Brothers.

Lionberger, Herbert F.
1960 Adoption of new ideas and practices. Ames, Iowa: Iowa State University Press.

Loomis, Charles P.
1959 Toward a theory of systemic social change. Unpublished paper presented at meeting of North Central Rural Sociological Committee. Mimeographed. Ames, Iowa: Iowa Department of Sociology and Anthropology, Iowa State University of Science and Technology.

Lutz, Gene Merlin.
1971 Constructing causal models of innovation adoption. Unpublished Ph.D. dissertation. Ames, Iowa: Library, Iowa State University of Science and Technology.

McGrath, Earl James, ed.
1948 Communication in general education. Dubuque, Iowa: Wm. C. Brown Co.

Merton, Robert K.
1957 Social theory and social structure. Glencoe, Ill.: The Free Press.

Metzner, Charles A. and Gerald Gurin.
1960 Personal response and social organization in a health campaign bureau of public health economics. University of Michigan, Research Series No. 9.

Monk, M., M. Taybakc, and J. Gordon.
1970 Evaluation of an anti-smoking program among high school students. Pp. 345, 359. Program Evaluation in the Health Fields. In H. C. Schulberg, Al Sheldon, and F. Baker, eds. New York, N.Y.: Behavioral Publications.

National Clearinghouse for Smoking and Health.
1974 Directory of on-going research in smoking and health.. Washington, D.C.: Government Printing Office.

National Interagency Council on Smoking and Health.
1970 National conference on smoking and health: A summary of proceedings. San Diego, Calif.: Dept. of Health, Education, and Welfare.

NewComb, T. M.
1953 An approach to the study of communicative acts. Psychology Review 60:393-404.

News and Editorial Content and Readership of the Daily Newspaper.
1973 American Newspaper Publishers Association. News Research Bulletin No. 5.

Nie, Norman H., C. Hodai Hull, Jean G. Jenkins, Karin Steinbrenner and Dale H. Brent.
1975 Statistical package for the social sciences. 2nd edition. New York, N.Y.: McGraw-Hill Book Company, Inc.

O'Hara, Robert C.
1961 Media for the millions. New York, N.Y.: Random House.

Osgood and Tannenbaum, P. H.
1955 The principle of congruity in the prediction of attitude change. Psychological Review 62:42-55.

Ostle, Bernard.
1963 Statistics in research. 2nd edition. Ames, Iowa: The Iowa State University Press.

Overall, John E. and Douglas K. Spiegel.
1969 Concerning least squares analysis of experimental data. Psychological Bulletin 72:311-322.

Parsons, Talcott and Edward A. Shills, eds.
1965 Toward a general theory of action. 3rd edition. New York, N.Y.: Harper and Row.

Persinger, L. A., Jr.
1975 A persuasive and informative communication program based on audience analysis. Unpublished M.S. thesis. Ames, Iowa: Library, Iowa State University.

Rahim, S. A.
1961 The diffusion and adoption of agricultural practices: A study in a village in East Pakistan. Comilla, Pakistan: academy for village development, 1961. Original not available; cited in Everett M. Rogers. 1962. Diffusion of innovations, p. 240. New York, New York: Free Press of Glencoe.

Read, Hadley.
1966 Reaching people by direct mail. In H. C. Sanders (ed.). The Cooperative Extension Service. Englewood Cliffs, N.J.: Prentice-Hall, Inc.

Rogers, Everett M.
1962 Diffusion of innovations. New York, N.Y.: The Free Press of Glencoe.

Rogers, Everett M.
1973 Communication strategies for family planning. New York, N.Y.: Free Press.

Rogers, Everett M. and Rabel J. Burdge.
1962 Community norms, opinion leadership and innovativeness among Ohio truck growers. Wooster, Ohio Agricultural Experiment Station Research Bulletin No. 912:1-18.

Rogers, Everett M. and F. Floyd Shoemaker.
1971 Communication of innovations. New York, N.Y.: The Free Press.

Rogers, Everett M. with Lynne Svenning.
1969 Modernization among peasants: The impact of communication. New York, N.Y.: Holt, Rinehart, and Winston.

Rokeach, Milton.
1968 Beliefs, attitudes and values. San Francisco, Calif.: Jossey-Bass, Inc., Publishers.

Schramm, Wilbur, ed.
1954 The process and effect of mass communication. Urbana, Ill.: University of Illinois Press.

Schramm, Wilbur.
1971 Communication in family planning. New York, N.Y.: Population Council, Reports on Population/Family Planning No. 7.

Schramm, Wilbur L. and David M. White.
1955 Age, education and economic status as factors in newspaper readings: Conclusion. Pp. 71-72 in Wilbur L. Schramm, ed., The Process and Effects of Mass Communication. Urbana, Ill.: University of Illinois Press.

Solomon, R. L.
1949 An extension of control group design. Psychological Bulletin 46:137-150.

Spindler, Evelyn.
1965 Group interviews as an approach to planning nutrition education programs for young homemakers. Journal of Home Economics 57 (No. 5):342-346.

Steyn, Ruth.
1972 A communication strategy based on audience analysis. Unpublished M.S. thesis. Ames, Iowa: Library, Iowa State University.

Timmons, John F. and Loyd K. Fischer.
1963 Appraising your soil conservation district. Iowa Agricultural and Home Economics Experiment Station, Iowa State University, Special Report No. 31.

Toennies, Ferdinand and Charles B. Loomis.
1957 Community and society: Gemeinschaft and gessellschaft. (Trans. and ed. by Charles B. Loomis). East Lansing, Michigan: The Michigan State University Press.

U. S. Department of Agriculture.
1968a Agricultural conservation program accomplishments, 1965-67 summary. Washington, D.C.: Agricultural Stabilization and Conservation Service.

U. S. Department of Agriculture.
1968b A national program of research for environmental quality-pollution in relation to agriculture and forestry. Prepared by Joint Task Force of the U.S. Department of Agriculture and the State Universities and Land Grant Colleges. Washington, D.C.: Author.

U. S. Department of Agriculture.
1969 Agricultural conservation program accomplishments, 1968. Washington, D.C.: Agricultural Stabilization and Conservation Services.

U. S. Department of Agriculture.
1970 Agricultural conservation program accomplishments, 1969. Washington, D.C.: Agricultural Stabilization and Conservation Service.

Van den Ban, A. W.
1957 Some characteristics of progressive farmers in the Netherlands. Rural Sociology 22:207-215.

Waples, Douglas, Bernard Berelson and Franklyn R. Bradshaw.
1960 Why they read. Pp. 56-67 in Wilbur Schramm, ed. The process and effects of mass communication. Urbana, Ill.: University of Illinois Press.

Warland, Rex H.
1966 The relationship between rural value-orientations and farm policy positions. Unpublished Ph.D. dissertation. Ames, Iowa: Library, Iowa State University.

Watson, Leighton.
1970 Do extension newsletter really work? West Virginia University Appalachian Center Research Report No. 4.

Yarbrough, J. Paul.
1964 Working paper on decision-making in the adoption-diffusion process. Preliminary -- for internal circulation only. Ames, Iowa: Department of Economics and Sociology, Iowa State University.

Yarbrough, J. Paul.
1966 Effects of predispositions upon attention and understanding in communication of scientific information. Unpublished M.S. thesis. Ames, Iowa: Library, Iowa State University.

Yarbrough, J. Paul.
1968 A model for the analysis of receiver responses to communication. Unpublished Ph.D. dissertation. Ames, Iowa: Library, Iowa State University.

Yarbrough, J. Paul and H. A. Gillespie.
1976 A model for nutrition education experiments. A paper presented to the North Central Regional Committee 108 (Nutrition), Milwaukee, Wisconsin, November 18. Department of Journalism and Mass Communication, Iowa State University, Ames, Iowa.

Yarbrough, J. Paul and Gerald E. Klonglan.
1970 The home fallout protection survey and resulting changes in shelter adoption. Iowa State University Department of Sociology and Anthropology Rural Sociology Report No. 85B.

Yarbrough, J. Paul and Ruth Steyn.
1971 Interactions of message content, treatment and receiver dispositions in the communication of scientific information. Unpublished Research Proposal. Ames, Iowa: Department of Journalism and Mass Communication, Iowa State University.

Yarbrough, J. Paul, Gerald E. Klonglan, and Gene M. Lutz.
1970 System and personal variables as predictors of individual adoption behavior. Iowa State University Department of Sociology and Anthropology Rural Sociology Report No. 86.

Yarbrough, J. Paul, Gerald E. Klonglan, and Steve Padgitt.
1971 Public response to community shelter planning: Des Moines and Polk County, Iowa. Iowa State University Department of Sociology and Anthropology Rural Sociology Report No. 87B.

Yarbrough, J. Paul, Gerald E. Klonglan, Steve Padgitt and Gene M. Lutz.
1971 Public response to community shelter planning: Rochester and Olmsted county, Minnesota. Iowa State University Department of Sociology and Anthropology Rural Sociology Report No. 97A.

Yarbrough, J. Paul, Gerald E. Klonglan, and Steve Padgitt.
1972 Comparative analysis of public response to shelter planning in three communities. Iowa State University Department of Sociology and Anthropology Rural Sociology Report No. 89.

Zadrozny, John.
1959 Dictionary of social science. Washington, D.C.: Public Affairs Press.

Zagona, Salvatore V., ed.
1967 Studies and issues in smoking behavior. Tucson, Ariz.: The University of Arizona Press.

Zajonc, Robert B.
1960 The concepts of balance, congruity, and dissonance. Public Opinion Quarterly (A Special Issue) 24:280-296.

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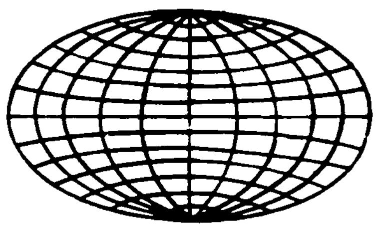
APPENDIX A. PROGRAM'S MATERIALS

Agriculture and the Environment



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June 1975

TOPIC 1 –

Basic Environmental Concepts

Pesticides, Pollution, and the Food Production P

The Dilemma

The scramble to keep the national stomach filled is creating a dilemma for the farmer. You are pressured to produce larger yields; pesticides usually play an important part in your efforts to meet this demand. But at the same time, you're being told that chemical pesticides are polluting the environment. How do you escape this do-it/don't-to-it dilemma?

A Way Out

Harold Stockdale, ISU extension entomologist, says one solution is integrated pest management. This *isn't* a fancy way to say "don't use pesticides." What's involved is a system of managing pests in which you consider both the efficiency of the control agent and its environmental impact. Some traditional farming practices such as crop rotation and use of disease and insect resistant varieties are great aids in preventing major pest problems. And scientists are developing a number of effective non-chemical control agents.

When chemical pesticides are needed, the environmental impact can be minimized by carefully calculated dosages and precision application techniques, Stockdale says. And, you can largely eliminate off-site pesticide damage by using soil conservation techniques. Most pesticide pollution in streams occurs because the chemicals have "hitchhiked" a ride from the field to the stream on an eroding soil particle. Stop the erosion, and you stop the pesticide pollution.

Stockdale cautions that following a program of integrated pest management will almost certainly make your job as a farm manager tougher than it already is. There simply are more factors to consider, and you will need to more carefully monitor your pest problem and the effectiveness of your control practices. But an integrated program can provide effective control of crop pests. you may also save money by avoiding unnecessary applications of chemicals. And you'll have the additional reward of being taken off the hook as an accused polluter.

There are some techniques and guidelines already developed to help you work out the goals of integrated pest management.

Pesticides, Pollution, and the Food Production Push

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Resistant Varieties

The use of resistant crop varieties is the major way of controlling plant diseases. It is becoming increasingly important in insect control. For example, use of corn lines inbred to be resistant to first-generation infestation by European corn borers can help fight the borers. ISU extension specialists say chemical treatments alone will not solve the European corn borer problem. So why not try an integrated program involving resistant varieties combined with other treatment practices? The extension publication, *The European Corn Borer and its Control in the North Central States*, will tell you about possible treatments and will guide you in using recommended practices. You can request this pamphlet on the enclosed return information sheet.

Varieties are also available which offer at least some resistance to cornleaf aphid and corn earworm. Plant diseases, such as leaf rust, are controlled almost entirely by resistant crop varieties.

Stockdale says crop rotation is the best method for control of corn rootworm. Corn rootworms feed only on corn; they lay their eggs in the fall around cornstalks. The cycle is broken if soybeans are planted, because the larvae will starve in the spring.

Sometimes, an even easier treatment is no treatment at all, according to Stockdale. For example, cornleaf aphids won't reduce yields if they infest corn *after* the ears are pollinated. There's no need for treatment then.

Fooling Around with Mother Nature

Parasitic wasps may become part of an integrated pest management program for controlling the alfalfa weevil in Iowa. The weevil came into the state in 1967 and its damage reached economic proportions in 1973 in southeast Iowa. A wasp which kills weevils by laying eggs in them has been following the migration across Iowa. Stockdale says research now indicates that wasps may be able to satisfactorily control the warmth-loving weevil in cool northern Iowa. In warmer southern Iowa, chemical insecticides may be needed to supplement the wasp's work.

An important point in getting the insecticides and the wasp to work together to control the alfalfa weevil will be reduction of the amount of insecticide used. Heavy treatments would kill all the wasps; weevils could then migrate in from other areas, unchecked by wasp action. Hopefully, light treatments of insecticides will kill enough weevils so that wasps will be able to control them completely.

A similar program, which controls greenbugs by balancing insecticides with a natural predator, is already working in Texas. There, reducing the amount of chemical insecticide to one-tenth pound per acre gives the natural predator "the edge" by killing most of the greenbugs. Iowa researchers are operating a similar pilot program. Within a year, they hope to be able to suggest how this technique can be practical for Iowa farmers.

Iowa has several important predators. Many different species of flies, wasps, lady beetles, aphid lions, and ground beetles are predators. Predators are usually larger than their prey, while parasites are smaller. Iowa's most important parasites are flies and wasps. Two such parasites in Iowa reduce corn borer larvae in some years by 12 to 15 percent. Stockdale says flies and wasps also prevent Iowa farmers from having a "moderate to severe" armyworm problem every year.

Some Exotic Treatments

Scientists have successfully used radiation to control screwworms. In the southeastern United States, they bred masses of screwworm flies, sterilized them with gamma radiation, and then released them. Since these insects mate only once, the sterilized flies, in competition with the normal population, greatly reduced the total population. This program was successful over a period of years and rid the region of screwworms. Cutbacks in funding in 1973 allowed the insects to rebuild healthy populations. Since then, the program has restarted, but is still catching up to former levels of control.

Currently, the bacteria Bacillus thuringiensis (B.T.) is the most effective method available to home gardeners for control of moth larvae feeding on cabbage. In one study, plants treated with B.T. yielded one-third more marketable cabbage than plants treated with a chemical insecticide. In the midwest, B.T. has had limited success in controlling corn borer larvae.

Limited success has been achieved in experiments using artificially produced attractants to lure insects into a trap. Researchers are currently working on a practical method to trap and kill the gypsy moth with attractants. Research also suggests the possibility of using hormones to disrupt growth of insect larvae. The manufactured hormones would affect specific pests but not harm other organisms. The use of hormones is promising, but not yet practical.

Use Chemicals Cautiously

Don't Waste Chemicals

Always avoid using insecticides when wind currents are such that chemicals might drift to adjacent crops or pastures. Failure to take such precautions could result in excessive residues in meat, milk, or harvested crops. Such carelessness can result in seizure of contaminated feed and milk by government officials.

Depending on the particular pest problem and the strengths of the recommended chemicals, application equipment and treatment methods will vary. No matter what insecticide you're using, though, remember to read and follow label directions carefully. Don't overdose and don't try to reuse containers. Destroy all empty containers.

An Extension Service publicaion gives complete information on strengths, application methods, and safe disposal procedures of pesticides recommended for treating corn, sorghum, soybeans, forage crops, and stored grains. It also deals in detail with control of pests which attack livestock, people, and lawns and gardens. Ask for *Summary of Iowa Pest Control Recommendations for 1975* on your return information sheet.

Don't Waste Money

Before you treat, make sure your profit losses due to crop damage will be at least as great as the cost of pesticide treatment. If only slight pest damage is occuring, chemical treatment will cost more than it's worth. Stockdale says the traditional advice of "Go ahead and treat with chemicals; you'll at least get your money back" is obsolete. Integrated pest management can help find inexpensive alternatives to costly chemicals.

Depend on Soil Conservation

As mentioned before, measures you may already be taking to prevent soil erosion can greatly reduce pesticide pollution. Pesticides bind tightly to soil particles. When soil erodes from fields, the pesticides go right along with it into streams. Contour terraces, minimum tillage, and grassed waterways all can stop pesticide pollution by stopping soil erosion.

Iowa *does* have a problem with pesticide pollution. The State Hygenic Laboratory has determined that carp, buffalo and catfish in the Coralville Reservoir contain enough dieldrin to make them unsafe for human consumption. Fish from the Nishnabotna River were found to contain 1,600 parts per billion of dieldrin. In food, dieldrin levels of more than 300 parts per billion are considered unsafe by the federal Food and Drug Administration. Fish from 17 rivers across the state were found to contain unsafe levels of dieldrin. Preventing soil erosion would help reduce this pollution.

For Further Reference

A detailed examination of the problems and prospects of integrated pest management has been published by the federal Council on Environmental Quality. This 40-page booklet discussed current pest control practices and problems, what integrated pest management is, and the major techniques for an integrated program, and the federal government's role in the development of integrated pest management. You can get a copy by sending 55 cents to the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. Ask for *Integrated Pest Management*, stock number 4111-0010.

Cooperative Extension Service, Iowa State University of Science and Technology and the United States Department of Agriculture cooperating. Marvin A. Anderson, director, Ames, Iowa. Distributed in furtherance of the Acts of Congress of May 8 and June 30, 1914.

Soil Erosion Costs Money-On and Off the Farm

There's little doubt that soil erosion costs farmers money. Soil losses mean a loss of natural fertility that will have to be replaced with fertilizers. Gullies take land out of production and make farming the remaining land more difficult.

What is not generally considered is that soil erosion has very major costs off the farm. Siltation of streams and lakes from farmland erosion has already ruined many recreational resources within Iowa; many more are endangered. The siltation increases the cost of water purification by cities and industries downstream. And soil erosion is the major reason that agricultural chemicals pollute the environment.

Costs to Farmers

Production Losses

Last spring, Iowa suffered the worst soil erosion losses in two decades when heavy rains washed away more than 45 million tons of prime cropland in less than one week. The soil loss, which was equivalent to displacement of 18 inches from an area of 182,000 acres, was accompanied by seed washouts and crop flooding. As a result of the washouts and floods last year, 1.5 million acres yielded only half as much as usual and over 500,000 acres produced no crop at all, according to Wilson Moon of the Soil Conservation Service (SCS).

Chemicals Wash from Unprotected Fields

Improperly protected fields lost not only soil, but also probably lost a lot of farm chemicals which were attached to the soil. Rains like last spring's probably removed 15 to 18 percent of atrazine and most of the propachlor which had been applied a week or two before the storms, 1970 data from the Agricultural Engineering Department at ISU shows. A recent study by the State Hygienic lab showed heavy nitrogen losses from unprotected fields in one small watershed area near Cedar Rapids during last spring's rains.

Conservation Measures Help

Soil losses of 40 to 50 tons per acre were not uncommon last spring. Some fields lost up to 200 tons per acre in one five day period. But other fields, adjacent to those hardest hit, sustained losses of only a few tons per acre during the deluge.

The difference in soil losses can be explained by differences in field management, according to State Conservationist Moon. He reported last spring that where conservation measures were in effect, damage to soil and crop was reduced. Unfortunately, less than half of Iowa's land is adequately protected against erosion, Moon said.

When soil erodes on upland fields, the sediment usually piles up at a low point in the field, smothering crops and interfering with tillage operations. Where fields drain into streams, however, the eroded soil takes off downriver. And once in the rivers, field soil can cause some expensive problems.

Lakes Lost to Silt

Lake and reservoir siltation is perhaps the most obvious and most costly problem of off-site soil pollution. Last summer, the Iowa Conservation Commission hired two consulting firms to estimate the cost of dredging eight small Iowa lakes.

Backbone Lake: "A Lost Resource"

The firms reported that three of the lakes, formed by damming up streams, would silt up as fast as they were dredged. One of them, Backbone lake on the Maquoketa River near Cedar Rapids, is considered a lost resource by Conservation Commission officials. Backbone, built in 1935 and two miles long, is now filled with sand and silt that is 15 feet deep in spots.

Mill Creek Lake and Rock Creek Lake, also formed by dams, are similarly choked with silt almost to the point of no return. The consulting firms concluded that it wouldn't be worth dredging them until soil conservation practices are installed in the creek watersheds to control erosion.

The five natural lakes that were studied are also threatened by silt. The firms estimated that dredging of all five would cost $32.5 million. They recommended dredging only Lake Manawha because, at the other lakes, funds from recreation would not pay the cost of dredging for 25 to 200 years.

Lake Manawha, a major recreation spot just south of Council Bluffs, could become "an urbanized backwater swamp" if it is not soon deepened, the consulting firms reported.

Statewide Silt Problem

The Conservation Commission found in 1968 that 13 other natural lakes and reservoirs around the state have a "critical siltation problem." Prairie Rose Lake, built north of Atlantic in 1960, was found to be losing four percent of its water capacity every five years to silt.

The situation at Prairie Rose Lake shows that silt can get the upper hand even if a siltation problem is planned for. Two siltation ponds, meant to protect Prairie Rose from sediment, filled up in just five years. The Conservation Commission built a siltation pond in 1950 to protect Spring Brook Lake near Guthrie Center. The pond was supposed to last 50 years, but erosion was so heavy that it filled up in 14 years. In one summer's time, the pond received three feet of silt.

Unchecked soil erosion will eventually fill basins to the top with mud. Before that point is reached, though, the recreation value of the lake decreases.

More Erosion Costs

Recreation

Some bays of Red Rock Reservoir on the Des Moines River, which were once used by water skiers, cannot float a canoe now, according to Conservation Commission officials. The lake was formed only seven years ago.

Lakes like Backbone and Manawha, which once held healthy populations of bass and crappies, now support only carp and suckers. The Maquoketa River used to be the finest trout stream in the state, Conservation Commission officials say. Now there aren't any pools in it deep enough to support trout, because of siltation.

The total cost of losing recreational resources is difficult to figure in dollars, because in a state like Iowa there just aren't many possibilities for developing a lake like Backbone, Conservation Commission officials say.

Fisheries Disrupted

The farm chemicals carried by eroded soil can interfere with Iowa's commercial fisheries industry. In 1972, the State Agriculture Department and the federal Food and Drug Administration (FDA) banned the sale of buffalo fish and carp from the Coralville Reservoir near Iowa City. The fish were found to contain dieldrin levels that far exceeded the standards of wholesomeness set by FDA and the state.

Dieldrin, which has been shown to cause cancer in laboratory animals, is a breakdown product of aldrin. And, although further production of aldrin and dieldrin was banned last October, the fish contamination problem is likely to continue for years, because dieldrin remains unchanged in the environment for years after application, according to Robert Morris of the State Hygienic Laboratory. That means that even though no more aldrin will be applied after this spring, the dieldrin residues from past seasons will continue to wash into Iowa's streams as the fields erode. So the only certain way to stop dieldrin pollution is to stop soil erosion.

In addition to the special problems of reservoir siltation and fish contamination, there are routine costs associated with off-site soil erosion.

Polluted Rivers

Cities which draw their water supplies from rivers must constantly assume the cost of soil erosion by processing the water to remove the silt and other pollutants. Of course, discharge of inadequately treated sewage from cities and towns contributes heavily to river pollution. But a study by the Environmental Protection Agency (EPA) says that "Soil erosion is a major contributor to water degradation, adding acres of silt, and quantities of organic matter, nutrients, and pesticides to the state's waters."

Specifically, the report says that soil erosion, runoff from animal feedlots, discharges from packing plants and other industries, and inadequately treated sewage make the Missouri River along Iowa the most polluted stretch of river in the nation.

Pollution by nitrogen and phosphorus fertilizers is increasing, according to the report. Excess runoff of these two nutrients is causing slime, odors and heavy algae growth which robs the water of life-giving oxygen, the EPA report notes.

How Soil Erodes

From Raindrop to Gully

Raindrop impact and flowing water are the reasons soil gets up and goes. Once loosened by raindrops, soil is carried down smooth slopes by a thin sheet of flowing water, according to Min Amemyia, ISU extension agronomist. This sheet erosion is usually funneled quickly from a large area into a low point in the field. If unchecked, the concentrated runoff will carve a rill, which will eventually be expanded to a full-blown gully, Amemyia said. The longer the slope and the smoother the soil surface, the greater the danger of soil erosion, because long, smooth slopes allow water to move faster and harder.

Buffer Raindrops; Stop the Water

The way to keep the soil in place on the fields is to control the forces of rain and flowing water. The first effort of any soil conservation measure is to dissipate the force of raindrop impact before it dislodges soil particles; the second is to reduce surface runoff.

Mulching, field trash, and rough, cloddy soil surfaces, such as those left by minimum tillage techniques, will safely absorb the energy of raindrops before they can move soil.

Reduce Amount of Runoff

The quantity of runoff can be reduced by increasing the soil's water capacity, and by pooling water on a rough field surface so that it can soak in later. Conservation tillage practices can usually control erosion on gently sloping land with a grade of less than six percent. On steeply sloping land, however, driving rains like last spring's are liable to cause runoff to overtop the field furrows, so that water will flow down the slope again. On fields with a grade steeper than six percent, terraces are the most effective erosion control structure, Extension Agronomist Amemiya says.

Terraces stop soil erosion by reducing the slope of the land and by breaking up the distance that water can flow. Sheet erosion on an unterraced slope will gather more and more momentum as it proceeds downhill, and carry more and more soil as it goes, Amemiya says. Terraces reduce the slope of the land so that water can't gain the momentum. Terraces also stop and hold soil that washes onto them from uphill.

Parallel Terraces Best

Parallel terraces with tile drainage are gaining increasing popularity across Iowa. Unlike terraces built on the contour, parallel terraces are built straight across the field so as to eliminate point rows. The water that collects in the terrace channel is removed through the soil. In some situations, drop-inlet tile systems are used to augment drainage. In these cases, the lines run from a drop inlet in the terrace channel to grassed waterways at the edge of the field. Thus, the parallel terrace system elimates the need for open grassed waterways that cut through the field, are hard to maintain, and interfere with field machinery.

Planning Against Erosion

Terraces are expensive, but so are the consequences of unchecked soil erosion. Planning agencies are realizing that it is cheaper in the long run to prevent erosion than to fight it after it happens. For instance, the Iowa Conservation Commission will no longer begin work on artificial lakes unless soil conservation practices are in effect or promised on at least 75 percent of the land in the watershed.

The Cost of Conservation

Soil conservation need not be expensive, Min Amemiya says. But even where structures such as terraces are involved and costs are high, the benefits can offset the investment, Amemiya says. In rolling terrain, the farmer gains from terracing his fields, because then he can row-crop more intensively and more easily. The public and the environment also benefit in terms of cleaner rivers and lakes.

Because of these off-site benefits, and because soil is a limited and vital public resource, the state and federal governments have been providing conservation cost-sharing funds to farmers. In the past two years, state and federal monies have been available to fund up to 75 percent of the construction costs of SCS-approved practices.

Cost-sharing

The state and federal legislative bodies are presently considering funds for this year and 1976. Your conservation plans may make you eligible to receive cost-share funds. At any rate, it is a good idea to firm up conservation plans now, Amemiya said. That way, you'll be able to coordinate construction plans with your farming operation. Contact your local SCS agent. He can help you plan your conservation program and discuss the possibility of funding assistance.

Cooperative Extension Service, Iowa State University of Science and Technology and the United States Department of Agriculture cooperating. Marvin A. Anderson, director, Ames, Iowa. Distributed in furtherance of the Acts of Congress of May 8 and June 30, 1914

Conservation Views—Farmers and Conservation Specialists

Does Iowa have a soil erosion problem? Statistics show clearly that we do. Most people would agree that more soil conservation structures and practices are needed in Iowa. But an ISU poll shows that Union County farmers and soil conservation specialists disagree on the amount of increase that is needed.

Heavy Soil Losses Across Iowa

Twenty-Eight Pyramids Worth

Iowa crop fields lose an estimated 200 million tons of soil each year, according to Wilson T. Moon of the Soil Conservation Service (SCS). This 200 million ton loss means an average of over 10 tons per acre lost from cropland every year. That is enough soil to fill the volume of 28 Great Pyramids of Egypt -- over 168 million cubic yards of sediment.

Soil Conservation Incomplete

Only about a third of Iowa's cropland is adequately protected against erosion, says State Conservationist Moon. Only 60,000 miles of terraces have been built out of 368,000 miles needed. The job is only one-sixth completed.

About 200,000 acres of grassed waterways have been built out of 349,000 acres needed. The job is three-fifths completed.

Only 36,000 ponds have been built -- 92,000 are needed. The job is a little over one-third completed.

About 255,000 miles of drainage work are completed out of 360,000 miles needed. The job is more than two-thirds done.

About 18,000 grade stabilization structures out of 47,000 needed have been built. The job is less than half done.

Farmers practice conservation (minimum) tillage on one-fourth of Iowa's cropland, but there is potential for reduced tillage on all of Iowa's cropland, says Moon.

Specialists See More Union County Needs

The conservation treatment in Union County is only about two-thirds complete, according to the 1970 Iowa Conservation Needs Inventory. Although the data is seven years old, the Inventory is still considered accurate because the increase of cropland each year in Iowa has kept pace with increases of conservation treatments, says Wilson Moon, chairman of the State Conservation Needs Inventory Committee.

The Conservation Needs Inventory indicates that Union County needs about half-again as much conservation treatment as it has at present, in order to bring soil losses to within SCS limits. A 1974 ISU poll of 32 Union County farmers, however, shows that farmers generally see less need than the SCS for conservation treatment in the county.

According to the Inventory, Union County needs contouring on 35,430 acres, or 21 percent of the cropland. In the ISU survey, however, only 2 of the 32 Union County farmers said their land needed more contouring. They farm 680 acres between them -- less than five percent of the 14,240 acres in the survey sample.

The Inventory indicates a need for more strip cropping, terracing, or diversions on 45,843 acres, or 27 percent of Union County's cropland. In the ISU survey, six farmers said their farmland needed more strip cropping, terracing or diversions. Those six farmers cultivate about 20 percent of the cropland in the sample.

The Inventory shows a need for more permanent cover on 26,609 acres or 16 percent of the county's cropland. In the ISU poll, however, only one Union County farmer said his farmland needed more permanent cover. His farm represents less than three percent of the cropland in the survey.

Farmers and conservation specialists agree that there is little need for more sod-based rotation in Union County -- the Inventory shows an additional need of less than one percent and no farmers in the ISU poll said their fields needed more sod-based rotations.

How Do You Feel?

Statistics from the Conservation Needs Inventory and the ISU poll indicate that farmers and specialists disagree on the need for more conservation practice. We would like to know your opinion -- Are the needs correctly stated? Do conservation specialists overestimate the need? Do farmers now practice enough conservation?

Please take a minute to fill out the brief questionnaire on the next page, and return it in the stamped envelope provided. Feel free to include your own comments, pro or con.

Please remember, any information you give us will be kept in complete confidence. You will not be identified with any information you give.

Conservation Views- Farmers and Conservation Specialists

How Do You Feel?

Please indicate your opinion of the need for more soil conservation by filling out this questionnaire and returning it in the stamped, addressed envelope provided. Feel free to include your own comments.

Any information you give us will be kept in <u>complete confidence</u>. You will not be identified with any information you give.

1. How much additional soil conservation practice do you think is needed in Woodbury County -- *a great deal, a moderate amount, only a little, or no more at present?*

    ___ *A great deal*

    ___ *A moderate amount*

    ___ *Only a little*

    ___ *No more at present*

    ___ *Don't know*

2. Do you think the SCS Conservation Needs Inventory Committee *overestimates the need for additional conservation practice, estimates about the right amount, or underestimates the need?*

    ___ *Overestimates the need for additional conservation*

    ___ *Estimates about the right amount of need*

    ___ *Underestimates the need*

    ___ *Don't know*

3. Please check the appropriate blanks if you feel a need for more of any of the following conservation practices or structures on your farm.

    ___ *Terraces*
    ___ *Grassed waterways*
    ___ *Permanent cover*
    ___ *Contour farming*
    ___ *Permanent open drainage*
    ___ *Diversion terraces, ditches, or dikes*
    ___ *Sod-based rotations*
    ___ *Erosion control dams, pits, or ponds*
    ___ *Underground tile drainage*
    ___ *Contour strip-cropping*
    ___ *Minimum tillage*
    ___ *Other:* ____________________

4. Please use the back of this sheet to write your own comments about soil conservation.

. . . AND JUSTICE FOR ALL

Programs and activities of Cooperative Extension Service

Cooperative Extension Service, Iowa State University of Science and Technology and the United States Department of Agriculture cooperating. Marvin A. Anderson, director, Ames, Iowa. Distributed in furtherance of the Acts of Congress of May 8 and June 30, 1914.

Landowners Cooperate in Watershed Developme

Treatment vs. No Treatment

Four summers ago, twenty inches of rain fell in three days in southwes Iowa. Streams stayed within their banks where soil and water conservation treatments and structures were sufficient.

But treatment was incomplete in the drainage area of Picayune Creek in Harrison County, and the driving rains ran largely uncontrolled through tha watershed. Picayune flooded a plain 300 feet wide and about 5½ miles long, covering about 200 acres of corn and soybeans. Roads and bridges were also damaged, according to Wilson Moon of the U.S. Soil Conservation Service (SC in Des Moines.

Mill Creek, which is adjacent to Picayune Creek and received the same fall, did not overflow its banks. In fact, it flowed only half-full, said The difference is that the Mill Creek drainage area was well-protected by s watershed structures; the Picayune Creek area was not.

Multiple Benefits

Moon thinks that Mill Creek would have damaged or washed out all the b along a six-mile stretch, except that conservation treatments and 23 detent dams released the runoff slowly. Bill Brune, deputy state conservationist, that the watershed protection measures kept road and bridge damage to a min saving the county considerable money.

The 1,200 residents of Dunlap, on a stream near Mill Creek, were spare higher costs because a floodwater-retarding structure had been built direct above the town. Fifty families through the center of town would have been except for the structure, said state conservationist Moon. As it was, the held back the water, releasing it slowly through a 30-inch pipe.

The Mill Creek incident illustrates the multiple benefits of watershed said Moon. They help landowners work together to solve costly erosion prob which extend through the property of more than one landowner. And they pre floodwater damage to public and private property downstream. The watershed ervoirs may also serve as municipal and industrial water supplies, wildlife opments, and lakes for boating, swimming, and fishing.

Groups of landowners initiate the projects, with the local Soil Conser District acting as sponsor. The project proposal must be approved by the S Soil Conservation Committee and the Administrator of the SCS in Washington,

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Once approved, the SCS completely funds all planning and construction of flood control structures in the watershed. But more about that later.

What is a Watershed?

A watershed is simply all the land from which water drains to a given point. Water drains to a mud puddle from a distinct area of land; that area is the watershed of the puddle. A stream drains a watershed of land along either side of its banks. In turn, every stream in Iowa eventually drains into a river which empties into the Mississippi or Missouri Rivers..

Small watersheds make up larger ones -- the Mississippi River drains a watershed of about 1,243,000 square miles. This large watershed is made up of thousands of smaller ones, including the watersheds of the Cedar River, Skunk River, and Des Moines River. Similarly, the Missouri River watershed includes the watersheds of thousands of tributary streams from Montana to Missouri.

Why Watershed Projects?

Cooperative Erosion Control

Just as watershed areas can extend over the land of many farms, so can the erosion problems of runoff from watersheds. "A gully that goes through four or five farmer's land is too big a project for one man to handle alone," said state conservationist Moon. "One man can't handle it alone because the water that is causing the gully is coming off land further up the watershed." They can cooperate in watershed projects to solve the problem, he said.

Cooperative Flood Control

Watershed projects control flooding, in addition to preventing erosion. "Farmers on uplands team up with those down below -- keeping the water on their land rather than allowing it to run off uncontrolled," Moon said.

That means coordinating runoff-control measures across the land of several farmers in a watershed area. Watershed projects do just that by combining conservation practices in upland fields with water-retention structures in lowland fields and streams.

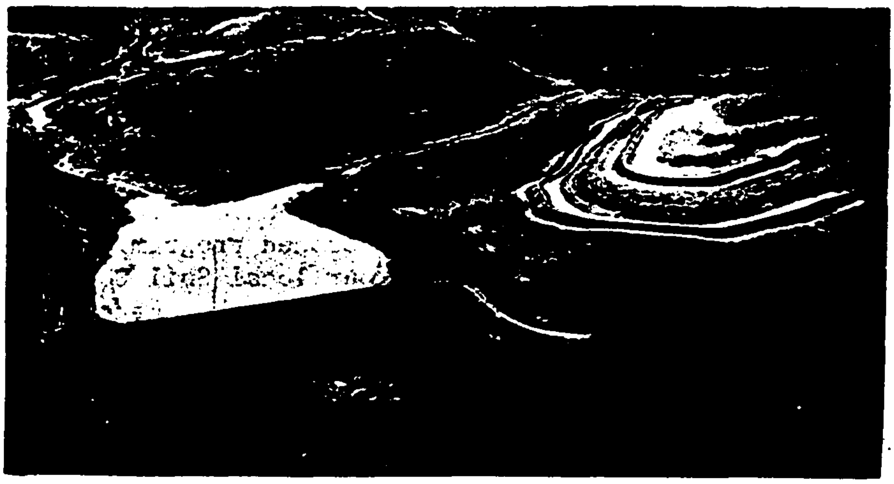
Conservation practices such as strip cropping, terracing, contouring, and conservation tillage slow down runoff, so more can soak into the field. Dams and other water-retention structures hold back water that does run off, releasing it slowly to the watershed streams. Thus, floods are stopped before they can start.

Walters Creek Pays Off

The Walters Creek Watershed project in the rolling hills country of Adams County has paid big conservation dividends to the farmers there. In 1974, ten years after the blueprints were drawn up, SCS figures indicated that conservation tillage, terracing, contour plowing, tiling, and crop rotation had cut soil losses by 25 percent, to not more than 4½ tons per acre per year.

Land treatment measures, together with 37 structures built to prevent further gully erosion, have reduced floodwater damage to crops and pastures by 84 percent, said Mark Berkland, district conservationist in Adams Soil Conservation District.

A completed watershed project typically involves dozens of small developments like this one. The above photo shows the same area before conservation work on the Mill-Picayune Watershed. (Photos courtesy of USDA Soil Conservation Service)



In 1972, SCS officials estimated that these measures had prevented the destruction and further depreciation of over 4,000 acres of croplands -- that represents a direct benefit to 69 percent of the 158 farms in the watershed, Berkland said.

Federal Program

The federal government recognizes the need to protect land from floodwater and erosion damage, and encourages the development of watershed projects. In 1954, Congress passed a bill, Public Law 566, which created the Small Watershed Program. This program enables local groups to obtain technical and financial aid from the federal government in planning and developing watersheds of less than 250,000 acres.

The Soil Conservation Service administers the program, and progress in Iowa as of March, 1975 is as follows:

135 applications submitted for watershed projects.
16 watershed projects completed.
28 projects under construction.
24 projects in some stage of development.
30 applications pending

$20 Million in Iowa

Once a project is approved, the SCS completely funds all phases of planning and construction for dams and other grade control structures having the single purpose of flood control, said Moon. Since 1954, the SCS has spent about $20 million in Iowa on the Small Watershed Program for construction costs, contracts, planning, and personnel expenses, said Moon.

In addition, Bill Greiner, director of the Iowa Department of Soil Conservation, said that the state has allocated $60,000 per year for watershed planning purposes over the next two years. Watershed funds are also usually available from the local County Board of Supervisors and the County Conservation Board, Moon said.

For instance, on the Walters Creek Watershed in Adams County, the Soil Conservation Service spent $1,254,749; the State Conservation Commission spent $317,844; and local organizations spent $736,000, said district conservationist Berkland.

How to Get Started

Any group that recognizes a conservation problem requiring cooperation among landowners can initiate a watershed program. If you think a watershed could work in your area, contact your local Soil Conservation District Office. Your local Soil Conservation District has the authority to sponsor projects and submit proposals to the State Soil Conservation Committee for approval.

Watershed projects are designed as large or small as the problem. The largest project in Iowa is 244,000 acres; the smallest is about 700 acres. According to Public Law 566, watershed projects cannot be larger than 250,000 acres, but there is no lower limit to their size. If the SCS builds a structure like a dam, however, at least two landowners must benefit, Moon said.

"You'll Need Patience"

Watershed projects don't happen overnight. You'll need patience, says Moon. Most projects take 10 to 12 years to complete. They require perseverence and cooperation.

Before a project proposal is presented for approval, at least 50 percent of needed conservation treatment in the area should be completed by individual landowners, said Moon. State and, federal conservation cost-sharing funds have been used to provide up to 75 percent of construction costs for conservation practices not covered by the Small Watershed Program, he said. Also, at least half of the landowners in the watershed must be District Cooperators before a proposal can be approved. That is, they must have signed pledges with the Soil Conservation District agreeing to conserve soil to the best of their ability, he said.

After approval by the State Soil Conservation Committee of the Iowa Department of Soil Conservation, each project proposal is put on a waiting list for planning. Then each proposal must be approved by the SCS administrator in Washington, D.C.

The next stage -- the planning process and construction design -- may take 2 to 3 years. Then, before construction can begin, local directors must handle land easements, water rights, and rights-of-ways; they must determine priorities of work, arrange for long-time maintenance and give emphasis to needed upland treatment. By the time ground-breaking ceremonies take place, upland conservation treatment must be 75 percent complete in the area, said Moon.

Here is the schedule of work on the nearly-completed Walters Creek Watershed project:

1. Organized -- March 1956.
2. Application for planning assistance completed -- December 1958.
3. Authorized by U.S. Congress -- April 1965.
4. Approved by committee on public works of the U.S. Senate and House of Representatives -- June 1966.
5. Iowa State Conservation Commission agreed to sponsor project -- January 1967.
6. Ground-breaking ceremony and beginning of construction -- July 1967.
7. Construction completed on small structures for flood control and grade stabilization -- September 1974.
8. Dam scheduled to be closed off, creating Lake Icaria reservoir and recreation lake -- end of this summer.
9. Recreation facilities scheduled to be complete at Lake Icaria -- by 1978.

Is it Worth it?

In 1972, 10 inches of rain fell in three days on the farm of Gail Turner in the Crooked Creek Watershed in southwest Iowa. He has two watershed dams on his farm -- the pond behind one rose from 5 acres to 13. The other rose from four to eight acres. Their spillway pipes released the water slowly over a period of 48 hours.

In an article in *Wallace's Farmer*, Turner told the SCS that the dams help prevent flooding for other people, but pointed out that they were useful to him, too. "I can fish there, and the lifetime supply of livestock water is really an asset," he said. "I don't see why some people won't cooperate in these projects."

For More Information

Call Harold Godown, your district conservationist, at 382-2217 for more about watersheds. He can answer specific questions about your situation and fully explain the benefits and responsibilities that are involved.

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Communities Cooperate in RC&D Projects

A relatively new program that provides for farm and city interest coop eration in natural resource management is now operating in three Iowa area: The program is called Resource Conservation and Development, or RC&D for s

According to Wilson Moon, state director of USDA's Soil Conservation Service, RC&D projects provide a means for local people--both those from t farm and from the city--to decide what needs to be done to preserve and im the natural resources of their area. Through the RC&D organization, they pool their efforts to get the job done. Technical and financial assistanc available from state and federal agencies to help them carry out the job.

RC&D projects usually involve three to six counties. They are design big enough to allow coordination of improvements over a broad resource are but small enough that local leadership can prepare and carry out the proje plan.

There are three operational RC&D projects in Iowa: Southern Iowa, a seven-county project with headquarters in Creston; Chariton Valley, a four county project with headquarters in Centerville; and Upper Explorerland, a five-county project with headquarters in Postville. In addition, applicat is pending for a four-county Geode Wonderland RC&D Project in the southeas corner of the state, Moon said.

USDA is authorized through the Food and Agriculture Act of 1962 to pr local groups with technical and financial help in conserving and developin their natural resources. The Soil Conservation Service (SCS) administers program for USDA. Besides providing direct assistance, SCS also helps the that sponsor RC&D projects to seek funds and services from other federal, and local sources, said State Conservationist Moon.

Local People are the Key

The SCS restricts its participation to advice and assistance. RC&D projects are self-help projects. Local people get them going and run them Cooperation between people plus assistance from public agencies make an RC project work. The idea is that a broad plan can be accomplished step by s by groups, towns, and communities. Each RC&D project has its own locally developed goals. But typical improvements include watershed development, halting roadside erosion, improving pastures, helping cities halt flooding developing rural and municipal water supplies and solid waste management f

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loping rural and municipal water supplies and solid waste management facilities.

Besides helping to solve soil and water conservation problems, RC&D projects are of large enough scope to plan for industrial growth, improvement of community facilities like hospitals, schools, sewage treatment plants, and roads, and development of training and retraining programs to improve job skills.

The Southern Iowa Project

In the Southern Iowa RC&D Project, the needs for rural water supplies and distribution system were given top priority during the past year, said Herb Kayser, project coordinator. The SCS, the Farmers Home Administration, and the Cooperative Extension Service have been called in to provide data and advice throughout the project, he said. The Forest Service, through the Iowa State Conservation Commission, has assigned a Forester to the project to advise on woodland development and management.

Eight RC&D measures have been completed since 1972 in the seven-county project area, Kayser said. The federal share of the cost of those was about $23,400. The local share was about $13,070, including land easements and rights-of-way.

Another eight measures are presently in the planning or construction stage. The estimated federal share of the costs of these is $2.6 million; the estimated local share is $1.05 million, Kayser said.

One RC&D measure in Taylor county involves forestry plantings to protect the city of Bedford from sediment damages. It also adds much to the esthetic value of the area and provides wildlife habitat, Kayser said.

Another measure--a grade stabilization structure--stopped a ravine from undercutting the Clarke Community School building area. The school developed an outdoor environmental classroom in conjunction with this measure.

In Ringgold County, an RC&D measure protects the runways of the Mount Ayr Airport from rill and gully erosion.

A flood prevention project scheduled for construction this year in Creston will reduce flood damages to the Junior High School and residential sections, Kayser said.

How to get Started

As mentioned before, RC&D projects are locally initiated, sponsored, and directed. A project typically begins when citizens from neighboring counties meet to discuss possible solutions to resource management problems across their area, said State Conservationist Moon.

If they think RC&D has possibilities for their situation, they should contact their Soil Conservation District Commissioners, Moon said. The Soil Conservation Districts are usually the sponsors of RC&D projects, although any entity of local or state government can assume sponsorship, he said. The sponsoring agencies for the Southern Iowa Project are the County Boards of Supervisors and the Soil Conservation Districts of Union, Clarke, Adams, Adair, Ringgold, Decatur, and Taylor counties.

After sponsorship is secured, a steering committee is formed of local officials and other interested citizens to investigate local support and begin work on an application. The steering committee organizes informational meetings throughout the project area, and seeks endorsements from civic clubs, farm groups, churches, chambers of commerce, and other local organizations.

If the meetings indicate sufficient local support, the sponsors submit an application for assistance to the SCS state conservationist. The application for the Geode Wonderland Project in southeast Iowa has over 30 local endorsements attached, Moon said. The state conservationist circulates the application to various agencies and officials for review and comment. It then goes to the Governor's office for approval.

After state approval, the application is submitted to the Secretary of Agriculture in Washington D.C. for final approval. If approved, then work can begin toward developing a work plan and, ultimately, toward its implementation. There are now 63 RC&D applications awaiting approval in Washington--the review process may take 3-5 years, Moon said.

For More Information

Your district conservationist can answer specific questions about Resource Conservation and Development projects. Call Earl Kizzier at 276-7533 for more about RC&D.

Cooperative Extension Service, Iowa State University of Science and Technology and the United States Department of Agriculture cooperating. Marvin A. Anderson, director, Ames, Iowa. Distributed in furtherance of the Acts of Congress of May 8 and June

AGRICULTURE ENVIRONMENT

Who Pollutes?

Pollution is obviously very much in the nation's public mind. Most Iowans have apprehensions of some sort, but they may seem quite distant. However, Iowans should indeed give serious consideration to one simple question: "Who pollutes?"

Fresh air, wide open spaces, and clean water--a typical description of Iowa, perhaps, but not an entirely accurate one. Iowa does have a water pollution problem, and it's not a small one. The most polluted major waterway in the U.S. is the Missouri River from Sioux City to Kansas City, according to the U.S. Enviornmental Protection Agency (EPA). The Mississippi River along our eastern border also falls in the most polluted one-third of the list. Several interior Iowa streams also show unsafe pollution levels.

Iowa's Role

Iowa's effect on pollution is sharply visible--the Missiouri from its source in Montana to Sioux City is rated the cleanest waterway in the country. Along Iowa's border the river contains bacteria from human and animal wastes, pesticides, and other pollutants.

As stated above, an important question is, "Who pollutes?" In Iowa and neighboring states several sources are responsible for this pollution. The major causes are inadequately treated sewage, discharges from packing plants and other industries, extensive irrigation, runoff from feedlots, and soil erosion according to the EPA.

While experts disagree on which sources are the most serious, they do agree that agriculture is indeed one that must be considered. Specifically in Iowa, the EPA says, "Soil erosion is a major contributor to water degradation, adding acres of silt and quantities of organic matter, nutrients, and pesticides to the state's waters."

In the Omaha area, fecal coliform bacteria from human and animal wastes are ten times higher than water quality standards for swimming and drinking downst[ream]. Both farm and feedlot runoff and discharges from sewage plants and industrial plants are blamed. Some sewage treatment plants in Iowa and Nebraska remove less than 50 percent of the major water pollutants.

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What's Pollution? Who Should Pay?

Most farmers see agriculture pollution in a different light than they do other types of pollution, according to a recent ISU survey of a sample of 89 Iowa farmers in Story, Union, and Woodbury Counties.

More than 95 percent of the farmers agreed that sediment costs taxpayers money in maintaining streams, lakes, and reservoirs, and that private producers of pollution should pay for its control. However, 91 percent thought public funds should pay for erosion control practices whose benefits occur off the farm.

One reason is that the farmers question agriculture's role in pollution. Only 55 percent believed "sediment from soil erosion is a pollutant similar to industrial wastes or harmful car exhausts."

Nationally, such pollution by bacteria is decreasing, but levels of nitrogen and phosphorus are getting higher. Depending on the amounts, these materials can improve water quality or can lead to destruction of water life. The main source of nitrogen and phosphorus is agricultural runoff, although sewage and industrial plant discharges also contribute, the EPA says.

Problems of environmental quality would be easier to solve if we knew more about what we were doing," according to Charles P. Gratto, ISU extension economist.. However, he says, we do know that we pay for environmental quality in some way. We even pay for a low quality environment through reduced productivity of people, capital, and land. In fact, the price of a "second-class" enviornment may be higher than the cost of a first-class one.

Of course, many different groups must help achieve a clean environment. Pollution comes from many sources, including cars, municipal sewage plants, and a wide range of industries. But it is important to realize that agriculture also has a major role in maintaining or improving the quality of our environment.

The EPA report touches on the areas of specific concern to Iowa agriculture: sediment, pesticides, animal wastes, and fertilizer. These materials can all cause environmental problems. Some of the problems are moderate; some are quite serious. Some are widespread; others happen only in specific cases. But the following examples show what *can* happen and why specialists are concerned about agriculture's relation to environmental quality.

Sediment—A Serious Problem

Sediment is by far the nation's largest single water pollutant, according to A. R. Robinson of USDA Sedimentation Laboratory. About half of all sediment comes from agriculture land. On a volume basis, sediment pollution is 500 to 700 times larger than the sewage load. ISU extension specialists agree that sediment is also Iowa's number one water pollution problem.

The effects are many and complex. Sediment depletes the land it comes from. It becomes a pollutant when it fills reservoirs, lakes, and streams, destroys water habitats, and degrades drinking water. (To remove the sediment from reservoirs in the U.S. would cost $1 billion a year.) Also, sediment can carry plant nutrients, toxic metals, bacteria, viruses, and pesticides.

Pesticides—Pros and Cons

At least for the foreseeable future, pesticides will be indispensible to modern society. For many control problems, they are the only answer. According to the National Academy of Sciences: "Contrary to the thinking of some people, the use of pesticides for pest control is not an ecological sin. Where their use is approached from the sound basis of ecological principles, chemical pesticides provide dependable and valuable tools."

Harmful Effects

However, many Iowans are familiar with the harmful effects some pesticides can have. About one-half of Iowa's pesticide dealers, commercial applicators, farmers, and homeowners have experienced poisoning while working with pesticides, according to a recent survey conducted by Steve Ryan, ISU extnesion entomologist.

In October 1972, more than 100,000 pounds of fish from the Coralville Reservoir near Iowa City were banned for sale. The fish contained dieldrin residues up to three times higher than the standard for wholesomeness set by the U.S. Food and Drug Administration (FDA). Dieldrin--a breakdown of the agricultural pesticide Aldrin--has caused cancer in laboratory animals. Contaminated fish have been found in the reservoir over a four-year period.

Dieldrin is also a persistent pesticide. That is, its residues remain in the environment for a long time without degrading to other forms. Most herbicides and some pesticides are not too persistent, and may "disappear" over a single growing season. But with dieldrin and DDT, it can take two to four years for just one-half of the amount present to degrade. With pesticides containing heavy metals--mercury, arsenic, lead, and tin--the figure can be as high as 30 years. Also, some of these heavy metal pesticides can easily cause sickness and death if misused, according to Robert L. Metcalf, head of the University of Illinois Department of Zoology. Another problem is that some of the pesticide breakdown products can cause the same problems as the original pesticide.

These are some of the major considerations behind current pesticide regulation. The problem is that we don't know the effects of small amounts of these farm chemicals--especially long term effects. We do know that the persistent chemicals can build up through the food chain.

For example, DDT is present in Lake Michigan water at a level of 2 parts per trillion. In certain body tissues, animals contain 0.4 parts per million (ppm); lake trout contain 3 to 6 ppm; herring gulls at the top of the lake's food chain contain up to 99 ppm. The concentration from the water to the gull is about five million times. To give some idea of what these numbers mean, the FDA tolerance for the edible portions of fish is 5 ppm of DDT. Also, the brain tissue of robins killed in an elm spraying program contained 50 ppm of DDT.

Only aobut five tons of DDT are needed to produce the present concentration in Lake Michigan. Even though DDT has not been used for several years, the concentrations will remain for several generations, according to Metcalf.

In California bays exposed to agricultural runoff, shellfish contained 100 times more DDT, dieldrin, and endrin than the shellfish in bays isolated from runoff.

Those Small Numbers

Many of the numbers you hear--parts per million or even parts per trillion--sound so small that they may seem insignificant. One thing to remember, though, is that the amounts you normally apply are measured in the same range. Applications of 1 to 4 pounds per acre represent less than 1 part per million in the top foot of soil. This microscopic concentration is enough to kill the pests--it therefore seems important to consider what levels will harm animals and people.

What Does It Mean to You?

An Iowa study showed how chemicals can enter the environment. Significant amounts of surface applied atrazine and propachlor were lost from surface-contoured watersheds during storms shortly after the chemicals were applied.

A storm seven days after atrazine was applied to a surface-countoured watershed washed off 15 percent of the atrazine, in both surface runoff and sediment. Only about one-eighth as much washed off of a ridged watershed. No significant amounts of diazinon--a nonpersistant chemical--were found in surface runoff when it was applied at recommended rates and incorporated into the soil.

So proper care in application, along with effective soil conservation practices, will keep the chemicals on your farm.

Animal Wastes—A Potential Resource

Animal wastes may carry pathogens--disease-causing bacteria or viruses. These wastes have caused abnormally high pathogen counts in recreational lakes. Also, nitrogen from animal wastes may be the major contaminant of groundwater. This contamination is a major problem in land disposal of animal wastes. In Nebraska and Illinois, runoff from barnyards, manure piles, and feedlots was a source of high nitrogen concentration in shallow wells, according to an American Society of Civil Engineering study.

However, agriculture can use large amounts of animal wastes without polluting the water, soil, or air. Soil can serve as a "filter" to remove pollutants, and the wastes can be a beneficial source of nutrients for plants and soil. Remember, though, that disposing of excessive amounts of wastes on easily accessible land is risky. This practice will only increase the hazard of polluting water with both pathogens and nitrogen and can also create salt problems for crops. A proper disposal system requires careful planning.

Fertilizer—A Balance Needed

Commercial fertilizers, like pesticides, are essential to our modern agriculture system. Nutrient runoff, however, can cause problems. It is well known that eroded soil contains more of some nutrients--particularly phosphorus--than the soil that remains in the field. So **erosion** can cost you money in lost fertilizer and lead to water pollution. On the other hand, if fertilization produces better vegetative cover, runoff and erosion may be reduced enough to give lower nutrient losses.

The key point is this: If erosion is not controlled or increased plant growth does not result in better erosion control, then phosphorus fertilization can increase the water pollution hazard, according to the USDA.

Nutrients Can Pollute

In August, 1970, about 5,000 fish were killed below Red Rock Dam on the Des Moines River. There had been a smaller kill there three weeks earlier. Agricultural runoff was the cause, according to Jim Mayhew, a fishery biologist for the Iowa Conservation Commission. Nutrients, including organic material such as leaves and animal wastes, as well as phosphates, washed into the lake during heavy rains ten days before the fish kill. These nutrients caused a heavy algae growth that used up much of the oxygen in the water. Measured oxygen levels were so low that the fish couldn't survive. The Des Moines sewage plant was not a factor in this fish kill. Monitoring of water below the plant showed no contamination during this period.

So erosion and runoff should be controlled to prevent too much organic debris and phosphate from entering bodies of water. It is also important to apply no more than needed amounts of fertilizer. Erosion control encourages water movement down through the soil. While phosphorus will stay in the soil, nitrogen--in the nitrate form--is soluble and can move down with the water. So excess use of notrogen fertilizer cna lead to nitrate contamination of surface waters through drain tile effluent. Groundwater supplies that are not too deep are also liable to pollution.

Nutrients Can Help

Another example shows how nutrients can help aquatic life if erosion and runoff are held to acceptable levels. The U.S. Fish and Wildlife Service recently studied the Hudson River in New York. They found that the middle section of the river is extremely productive, containing striped bass, sturgeon, white perch, bluefish, shad, herring, and large-mouth bass, to name only a few. This productivity is due to a good supply of plant nutrients--from sewage and agricultural runoff.

In contrast, the upper portion of the river, running through virgin forest, is unusually unproductive of fish. The soils in the Adirondack Mountains simply don't provide enough nutrients to support aquatic life.

The Message to Agriculture

What this all boils down to is that agriculture is a major water polluter today. But this doesn't mean farmers have to stop using pesticides and fertilizer, or cut back on livestock production. Quite the contrary, farm chemicals are essential in maintaining high productivity of specialized crops. And animal wastes can be put to good use.

The key is to control runoff and erosion. If excessive amounts of water and soil don't leave your farm, neither will the other potential pollutants. They will stay on the field, where they are a valuable part of your operation.

Cecil Wadleigh, one of the world's acknowledge experts on agricultural pollution and science advisor to the USDA outlined the changes in public attitudes toward pollution.

He pointed out that many areas, besides agriculture, desperately need attention and gave examples of agricultural benefits, such as the Hudson River story. Also, he emphasized this important point: "Agriculture must do all that is possible to put its own house in order."

Soil, fertilizer, pesticides, animal wastes--they can be valuable resources or dangerous pollutants. You can help determine their effects.

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TOPIC 2—

Environmental Regulations

AGRICULTURE

ENVIRONMENT

Soil Loss Regulations

Iowa can now encourage or require proper use of the state's soil and wa resources, according to Richard Wilcox, resource conservationist, Iowa Depar of Soil Conservation, and Min Amemiya, extension agronomist, Iowa State Univ In July, 1971, the Iowa Conservancy Act established a policy *to preserve and tect the public interest in the soil and water resources of this state for f generations*.

For more than 25 years Iowa has had 100 soil conservation districts. U the provisions of the new Conservancy Act, the commissioners of these distri have the responsibility of setting soil loss limit regulations as necessary each district. First, the commissioners classify land in their district on basis of topography, soil characteristics, current use, and other factors af ing soil erosion. Then they establish soil loss limits for the different cl of land. Soil losses permitted on agricultural lands range from 1 to 5 tons acre per year. (Five tons of soil cover an acre to a depth of about 1/32 of inch.)

As the first step towards enforcing the law, someone must file a compla He will say that his land is being damaged by sediment from excessive erosio someone else's land. Then the district commissioners investigate to see if loss limits are being violated. The commissioners first seek voluntary comp when regulations are violated. If necessary, they may issue an administrati der. Then the landowner has 6 months to start and 12 months from the date o der to complete needed erosion control practices.

However, when an order is issued, cost-sharing must be available for 75 percent of the cost of installing any permanent soil and water conservation tice. Permanent practices include planting of perennial grasses, legumes, s or trees, establishment of grassed waterways, construction of terraces, and For temporary practices such as annual or biennial cover crops, strip croppi contour planting, or mulch tillage, the State Soil Conservation Committee se annual cost-sharing amount.

Failure to comply with an administrative order may result in a district court order for immediate compliance. The burden of proof here is on the d trict commissioners. At this stage, the penalty for non-compliance becomes tempt of court. So far, a considerable number of complaints have been made the Conservancy Act. However, they have all been handled by negotiation or ministrative order, and none have gone to court, according to Amemiya.

The federal Environmental Protection Agency (EPA) currently has no soil guidelines in effect, but is developing such guidelines. Extension speciali expect that the EPA well set standards and then the states will either have enact laws accordingly or abide by the federal regulations. Therefore, the servancy Act puts Iowa one step ahead.

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If you want more information on the Iowa Conservancy Act, you can use the enclosed form and return envelope to request the pamphlet on *Iowa's New Conservancy Districts and Soil Loss Limit Regulations.*

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Livestock & Pollution— Your Legal Duties

Iowans with livestock operations need to be aware of state and federal pollution regulations. If your operation meets requirements for registration or permit application, you may have to install pollution control facilities or add to existing ones. State and federal regulations are similar, but do have important differences. To be safe, you need a full knowledge of both.

Iowans with livestock operations now fall under control of both state and federal regulations. Operators who meet certain requirements must register with the state, apply for a federal permit, or both. Then, if the agencies think it is necessary, they may specify required water pollution control facilities. The Iowa Department of Environmental Quality (DEQ) has implemented its *Confined Feeding Operation Rules and Regulations*. The federal Environmental Protection Agency (EPA) has included agriculture in its *National Pollutant Discharge Elimination System*. The specific rules for registration and permit application are rather complicated, but the major points are given below.

State Regulations

As of mid-August, more than 900 Iowa operators had registered with DEQ, according to Dean Lemke, environmental engineer in the DEQ Water Quality Management Division. More than 90 percent of those who registered operate either beef cattle or swine operations. Some 660 pollution control facilities—some old and some new—have been approved. Lemke says most of the new facilities were taken care of by voluntary compliance. In some cases, however, a farmer might first have been approached by a local board of health or other body and asked to make certain changes.

The Iowa regulations deal with two types of operations—"open feedlots" and "confinement feeding operations."

Open Feedlots

An open feedlot can be unroofed or partially roofed. To be subject to DEQ regulation, it must have at least a certain number of animals, as given in Table 1. Also, the animal population density must exceed the values given in Table 1. For example, a beef cattle operation must have at least 100 head and more than one animal for each 600 square feet of lot area before it can be regulated as an open feedlot.

Table 1

Species	Square feet of lot area per animal is less than:	Animal Population Exceeds
Cattle, Beef	600	100
Cattle, Dairy	600	70
Swine, Butcher & Breeding (Over 40 lbs.)	100	500
Swine, Feeder Pigs (Below 40 lbs.)	15	4,000
Sheep	60	1,200
Turkeys	10	6,000
Chickens, Broiler	2	30,000
Chickens, Layer	2	20,000

Confinement Feeding Operations

A confinement feeding operation can be roofed or partially roofed. Wastes are removed as a liquid or semi-liquid. To fall under DEQ regulation, the lot must contain more than 50 beef cattle or the equivalent at one time. The equivalent numbers for other animals are shown in Table 2.

Table 2

Species	Animal Number Exceeds
Cattle, Beef	50
Cattle, Dairy	40
Swine, Butcher & Breeding (Over 40 lbs.)	250
Swine, Feeder Pigs (Below 40 lbs.)	1,800
Sheep	600
Turkeys	3,000
Chickens, Broiler	15,000
Chickens, Layer	9,000

Who Must Register?

Operators of open feedlots and confinement feeding operations whose size and density exceed the figures listed in Tables 1 and 2 must register with DEQ and submit a properly labeled aerial photograph if they meet any of several additional conditions.

Open feedlot operators must register with DEQ if they meet *any* of three conditions. The most stringent condition applies if the feedlot discharges water or waste overflow directly into a tile line or other buried conduit, drainage well, pumped well, abandoned well, sinkhole, or a gravel pit, rock quarry, lake or pond not wholly owned by the operator. All feedlots that exceed the size and density criteria in Table 1 must register if they make such discharges.

The second condition applies if the feedlot discharges into a watercourse draining more than 3,200 acres above the lot, and the lot is less than a specified distance from the watercourse. The distance depends on the numbers of different animals. For example, an operator with beef cattle must register if his feedlot is closer to the watercourse than 200 feet per 100 animals. Table 3 shows the distances for other animals.

Table 3

Species	Distance to Watercourse is Less than (Feet per 100 Animals)
Cattle, Beef	200
Cattle, Dairy	300
Swine, Butcher & Breeding (Over 40 lbs.)	50
Swine, Feeder Pigs (Below 40 lbs.)	10
Sheep	20
Turkeys	5
Chickens, Broiler	1
Chickens, Layer	1

If neither of these conditions is met, registration will depend merely on the number of animals in the feedlot. An operation of at least 1000 beef cattle or the equivalent in other animals must be registered. The equivalent numbers for other animals are given in Table 4.

Table 4

Species	Animal Number Exceeds
Cattle, Beef	1,000
Cattle, Dairy	700
Swine, Butcher & Breeding (Over 40 lbs.)	4,500
Swine, Feeder Pigs (Below 40 lbs.)	35,000
Sheep	12,000
Turkeys	55,000
Chickens, Broiler	270,000
Chickens, Layer	180,000

Three similar conditions apply to registration of *confinement feeding operations*. The first condition is similar to the one for open feedlots--any confinement feeding operation whose size exceeds the number of animals listed in Table 2 must be registered if it discharges directly into the facilities or bodies of water listed above.

The second condition is more stringent for confinement feeding operations than for open feedlots. The operation need only *contribute overflow* or other waste discharge to any watercourse, regardless of its distance from the feeding operation.

As with open feedlots, confinement feeding operation registration depends only on size when the first two conditions are not met. However, registration is required for much smaller numbers of animals--100 beef cattle or the equivalent, as shown in Table 5.

Table 5

Species	Animal Population Exceeds
Cattle, Beef	100
Cattle, Dairy	70
Swine, Butcher & Breeding (Over 40 lbs.)	500
Swine, Feeder Pigs (Below 40 lbs.)	4,000
Sheep	1,200
Turkeys	6,000
Chickens, Broiler	30,000
Chickens, Layer	20,000

In determining whether your open feedlot or confinement feeding operation meets the conditions for registration with the State DEQ, you only have to consider one type of animal at a time, according to Lemke. That is, you don't have to combine different types and base your figuring on total size. This is a major difference from the federal regulations, as explained later.

You can use the flowsheet on page 6 to determine whether you should register your operation with the state.

Finally, any operation meeting the definition for an open feedlot or confinement feeding operation can be required to register if investigation by DEQ shows there is or may be a water pollution problem. The *DEQ Rules and Regulations for Confined Feeding Operations* give more information on state registration. You can request a copy of this publication by using the enclosed form and return envelope.

"Grandfather Clause"

The Iowa regulations contain a "grandfather clause." Farmers who qualify as described above but began their operations before July 1, 1969, must register only upon notification. This is another major difference from the federal regulations.

However, those who are expanding operations or starting new ones that qualify must register before beginning the operation. DEQ will then determine whether water pollution control facilities are required. The department will consider soil type, distance to a stream or lake, use of land between the feedlot and stream or lake, slope of land, control of waste discharge in proportion to stream flow, and distance to structures occupied by humans.

Pollution Control Facilities

Examples of facilities which may be required are terraces, retention basins, settling basins, waste storage tanks, or waste treatment. Local soil conservation district personnel can help with design of facilities.

Federal Regulations

The federal Water Pollution Control Act (October, 1972) gives authority for the federal regulations. Anyone discharging pollutants from a point source into a waterway must have a permit.

Conditions for a Permit

The key here is the determination of a *point source*. Operators of livestock confinement facilities holding more than 1000 feeder cattle or the equivalent (1000 "animal units") meet the federal definition and must apply for a permit. Numbers for different animals and multipliers for combining them are given in Table 6. Confinement facilities include open feedlots, confined feeding operations, stockyards, livestock auction barns, and livestock buying stations.

Table 6

Types of animals	
Slaughter and feeder cattle........	1,000
Mature dairy cattle-milker and dry.	700
All swine over 55 pounds...........	2,500
Sheep..............................	10,000
Turkeys-in open lots...............	55,000
Ducks..............................	5,000
Laying hens and broilers:	
Facilities with continuous overflow waterers..........................	100,000
Facilities with liquid manure handling systems...............	30,000

Slaughter and feeder cattle........	1.0
Mature dairy cattle................	1.4
Swine over 55 pounds...............	0.4
Sheep..............................	0.1

Example:

Number of animals		
Slaughter and feeder cattle..600	X	1.0=600
Mature dairy cattle..........200	X	1.4=280
Swine over 55 pounds.........500	X	0.4=200
Total.............		1080

The stipulation is again made that any livestock operation must apply for a permit if EPA or DEQ determines there is a pollution problem. These agencies recommend that any livestock producer whose facilities discharge waste to a watercourse apply for a permit--regardless of whether the operation meets the "point source" definition. Otherwise he may be subject to civil or criminal actions. A permit will prevent such prosecution at least through December 1, 1974.

When to Apply

The "grandfather clause" in the state regulations does not apply to federal permit applications. Therefore, anyone whose operation meets the above requirements must apply, no matter when his operation began. Permit applications should be made as soon as possible for existing operations and at least 180 days before beginning a new operation. More information on requirements and procedures is given in the *EPA Fact Sheet on Agricultural Permits*. You can request this publication using the enclosed form and return envelope.

Permits, when issued, will state the required facilities and compliance schedule, based on the new federal standards. These standards became effective in April. Generally, they apply to the larger feedlots (1000 animal units). Also, they concentrate more than the Iowa regulations on the operation of pollution control facilities, rather than just on how they are built, according to Stewart Melvin, ISU extension agricultural engineer. For example, a pond's level must be controlled so that the pond can handle a "10-year, 24-hour" storm without releasing any waste. Such a storm is one that is expected to occur once in ten years.

For More Information

As indicated in these descriptions, the state and federal guidelines are similar in many areas. EPA and DEQ cooperate in determining where permits are required and what the facilities and compliance schedules should be in each case. You can get application forms at county Extension Service, Soil Conservation Service, EPA, or DEQ offices. The two EPA and DEQ publications on the enclosed request form should help answer some questions about the federal permit program or state registration. You can also send questions to:

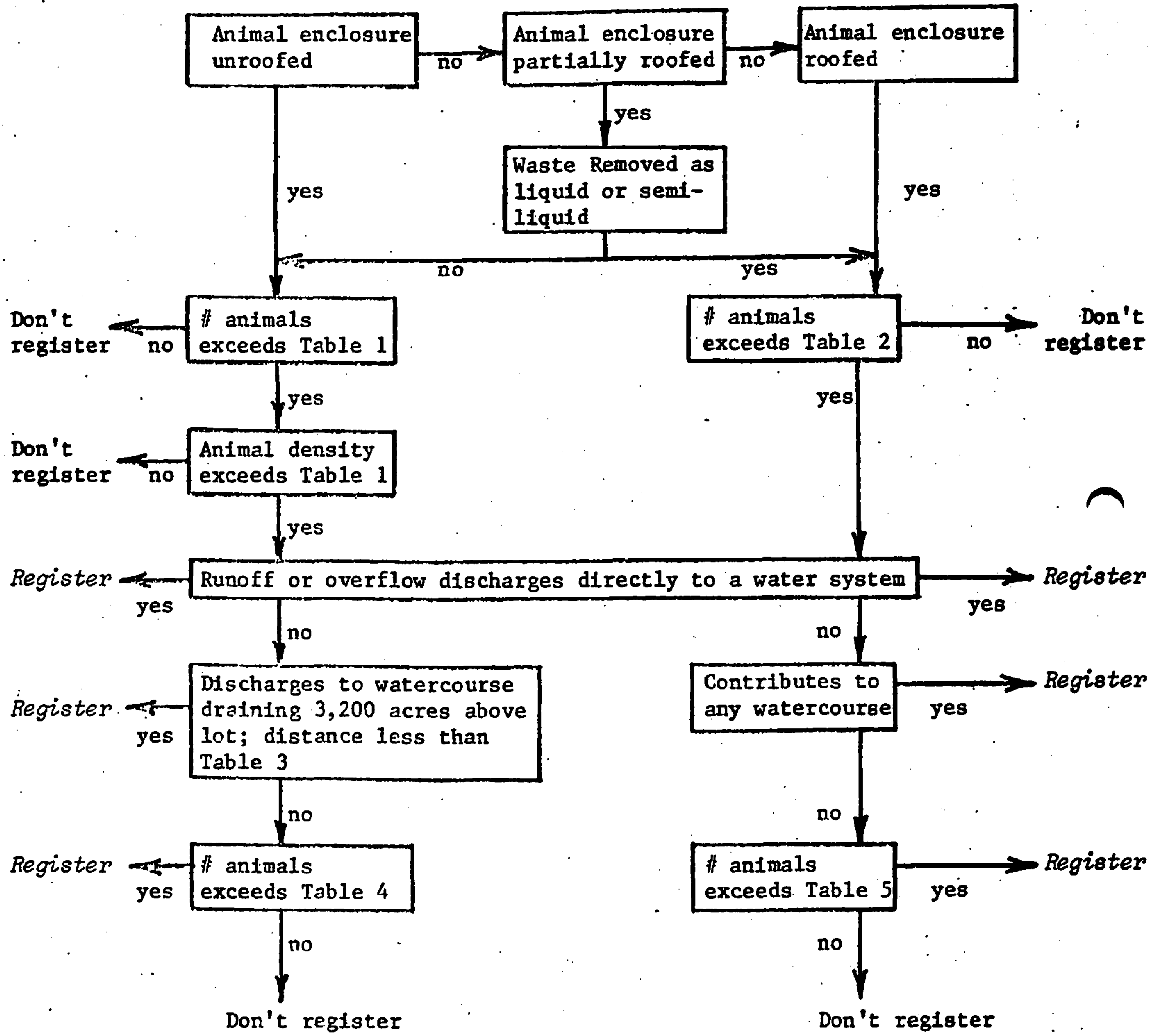
Iowa Department of Environmental Quality
3920 Delaware, P.O. Box 3326
Des Moines, IA 50316

SHOULD YOU REGISTER WITH THE STATE?

CHECK YOUR LIVESTOCK OPERATION HERE. . .

If operation began before July 1, 1969, register only upon notification.

Otherwise, follow these steps:



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AGRICULTURE ENVIRONMENT

New Pesticide Regulations-
Some Duties; Some Help

If you apply certain relatively common pesticides, you will have to be trained and certified by the 1977 crop year. There will also be new pesticide container disposal regulations. While stricter controls are being imposed, there are benefits for you. Enforcement of these regulations will require some sort of container disposal system, which may be a big help if you, like many other farmers, are new having problems with disposal. Also, more careful use of pesticides can save you money.

Federal Standards

The Federal Environmental Pesticide Control Act (FEPCA) was passed in October, 1972, but did not immediately affect farmers. Although a federal law, it merely set standards for new or amended state laws. The states will enforce these laws, with full compliance set for October, 1976--or the 1977 crop year. Two provisions of this law are most important to you.

Help With Disposal Problems

First, FEPCA required states to immediately set container disposal regulations. Iowa has been working on these regulations for some time. However, they are not yet in effect, because the state must first set up an adequate disposal system of some sort.

Proposals include the start of a new "can crushing" business in the state or provision to send empty containers back to the manufacturer, according to Harold Stockdale, Iowa State University extension entomologist. A committee appointed by the Iowa Department of Environmental Quality (DEQ) will probably make the decision, with the aid of industry representatives.

The disposal system will probably not be in operation much before October, 1976, but there are some steps you can take in the meantime. If you have empty containers, rinse them three times, draining the rinse water into your sprayer. Then take them to a sanitary landfill, but be sure to notify the landfill operator first, Stockdale says.

Leftover pesticides can be a bigger problem. If they are still legal, Stockdale advises you to use them as intended, if at all possible. If, however, you have pesticides that are illegal to use, as is DDT, you have to do something else. A small amount can be buried on your farm, which is not a good solution, but is better than dumping or storing it on your property, according to Stockdale. If you have a larger amount of such a

Worker Protection

Everyone using pesticides in Iowa should be familiar with worker protection standards set last year by the Environmental Protection Agency, according to Steve Ryan, ISU extension entomologist.

General standards are set for all pesticides, as well as one- to two-day field re-entry times after using any of 12 more toxic pesticides. The re-entry period applies to workers not wearing sufficiently protective clothing. Also, workers must be warned about fields that are to be treated.

Although the standards are intended mainly to protect migrant workers in other parts of the country, you should be aware of them, particularly if you may be spraying corn for insects during the detasseling period, according to Harold Stockdale, ISU extension entomologist. Last year in Indiana, a corn field was sprayed with the wrong insecticide during detasseling. Some of the workers became sick, but luckily there were no deaths.

pesticide, you may want to contact the Iowa DEQ or the federal Environmental Protection Agency (1735 Baltimore Ave., Kansas City, Mo. 64108).

More Careful Use

The other important provision of FEPCA imposes controls over pesticide application. The old federal and Iowa laws concentrated on production, labeling, and distribution of pesticides, with no control over application. Under the law, pesticides can't be distributed unless they are registered, represented correctly, and labeled properly. To register a pesticide, a company must prove that it meets all claims and conduct extensive analysis of residues.

The new law will give more control of and safeguards for pesticide use and application. It is designed to protect the farmer, the public, and the environment. The law will allow qualified people to use certain pesticides that might otherwise be withdrawn from the market. And more careful attention to pesticide use may save you money. A recent survey in Hamilton County showed that half of the fields studied were possibly overtreated, costing farmers up to $3 per acre extra.

Under the new law, pesticides will be classified for either "restricted" or "general" use. You will need to be trained and certified by the state to use restricted pesticides after October, 1976, unless, of course, a certified commercial applicator does the work for you. However, Stockdale notes that most of the restricted pesticides will probably be relatively common insecticides, such as *Thimet*, *Counter*, *Mocap*, *Dasanit*, *Dyfonate*, *Furadan*, and parathion. All of these except parathion are corn rootworm insecticides applied while planting. So you will need certification if you use these materials in your operation. Also, *Paraquat*, a herbicide that has caused deaths, is likely to be in the restricted category.

Experiment and Experience

The Environmental Protection Agency is developing the methods to classify pesticides. First, they will consider technical standards, such as toxicity, to see whether a particular pesticide should be under restricted use. Then they will consider actual experience with that pesticide, to see whether it has caused any problems over the years. Both evaluations will be used in making the final decision.

As an example, the EPA recently held hearings on the use of aldrin and dieldrin, common soil insecticides. Recent cancer studies show that low levels of dieldrin cause increased numbers of liver tumors in mice. And experience shows that the chemicals are persistant, with small amounts appearing as residues in human and livestock feeds and in livestock. So the EPA stopped further manufacture of aldrin and dieldrin for use on corn and other crops. However, you can use what you already have, so there will not be a disposal problem, as there is with DDT.

Similar hearings are beginning on the use of heptachlor and chlordane. The results will probably be the same as for aldrin and dieldrin, Stockdale says.

Your Certification

Iowa has licensed commercial applicators for ten years, but certification of farmers is new. To be certified, you must attend a training session lasting about a day or a half day. These sessions will begin next winter, and will be conducted in your county by the County Extension Director. It hasn't been decided how often you will need certification--maybe only once, but probably every few years, according to Stockdale. There will be a minimal fee to cover the cost of administering the program.

Stockdale estimates that about 40,000 farmers in Iowa will need to be certified, although the number could vary widely depending on which pesticides are finally placed in the restricted category.

If you have questions about the new regulations, they can probably be answered next fall, when the regulations will be in more precise form and the County Extension Directors will be trained to conduct the farmer training programs. Send any other questions about pesticides and their use to us on the enclosed information request form. We'll send you the reply from the appropriate source.

Related Information

Some of your questions may concern alfalfa weevils, which are now a problem in some parts of Iowa. An extension pamphlet, *"The Alfalfa Weevil in Iowa,"* deals with these questions. You can request a copy of this pamphlet using the enclosed information request form and return envelope.

Again, feel free to ask any other questions that you have, also.

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TOPIC 3—

Cultural Practices

AGRICULTURE
ENVIRONMENT

Concerned About Pesticide Sa

About one-half of Iowa's pesticide dealers, commercial applicators, far and homeowners have experienced poisoning symptoms while working with pestic a recent survey indicates. The symptoms range from skin irritation or soren trembling or shaking. Furthermore, about one-third of the people surveyed h experienced undesirable side effects other than health problems. Crops and dens have been damaged. Unlawful residues have been found in crops and milk

This situation contributes to growing concern by pesticide dealers and as well as the general public, over the proper use and disposal of pesticide The survey--conducted by Steve Ryan, ISU associate extension entomologist--sl that the most common means of disposal of empty containers or unwanted pesti are burning on private property, burying on private property, and dumping in fill or trash pick-up. However, a majority of respondents said they would support a disposal system in Iowa by paying a fee. Also, they would deliver unwanted materials to the disposal site at their own expense.

Other surveys have shown that this concern by farmers and others is valid. After ordinary emptying the average 5-gallon pesticide container has from ½ cup to ½ pint of concentrate left in it. This not only wastes money, but also creates the danger of unsafe disposal. A simple drain and rinse procedure can help lessen the problem. This procedure is outlined at right.

Another problem affecting some farmers is well poisoning. Ryan receives about a half dozen reports each year from Iowa farmers who have poisoned their well or farm pond while trying to fill a pesticide applicator. He says more such incidents probably occur, but are not reported or do not reach his office. The water sources are poisoned by backsiphoning, which can occur if a pump fails or shuts off when the hose is immersed in the pesticide tank. Three safety precautions--also given at right--can prevent backsiphoning of pesticides into wells and ponds. Finally, follow the precautions when pumping from streams, as backsiphoning can damage them also.

Clean 'Em Out

1. Empty container into t drain vertically 30 se
2. Refill container ¼ ful rinse thoroughly, pour into tank, drain.
3. Repeat step 2 three ti
4. Immediately crush cont for burying or landfil don't reuse containers

Don't Poison the \

1. Keep hose above spraye tank inlet--don't let dip below water surfac
2. Use only equipment wit check valves to preven backflow.
3. Eliminate all connecti between drinkable and non-drinkable water sy

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Clean 'Em Out

1. Empty container into tank; drain vertically 30 sec.
2. Refill container ¼ full; rinse thoroughly, pour into tank, drain.
3. Repeat step 2 three times.
4. Immediately crush container for burying or landfill-- don't reuse containers.

Don't Poison the Water

1. Keep hose above sprayer tank inlet--don't let hose dip below water surface.
2. Use only equipment with check valves to prevent backflow.
3. Eliminate all connections between drinkable and non-drinkable water systems.

'75 Fertilizer Outlook-

What's New/What You Can

Speculation has begun about possible shortages in this year's fertilizer supplies. Here's a glance at the nitrogen and phosphate situation as it looks now, and some suggestions from Regis Voss, ISU extension agronomist, on information you'll need to prepare for the '75 crop year:

The Supply and Price Outlook

Nitrogen

The outlook for availability of nitrogen fertilizer for the 1975 crop is no better --and perhaps worse-- than last year.

The '75 fertilizer production year began July 1st with practically no nitrogen fertilizer left in supply. In fact, some late row applications this past July were cutting into our '75 supplies. One new nitrogen plant is going into production for the '75 season, but its added production will not be enough to offset short supplies.

It's a little early to predict the '75 demand for nitrogen fertilizer, but we can expect two situations to contribute to a demand as great or greater than last year: (1) We will likely have as many or more acres planted in food and grain crop in '75 as we did in '74; and (2) The export market demand for nitrogen fertilizer is expected to remain high. Accordingly, prices are likely to stay at current levels and possibly rise.

Phosphate

The supply situation for phosphate in '75 should be a little better than the previous year.

The industry has planned a 40% expansion of production facilities. However, this expansion is being delayed now by equipment problems. Als there is a possibility of a shortage of rock phosphate, the raw material used in the fertilizer. If these problems continue, the '75 supply may not increase as much as is hoped.

The export market demand is high for both the raw rock phosphate and phosphate fertilizer manufactured in this country. This continued high de mand is expected to keep phosphate prices high this year. Within a yea or two, however, we should see consid erable improvement in the phosphate situation.

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What You Can Do

Nitrogen

Figure out now what your nitrogen needs will be in the '75 corn year. Advise your fertilizer dealer of your projected needs; if supply problems cause him to allocate to his customers, you'll want to be ready to tell him your needs.

An extension publication, *Getting the Most Out of N for Corn,* shows you how to figure out how much nitrogen you'll need. You can request this pamphlet on the return information sheet included in this news letter.

It's especially important to keep two factors in mind when figuring your needs: (1) You can utilize nitrogen already in the soil from previous legume crops or from manure applications; and (2) The most profitable rate of application for nitrogen fertilizer will change with fluxuations in corn and fertilizer prices.

Getting the Most Out of N for Corn will guide you in how to adjust for legumes, manure, and soil properties when figuring your needs. It also will show you how the relationship between corn and fertilizer prices will affect your rate of application.

Phosphate

Before the crop year, your soil should be tested to determine phosphate (and potash) needs. Guessing what your needs are can be expensive and risky when short supplies are still a possibility.

Also test acid soils and apply lime to soils that test low in pH (especially below pH6). Raising soil pH to a range of 6.5 to 6.9 will increase the availability of nutrients (particularly phosphorus) in low-testing soils.

You can request a new publication from us that will give guidelines to adequate soil samples; it's called: *Take a Good Soil Sample.*

The soil test and your yield goal for the next year's crop is your best determinant of phosphate and potash needs. Optimum rates for both P and K, like nitrogen, vary with changes in crop and fertilizer prices.

As soon as you have looked at your soil sample results and determined your needs, contact your dealer to make arrangements for getting your supply.

When to Apply

Nitrogen

You can apply nitrogen in the fall, but there are some possible risks involved. If the following spring is wet and warm, you are likely to lose nitrogen through leaching or denitrification by bacteria. Laboratory studies show losses as high as 20 to 30 pounds

Phosphate

If you've already applied your phosphate and potash, you're ahead of the game. There is no great danger of losing P and K in the soil before spring because it moves very little once it is in the soil. Fall tillage can also increase yields on level, nonerosive, poorly drained soils.

per acre per day. There's no sure way to predict ahead of time what your spring losses might be.

Fall application may be more practical for you than spring sidedressing if you plant in contours or plant narrow row corn.

In this case, it's important to make application late in the fall before the ground is frozen. Soil temperature at 4 inches below the surface should be below 50 degrees.

Some important guidelines and information on fall application techniques are given in the extension pamphlet, *Making the Most from Fall-Applied Anhydrous Ammonia for Corn;* you may request this pamphlet on your return information sheet.

Spring application of nitrogen is often preferred because it maximizes the advantages to the corn and minimizes the effects on the environment. However, in the face of possible higher prices and tighter supplies in the spring, some farmers may decide in coming years to risk spring losses and apply nitrogen in the fall when they are more sure of supplies.

Regis Voss, ISU extension agronomist, advises the farmer to assess his own situation thoroughly before choosing between fall and spring applications. If the farmer makes the most efficient use of nitrogen, he'll be doing himself and environment a favor.

There are several practical advantages to fall application: soil testing services, fertilizer supplies, and application equipment are all likely to be more available to you in the fall. Fields tend to be drier and firmer in the fall for operation of the application equipment. It's usually a practical and time-saving idea to get P and K application out of the way in the fall.

The general rule for application is that lower-testing soils should get more fertilizer. The best method is usually to fertilize fields that test very low, low, and low-medium with the normal amount. Then use less on medium-testing fields. Higher testing fields can get by on no more than maintenance amounts.

If soils stay wet in the spring, spring row application may be necessary in addition to the previous fall broadcasting.

If you need more information in specific methods to use in fall application of P and K, please use the return information form to request this extension pamphlet: *Making the Most from Fall-Applied Phosphorus and Potassium.*

But What About a Shortage?

Nitrogen

"Most efficient use" may be a tougher problem than usual if you can't get all the nitrogen fertilizer you want.

If supplies are short, the basic idea is to apply an amount such that

Phosphate

In case of a short supply, the same general rule still holds for application of both P and K; low-testing fields should be fertilized first and most.

Amounts should be decreased as you

the last pound added gives an equal yield increase for each acre. It's better to proportion your supply evenly according to recommendation than to spread the normal amount on favored ground and shortchange other corn acres.

Getting the Most Out of N for Corn tells you how to make adjustments for an inadequate nitrogen supply.

work up into higher-testing soils. If the situation is tight enough, both phosphate or potash fertilizers should be applied to fields testing very high.

If you must make a choice between crops, see that you fertilize the highest value crops first. The Extension Service, however, suggests that you first allocate your supply on the basis of soil tests.

Looking Ahead

The brightest outlook, supply-wise, is for potash. Barring transportation problems in getting potash from Canadian production points to U.S. outlets, the '75 potash supply should be up slightly from last year.

Regis Voss, ISU extension agronomist, feels that if phosphate supplies improve this year as is hoped, we can look for a normal phosphate situation within a couple of years.

The most long-range fertilizer supply problem will probably involve continuing tight supplies of nitrogen fertilizer. Voss says the nitrogen supply situation may remain short through 1978. There is considerable talk about expansion of nitrogen fertilizer production, but numerous technical and resource problems make it risky to depend too much on possible expansion.

In the meantime, plan to use fertilizers as efficiently as you can in the '75 crop year.

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AGRICULTURE ENVIRONMENT

Changes in Corn Rootworm Treatme

Iowa can expect a more severe corn rootworm problem in 1975, according to ISU extension entomologist Harold Stockdale. Many fields will be replanted in corn next year due to corn's high market price; rootworms thrive in a corn-on-corn situation. Stockdale says soybean rotation is the best control for corn rootworm. Rootworms don't eat beans, so the larvae will starve after hatching in beans.

If you're going to plant corn on corn in '75, Stockdale recommends planning now for chemical controls you'll need in spring. We can expect a shortage of corn rootworm insecticides.

Pesticide Banned

In October, the federal Environmental Protection Agency banned production of the rootworm insecticide, aldrin, because it breaks down into dieldrin, a dangerous pollutant, after field application. It will be legal to use any aldrin supplies on hand now in the spring, but no new supplies will be available.

Heptachlor is the most effective substitute for aldrin. But it, too, contaminates the environment and is likely to be banned in 1976. Production of heptachlor will be increased for 1975, but the increase won't offset the loss of aldrin. Therefore, Stockdale recommends getting sufficient heptachlor ordered and paid for now.

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Cooperative Extension Service

Minimum Tillage: Conservation Plus...

Save Time, Fuel, Money, and Soi

If you are using one of the many minimum tillage systems, you are not only saving time and increasing profits by as much as 25 percent, but also may be cutting soil losses by 50 percent or more. In fact, a better term for some of these farming practices is "conservation tillage," according to Min Amemiya, Iowa State University extension agronomist.

Many Options

Today, you have a choice of many different tillage systems besides a "conventional" combination of moldboard plow, disk, and harrow. Amemiya says each system has advantages and disadvantages. The one you use should depend on the needs of your crop, seedbed requirements, and the principles of soil and water conservation. Furthermore, the system must be compatible with fertilizer and pesticide application, row spacing, and harvesting and drying operations, and it must fit soil and weather conditions.

In general, conventional tillage includes moldboard plowing, disking, and harrowing. Nonconventional tillage refers to most systems not using moldboard plowing. "Minimum tillage" means many different things to different people. For some it may merely mean that you make fewer trips over the field, use fewer different operations, or create less disturbance of the soil. "Conservation tillage," according to Amemiya, includes only those minimum tillage systems tha are effective in controlling soil erosion. Specifically, they leave a rough so surface and maintain a plant residue cover. Not all minimum tillage systems me these criteria.

Factors to Consider

Seedbed Requirements

Seeds require a warm, moist, well-aerated soil fine enough for good seed-to-soil contact, but not so fine that water and air movement are restricted. I the soil is too fine, the surface will seal when wet and form a crust when dry. Such surface conditions can cause increased runoff and erosion and can reduce seedling emergence in your field and set the stage for flooding downstream. Id the soil particles should be small and firmly packed at the seed level and becon larger toward the surface.

Water Management

While seeds need the type of soil just described, good water management to reduce soil erosion and weed growth requires a different soil condition. Tillag can improve water entry and storage in soil by affecting depression storage, plc layer storage, and sustained high water intake.

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Conventional Tillage

ADVANTAGES

- smooth, firm seedbed--good stands and yields
- readily available equipment
- flexible system--errors can be corrected
- easier to fertilize, control weeds, disease, and insects

DISADVANTAGES

- soil conditions not best for water intake, erosion control
- time-consuming--many operations and implements
- excessive soil compaction

Nonconventional Tillage

ADVANTAGES

- soil conditions good for water intake, erosion control
- good stands and yields if used properly
- fewer trips--lower cost
- easier to work on schedule

DISADVANTAGES

- reduced flexibility
- more rigid system--need careful timing

Depression storage (a rough, cloddy surface) may be created by plowing alone, listing, or ridge planting. Contour furrows hold up to 3 inches of water, according to Amemiya. Chiseling, wheel-track planting, and strip tillage hold up to 2 inches. A plow, disk, and harrow sequence or rotary tillage creates the smoothest surface and holds less than 1 inch.

Plow layer storage results from increased porosity and thickness of the tilled layer. A 7-inch soil layer may expand to more than 9 inches when plowed, so it can hold 2 inches more water. However, disking and harrowing destroy much of the pore space added by plowing.

Surface soil condition affects water intake during rainfall. A smooth, well-pulverized surface quickly forms a continuous seal, while rough, cloddy soil will take more water for longer periods. A Minnesota study showed that plowed soil absorbed 6.7 inches of water before runoff began. With further disking and harrowing, only 2.1 inches were absorbed before runoff.

Plant residues also produce high water intake by absorbing raindrop impact and minimizing surface sealing. Another Minnesota study showed that fall mulch-tilling (6 inches deep with chisel cultivator) provides nearly eight times more water intake before runoff and four times more intake during runoff than does a plow-disk-harrow sequence. Mulch-tilling provides three times more intake than does spring plowing.

Residues and Soil Loss

Crop residues left on the surface in conservation tillage can cause problems, Amemiya cautions. Under continuous corn they may encourage disease, insects, and weeds, hinder pest control, and produce accumulations of plant poisons through decomposition. However, residues do have a dramatic effect in stopping soil loss, as shown in Figure 1. The values were calculated by William Hayes, regional agronomist of the Soil Conservation Service (SCS). Increasing residues by 2000 to 3000 pounds per acre cuts soil loss by over 50 percent. A comparison with a conventional system is also shown. Other SCS data show the same potential here for "soil savings." Under continuous corn, Iowa farmers can cut soil losses in half by switching from a conventional

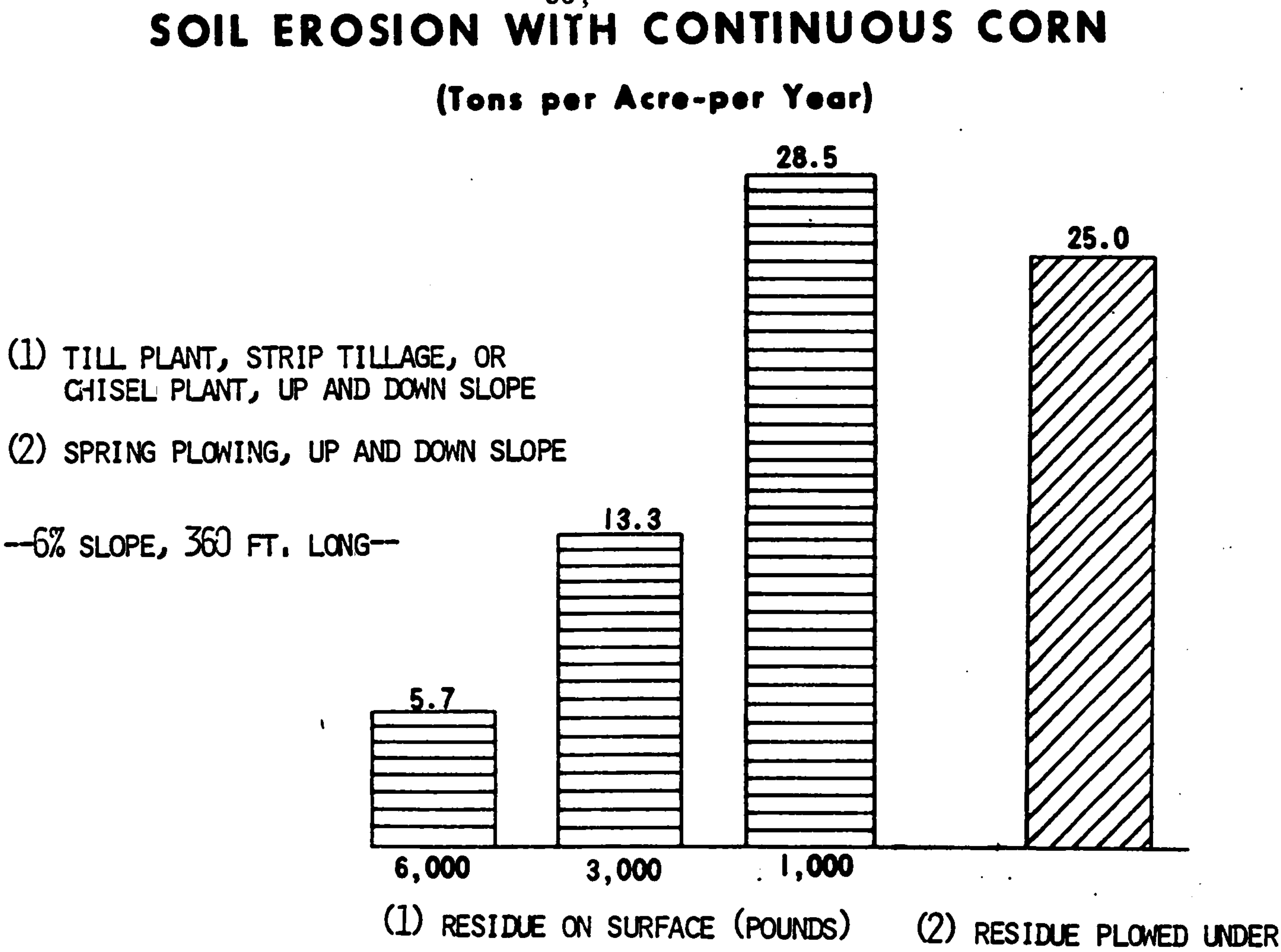

Figure 1

to a nonconventional system. The basic comparison is between a spring plowing system and a conservation tillage system that covers two-thirds of the soil with about 3500 pounds of residue per acre. Soil losses are cut even further (75 percent or more) if the conventional system involved fall plowing or if the conservation tillage system is one that covers more than two-thirds of the soil or leaves more residue per acre. With a corn-soybean rotation, the soil savings are somewhat less, but still very significant, ranging from 25 percent to 50 percent.

Save Energy and Dollars

Most of the minimum tillage systems employ fewer high-energy field jobs and give substantial fuel savings. ISU, the University of Nebraska, and the University of Missouri each made comparisons of different jobs and found quite similar results. If moldboard plowing is considered to require energy (horsepower hours per acre) at a level of 100 percent, then typical levels for other jobs are: chisel plow, 64-67 percent; disk-harrow, 28 percent; field cultivator, 25-35 percent; spring tooth harrow, 19-31 percent; spike tooth harrow, 7-11 percent; conventional planting, 13-19 percent; no-till planting, 10 percent; and rotary hoe, 7-11 percent. Fuel requirements follow the same proportions. For instance, moldboard plowing takes about three to four times as much fuel as field cultivation. Reasonable figures might be 1.6 to 2.0 gallons of diesel fuel per acre for plowing and 0.4 to 0.7 gallons per acre for field cultivation.

The overall savings possible when using conservation tillage systems are indicated by a comparison of various tillage-planting systems done by ISU Extension Service. Over one season, a no-till operation saves 5.7 gallons of gasoline per acre, or 50 percent, over a moldboard plow system. Till planting saves 49 percent; rotary strip-tilling saves 30 percent; an offset-disk system saves 35 percent; a chisel plow system saves 24 percent.

Savings result from 1) elimination of high-energy jobs, 2) fewer total trips over the field, and 3) less soil compaction. According to Wes Buchele, ISU agricultural engineer, a major expense in soil preparation is eliminating wheel compaction. While a conventional system compacts about one-third of a field, conservation tillage systems may reduce compaction to about one-fifth.

Conservation tillage, then, can save time, dollars, and soil. A summary example points out each of these advantages. For a Shelby soil of 8 percent slope, the Extension Service looked at all facets of a year's operation for two 100-acre systems: 1) a 5-year corn-oats-meadow rotation (CCOMM) with conventional tillage and 2) continuous corn with conservation tillage. The more intensive operation was possible with conservation tillage because of reduced soil losses. This advantage, along with lower operating costs, led to a 25 percent savings in both time and money. Total return was more than $1,800 higher for the conservation tillage system, with 100 hours per year less field time.

Systems Available

A number of different tillage systems, both conventional and nonconventional, are available.

Conventional Moldboard Plow

Conventional tillage includes fall or spring plowing followed by at least one disking and harrowing, and surface planting. *Plow-planting* involves planting directly into plowed ground with no secondary tillage. *Combined tillage* is done with a planter mounted behind a secondary tillage tool such as a disk, field cultivator, rotary hoe, spring-tooth cultivator, spike-tooth harrow, sweeps, or rotary knives. *Modified combined tillage* confines secondary tillage to the row zone, leaving most of the soil (between rows) undisturbed.

Minimum Tillage and Pests

Minimum tillage techniques can both help and hinder pest control, says Harold Stockdale, ISU extension entomologist. They'll help because they prevent soil erosion, the primary vehicle for chemical pesticide pollution. Pesticides adhere tightly to soil particles; when soil erodes, pesticides go along for the ride to pollute the streams. So, minimum tillage slows this pollution by stopping erosion.

The problem with minimum tillage is that insect eggs and larvae normally killed by fall or spring plowing may survive where minimum tillage is used. You may need to increase chemical pesticide doses to maintain sufficient control. Even if you do increase doses, you'll still reduce pollution with minimum tillage.

Armyworms and stalkborers are the greatest threat to fields in minimum tillage, according to Stockdale. Larvae of these pests live in grass between the corn rows. If the grass is killed with herbicide, the larvae move to the corn. Armyworms feed on the surface of leaves and can be killed by contact insecticides. But stalkborers get into the stalks where contact insecticides can't kill them. So, if stalkborers or armyworms are in the grass, Stockdale says to apply an insecticide soon after the herbicide.

Nonconventional Systems

No-plow systems include listing, ridge planting, chisel planting, rotary tillage, till planting, disk tillage, sweep tillage, slot or "zero" tillage. *Listing* is an old and widely familiar method. *Ridge planting* is similar to listing, except that seed is planted on the ridges with the same ridges used each year. *Chisel planting* involves deep chiseling with chisel points in the fall and shallow chiseling in the spring using sweeps mounted ahead of the planters. *Rotary tillage* uses spring tines or knives to make primary tillage, secondary tillage, and planting a once-over operation. Soil is tilled 3 to 4 inches deep in full width or in 10- to 14-inch row strips. *Till planting*--another one-pass operation--employs a wide sweep and trash bar to clear a strip over the old row. A narrow planter wheel packs the seed, and disks provide a loose soil cover. *Disk tillage* refers to use of a tandem disk for primary tillage. *Sweep tillage* is a two-pass subsurface system in which soil is lifted and shattered by 15- to 48-inch sweeps, leaving residues intact. In *slot* or *"zero" tillage*, fluted coulters cut through residues and till a 2- to 3-inch strip for each row.

Choosing a System

With so many systems available, the choice of the one for your farm is difficult. There are many management considerations in looking at tillage alternatives. With a no-plow system, you may want to moldboard plow every 3 to 5 years to incorporate fertilizer deeply. With surface residues and wet soil conditions, lower soil temperatures and slow early growth, you will probably want to use row fertilizer.

Further information on the relative advantages and drawbacks of various tillage systems is given in the extension publication: *Tillage Alternatives for Iowa.* Also useful is *Estimating Farm Fuel Requirements for Crop Production and Livestock Operations.* You can request these publications using the enclosed form and envelope.

Whatever choices you make concerning your tillage system, Amemiya reminds that it is important to keep flexible and be ready to change operations when weather and soil conditions cause unexpected problems.

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TOPIC 4—

Conservation Structures

AGRICULTURE
ENVIRONMENT

Problem-Solving With Grassed Waterways

Grassed waterways may be a vital means of preventing gullies on your land. There are important considerations in deciding between waterways and underground outlets. And if you have a waterway, but find it causing problems, you can take steps to remedy the situation.

Would a four-inch rain tonight result in any gullies on your farm? If so, you might need to use grassed waterways. An if you already have terraces without tile outlets, the need is even greater.

Stable Watercourse

Grassed waterways are intended to provide a stable watercourse that can remove water from a field without causing damage, according to Volney Smith, assistant engineer with the Soil Conservation Service in Des Moines.

When terraces were first used, runoff was discharged into existing draws, fence rows, or road ditches. This practice caused gullies to form and extend back into the fields. So the land became harder to farm and soil loss indreased greatly.

Grassed waterways--when properly located, built, and maintained--effectively control these problems. A strip of land is set aside as a waterway, the channel is shaped or graded, and a vegetative cover is established. Grassed waterways are used as outlets for terraces, diversion channels, stabilization structures, contour rows, and natural depressions. Figure 1 shows a waterway that has been quite effective for a number of years.

Develop Management Plan

Before building a waterway, you should develop a water management plan for your entire farm. Overall, a water management plan controls erosion, conserves water, helps make farming operations efficient, helps increase productivity, and gives an adequate income. You'll probably want to consider things like soil type, extent of erosion, cropping system, number and size of fields, tillage methods, and income potential of the land.

Figure 1. A reed canarygrass waterway in a contoured, strip-cropped field near Sigourney, Iowa. (Photo courtesy U.S.D.A. Soil Conservation Service.)

Also, you'll want to make sure the waterway doesn't interfere with farming operations. It should not be used as a roadway or livestock lane, but if properly located, it will not cause unnecessary inconvenience. Planning ahead is important--if your waterway will serve as a terrace outlet, you should build the waterway a year before it will be used.

You also need to know what type of storm and runoff to expect. Waterways are usually designed for the peak rate of runoff expected in a ten-year period. This runoff rate depends on factors such as watershed location and shape, soil type, tillage methods, and vegetative cover. The storm causing this peak runoff in your area will be about 1.9 inches in 30 minutes, or an equivalent severity for shorter or longer storms.

As Smith says, one purpose of a waterway is to "spread the water out and run it shallow." So the waterway should be designed wide enough to stop erosion when the grass is short. Also, it must be deep enough to carry peak runoff when the grass is long. If the slope of your land varies, if the runoff at different points varies, or if the waterway is a terrace outlet, the size and shape may change along the waterway.

More detailed planning and design information is given in *"Grassed Waterways and Underground Outlets,"* which you can request using the enclosed form and envelope.

Maintenance Essential

Maintenance of waterways is perhaps more important than anything else. Without proper maintenance, a grassed waterway can turn into a man-made gully. Waterways often are not really stable, Smith says. Most are either cutting or filling because of improper maintenance, and will eventually have to be rebuilt. Turning or driving machinery in the waterway, overgrazing by cattle, and grazing when the waterway is wet lead to gullying.

Proper weed control, removal of excessive cover-crop residue, and fertilization are essential. The waterway should be inspected several times a year, preferably after a heavy rain. Small washes should be repaired by transplanting sod.

Waterway or Tile?

If you're wondering whether a grassed waterway or underground outlets are best for you, there are many factors to consider. Grassed waterways are low in first cost, but they remove some land from grain crop production. Also, chemical weed control on nearby land can cause maintenance problems. Atrazine is particularly hard on waterways, according to Smith. Your district conservationist can help determine the specific effects in your case.

On the other hand, underground outlets are much harder to design and install. They cost more, unless they eliminate the need for a stabilization structure or overfall structure. However, they don't take land out of production, and may be considered where grassed waterways would be hard to build and maintain. A more detailed listing of the advantages and disadvantages of the two types of outlets is given in "*Grassed Waterways and Underground Outlets*" on the enclosed information request form.

Smith points out that in most situations a waterway and underground drainage should be used together. A wet waterway will erode when water flows over it, so underground outlets often help by removing standing water. This is especially important in Story County, because higher clay content gives less infiltration, according to Smith.

Where to Get Help

If you plan to construct a grassed waterway, you may be able to get federal and state cost sharing funds. For information on cost sharing, or to determine the needs on your farm, check with Harold Godown, your district conservationist, at 382-2217.

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Terraces Protect the Land, Protect Farming Investmei

Figure 1. A modern system of parallel seeded backslope terraces. (Courtesy U.S. Soil Conservation Service)

"To be accepted, today's terrace systems must be as modern as th equipment which farms the land, as valuable as the soil they protect, and as desirable as we have the know-how to make them." R.L. Phillip U.S. Soil Conservation Service.

Besides saving valuable topsoil in times of heavy rainfall, terraces increa cropping efficiency and profits on land which is otherwise too steep for intensi row-cropping. Even though terraces are expensive to construct, benefits can off- set the investment. And government cost-sharing will probably be available soon for up to 50 percent of construction costs, as it has been in past years.

Why Terraces?

In fields with a grade of less than six percent, cultural practices such as conservation tillage, contour plowing, and strip cropping can usually control soi erosion, says Min Amemyia, ISU extension agronomist. In fields that slope more t six percent, however, terraces make good sense for two reasons: they are the most effective soil and water conservation practice going, and they can be designed tc greatly improve the farmability of steep land. And terraces are especially impoi tant when steep fields are intensively row-cropped, rather than put into hay or pasture.

Terraces Protect the Land, Protect Farming Investments

Figure 1. A modern system of parallel seeded backslope terraces. (Courtesy U.S. Soil Conservation Service)

"To be accepted, today's terrace systems must be as modern as the equipment which farms the land, as valuable as the soil they protect, and as desirable as we have the know-how to make them." R.L. Phillips, U.S. Soil Conservation Service.

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They Stop Erosion Where It Starts

Soil erosion on unterraced fields usually begins as a thin sheet of water moving down the slope. The sheet of water gains momentum if it is not stopped, and usually funnels into small channels called rills. This concentrated flow will eventually carve a gully if left unchecked, and a lot of soil will leave the field.

But on a terraced field, the sheet erosion can move downhill only as far as the nearest terrace. The water can't gain momentum, and the soil it carries settles into the terrace channel, rather than leaving the field.

They Control Water, and Prevent Pollution

Once the water is stopped by the terrace, the moisture soaks into the ground, and is available for drier times. On the other hand, if your problem is too much water in the soil, terraces can be built to remove the water quickly through underground outlets.

Either way, terraces can put the water where you want it. They prevent upland field runoff from flooding bottomland fields. And they keep soil on the land and out of rivers, so that erosion can't silt in reservoirs or damage the ecological balance of our waterways.

They Protect Investments—Year-Around

Terraced fields will maintain their natural fertility and a high potential for productivity. Terraces prevent erosion from robbing the big investment in fertilizers, pesticides, lime, and time which is necessary to ensure high yields. And they protect the soil even between crops, when the soil is bare and most liable to erode. Terraced fields which were built thousands of years ago by Inca farmers in South America are still being farmed today.

They Upgrade Land, Restore Productivity

Terraces can upgrade land which is too steep for high-yield crops. The conversion of pasture land to corn or soybeans can be worth the cost of terrace construction over the long run, Amemiya says. And terraces are necessary to restore severely eroded land to production.

Of course, it is best to terrace steeply sloping fields before erosion depletes the soil's fertility and carves deep gullies. Once the soil is gone and the gullies have formed, terracing alone will not restore the former productivity--a good system of straight, parallel terraces will be more expensive to build, and a lot of fertilizer will be needed to replace the natural nutrients lost to erosion.

They Are Farmable

One of the biggest recommendations for modern terraces is that they are designed for easy farming. Here are some characteristics of easily-farmed terraces:

1. They are laid out parallel to one another, like steps down the slope. Parallel terraces eliminate point rows and turning between terraces. This means fewer trips through the field, savings in time and fuel, and less crop damage and soil compaction.

Figure 3. This field of modern parallel grassed backslope terraces works on the same principles as terraced fields in South America which were built by Inca farmers thousands of years ago. (Courtesy U.S. Soil Conservation Service)

2. Terraces should have a cross section that is easy to farm. The side slopes of the terrace channel and ridge should be flat enough and wide enough to permit easy operation of farm equipment.

3. The width of the terraces should fit the equipment used to farm them. For instance, if eight-row equipment is to be used, terraces should be some multiple of eight rows wide.

For more about farming terraces, request the booklet *"Farming Terraced Land"* on your return information sheet.

Different Terraces for Different Needs

There are terraces of different types for different slopes and needs. In Figure 2 are diagramatic cross sections for four common types--broad based, steep backslope, flat channel, and bench.

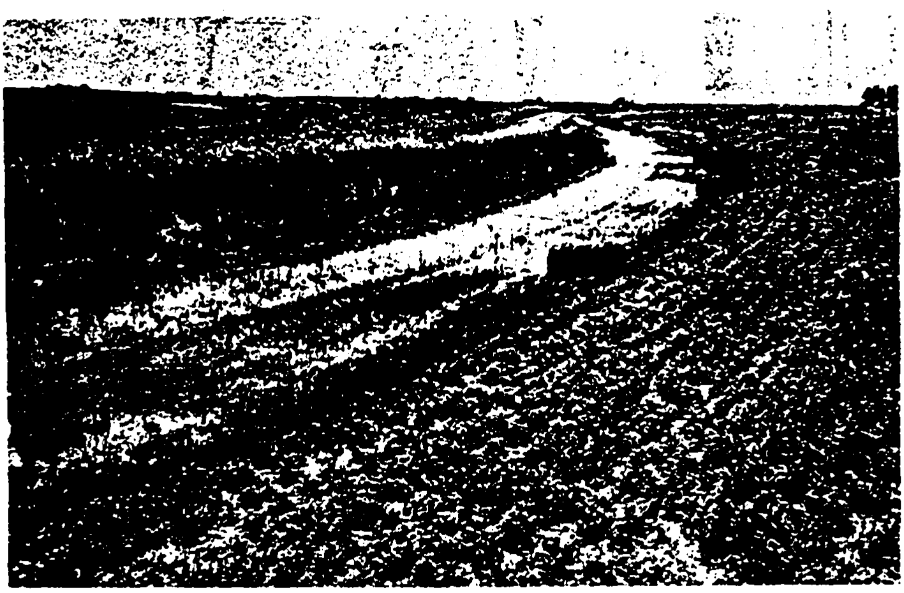
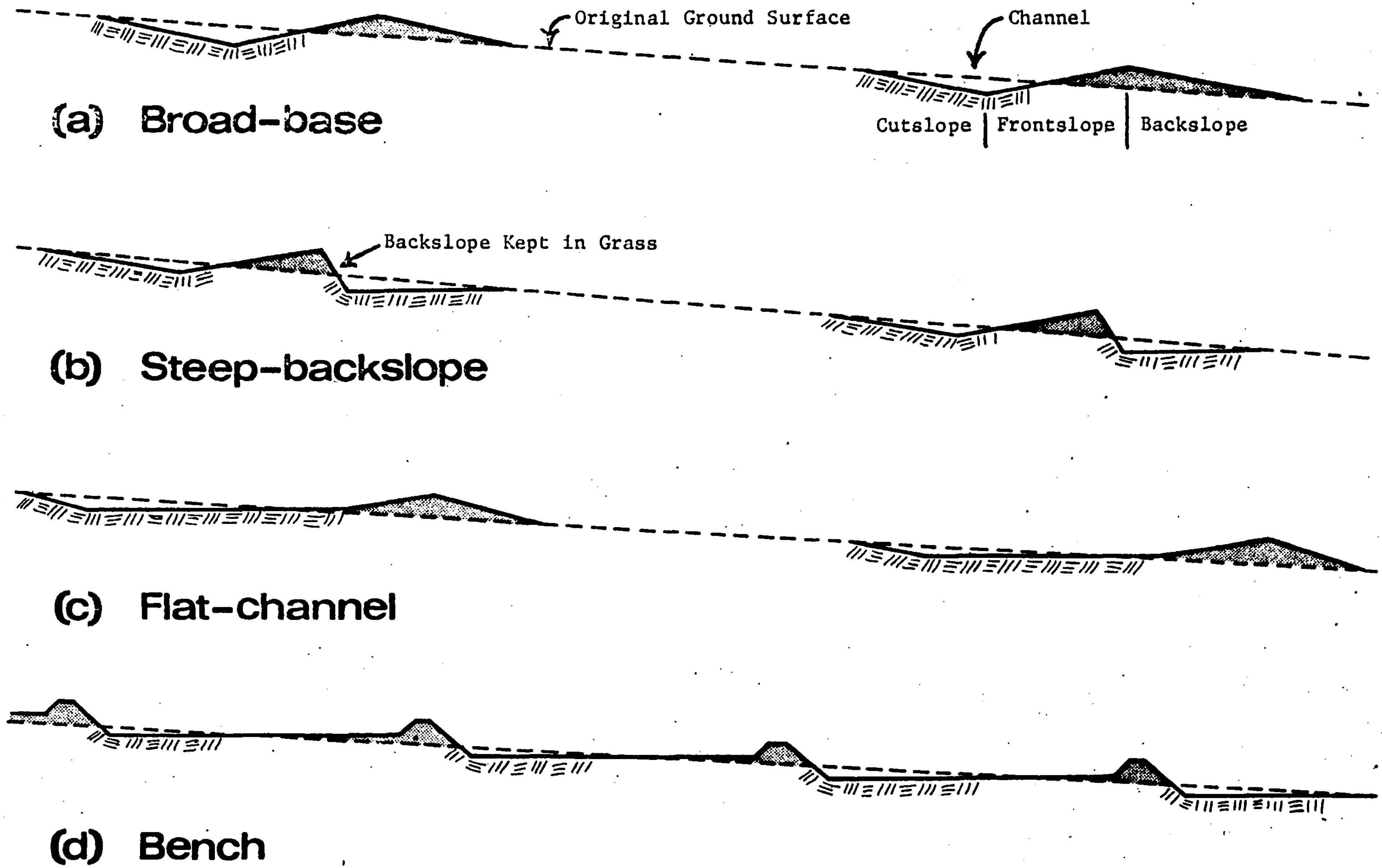


Figure 4. These grassed backslope level terraces near Wiota, Iowa held back water from 12 inches of rain which fell in three days. The water soaked in slowly, reducing runoff and flooding. (Courtesy U.S. Soil Conservation Service)

FIGURE 2
TYPES OF TERRACES



The broad-based terrace has gently sloping surfaces, so that crops can be planted over the entire terrace. This terrace is most effective on slopes of less than 12 percent. On slopes of more than 12 percent, the backslope may be too steep to farm. In that case, the steep-backslope terrace is a good alternative.

A field of steep-backslope terraces looks like a series of stair steps. The backslopes are kept in grass, and rise at an angle of 30 percent or more from one terrace to the next (see Figure 3).

The flat-channel terrace is designed to catch and store water, and is used mostly in areas of less than 25 inches of annual rainfall. The channel, uphill of the terrace ridge, is 25 to 75 feet wide, and is blocked off at both ends. Flat-channel terraces are particularly effective where infrequent, but intense, rainfalls are expected during the growing season (see Figure 4).

Bench terraces are used mainly on irrigated lands. Water is pumped into the flat "bench," and a slight grade moves the water through the field.

Do I Need Terraces?

There are several factors to consider when deciding whether or not to invest in terraces:

First of all, consider your cropping system, says extention agronomist Amemiya. Terraces are most desirable with continuous row cropping, because this is when erosion hazards are greatest. On the other hand, if you can afford to leave your sloping fields in grass, then your erosion problem is solved, he says.

After considering a cropping system, assess the effectiveness of other conservation practices you may be using. Contouring and conservation tillage will usually control erosion on slopes of less than six percent, Amemiya says. But if there is no other conservation practice , then terracing is the only answer, even on land that slopes only gently, he said. But terraces will be an expensive alternative.

Finally, consider the type of soil on your farm. Some soils are not compatible with terracing. In southern Iowa, soils may not be deep enough to tolerate the deep cuts of terrace construction and still maintain fertility. In that case, other conservation practices should be considered. And where slopes are much steeper than six percent, the field should be maintained in permanent pasture, Amemyia says.

Cost of Terraces

The cost of building terraces has gone up to $150-250 an acre, depending on topography and soils, according to Wilson Moon of the U.S. Soil Conservation Service in Des Moines.

But Iowa Farmers planting corn or soybeans on unprotected, sloping land are losing two bushels of soil for every bushel of corn they harvest, and seven bushels of soil for every bushel of soybeans they harvest, he says. That is equivalent to an average soil loss of 13 tons per acre, or an inch of topsoil lost every 12 years. Moon says the question isn't whether terraces are too expensive--it's a question of whether farmers can afford not to have them, if other conservation measures are inadequate to protect the land.

Funding Assistance

The increased efficiency and production made possible by terraces can make the investment pay, Amemiya says. And what's more, government cost-share funds have been available in the past to ease the construction costs.

The 1973 Rural Environmental Assistance Program (REAP) and the 1974 Rural Environmental Conservation Program (RECP) provided funds to cover up to 50 percent of the cost of terrace construction. In addition, the state provided an additional 25 percent of construction costs to eligible farmers in 1974 and 1975.

In Story County, farmers have used $21,874 of state and federal monies over the past two years to partially fund construction of various types of terraces.

Some farmers received both state and federal funds, amounting to 75 percent of construction costs in some cases, according to Bill White of the ASCS in Des Moines.

New Federal Funds Released

The U.S. Department of Agriculture recently released $190 million to fund the 1975-76 RECP work. The $190 million includes $33.7 million for ongoing Long Term Agreement projects (LTA's), and $156.3 million for annual practice projects, said Marvin Smith of the Agricultural Conservation and Stabilization Service (ASCS) in Des Moines. Iowa's share of the federal funds is $8,215,815, according to ASCS officials. Iowa's RECP cost-sharing program should be underway within the next few weeks, they said.

At the end of February, Story County had a total of $5,792 of state cost-sharing money left from the 1973-75 programs, said Leon Foderberg of the State Department of Soil Conservation in Des Moines. The 1975-77 funding bill has not yet been introduced in the state legislature, but should be voted on within the next few weeks, he said.

Call your local Soil Conservation District office at 382-2217 for assistance in planning your terrace system, or for more information on cost-sharing programs.

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TOPIC 5—

Funding Assistance

AGRICULTURE ENVIRONMENT

Conservation Cost-Sharing

Iowa farmers can receive cost-sharing up to 75 percent for certain soil conservation practices. The money comes from a combination of state and federal funds, and it can be used for practices approved by the Soil Conservation Service (SCS).

Approved practices are terraces; diversions; water impoundment reservoirs; stripcropping; establishing permanent vegetative cover; sediment retention; erosion or water control structures; shelterbelts; and sediment, chemical or water runoff control measures. Federal funds only will provide cost-sharing for improving permanent vegetative cover and establishing permanent wildlife habitats. Your local SCS technician can give you more information.

Sources of Funds

The federal program is the 1974 Rural Environmental Conservation Program (RECP). Iowa's share of this $90 million program is $3.2 million. The state funds--$1.5 million per year--are available through a new program administered by the State Department of Soil Conservation. Federal funds are being used for 50 percent cost-sharing up to a yearly maximum of $2500 per farmer. Iowa funds supply an additional 25 percent. So, to get the full 75 percent--while the funds last--you must make two separate applications.

Story County still has 1974 funds available from both the federal and the state programs. If you are interested, contact the county office of the USDA Agricultural Stabilization and Conservation Service at 382-4714 to find out about federal funds. For information on state funds, contact the Soil Conservation District office at 382-2217. Also, there are some 1973 funds remaining from the federal Rural Environmental Assistance Program. This money can be used for either soil conservation practices or livestock operation pollution control facilities. When the 1973 money runs out, there will be no more available for feedlot pollution control cost-sharing. The ASCS office can give you more information on the 1973 program.

Many Program Changes

While the state cost-sharing program is new, the federal program has been around for nearly forty years and has undergone a number of changes. The program began in 1936 as the Agricultural Conservation Program (ACP), which was initially aimed at controlling erosion and maintaining basic productivity of the soil. The emphasis changed over the years toward building capacity and increasing the inputs into farming operations. This program was often controversial. Critics charged that practices or materials designed to increase productivity were not justified during a period of agricultural surpluses.

In 1972 an attempt was made to resolve some of the controversy. The program was changed to the Rural Environmental Assistance Program (REAP). The intent was to phase out production-related items. However, this was not really done in practice, according to Min Amemiya, ISU extension agronomist. The new program did, however, increase the emphasis on environmental quality. It provided funds for abatement of pollution from livestock operations. In 1973 the Nixon administration froze the REAP funds on the grounds that the program was an "income supplement" no longer needed. A federal court later ordered that these 1973 funds be reinstated.

Then, in 1974 the program itself was revived as the Rural Environmental Conservation Program (RECP). RECP involves a real change in emphasis toward practices with long term environmental benefits. The new program, however, doesn't fund pollution control facilities for livestock operations. Long-term contracts--up to 10 years--for financial and technical assistance must be based on conservation plans approved by the soil and water conservation districts. Similarly, the new state program concentrates on permanent practices and helps fight special erosion or sediment problems.

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AGRICULTURE ENVIRONMENT

Old Funds About Gone -

Ford and Congress Debate New Monies

Some State Money Left

An enthusiastic response to last year's federal and state conservation cost-sharing programs has nearly drained available funds in Story County. There is some state money left, but all funds from the 1974 federal Rural Environmental Conservation Program (RECP) and the 1973 Rural Environmental Assistance Program (REAP) are gone.

The $4,955 of remaining state funds are available for cost-sharing of up to 50 percent in practices approved by the Soil Conservation Service (SCS). SCS-approved practices are designed mainly to control soil erosion and include terraces; diversions; water impoundment reservoirs; stripcropping; establishing permanent vegetative cover; sediment retention; erosion or water control structures; shelterbelts; and sediment, chemical or water-runoff control measures.

If you are interested in using the remaining state cost-share money, contact the Soil Conservation District office at 382-2217.

New Funding

Proposals for new conservation cost-share funds are before the state and federal legislative bodies now. The Iowa Department of Soil Conservation has asked the State Legislature for a total of $7.5 million for the next two fiscal years, about double the funding rate of fiscal 1973-74, said Leon Foderberg of the Iowa Soil Conservation Service. The legislature is now considering this request.

Federal Dispute

Federal funding for 1975 conservation programs has been an on-again, off-again proposition. As has been true for several recent years, the program is bogged down in a dispute between the President and Congress over the need for conservation payments.

Congress approved funds for conservation payments as a part of the agricultural appropriations bill in August. President Nixon vetoed that bill as one of his last acts before leaving office. A new bill was passed by Congress and signed into law by President Ford in December. That act appropriated $190 million for 1975 RECP under the federal Agricultural Stabilization and Conservation Service. Iowa's share of this amount is about $6.5 million, about twice the amount available last year, says Bill White of the ASCS in Des Moines.

However, President Ford has refused to release the appropriated funds. Instead, he has requested that $156 million be cut from the RECP budget (leaving only $34 million). Congress is now debating whether to allow the cut. Committee reports are expected within the next few weeks.

Ford's action has been taken under the Impoundment Control Act of 1974. This legislation allows the President to force Congress to consider funding cutbacks, but gives Congress the final word on the amount budgeted.

Informed observers in the Capitol believe that Congress is likely to override President Ford's request. An ASCS spokesman said that if history is any precedent, adequate funding can be expected for the 1975 cost-share program. He was referring to the Congressional protest that occurred when the Nixon administration unsuccessfully tried to withhold 1973 REAP cost-share funds. The spokesman said that the 1975 Congress is also considered to be a conservation-minded group.

Other Federal Actions

President Ford has opposed conservation cost-sharing programs in two other recent actions. In early January he vetoed a bill which would have extended the time deadline for spending 1973 REAP and 1974 RECP funds through December, 1975. In vetoing the bill, Ford said,

> "This Administration shares the view that REAP and RECP have made important contributions to conservation and the rural environment. However, the programs have long ago achieved their objectives. These programs were initiated in the 1930's to supplement farmers' incomes and provide incentives to farmers to install soil and water conservation practices. They were successful in demonstrating the value of conservation as a good farming practice. Many of the practices supported by the programs are profitable without Federal assistance and the supplementary income from this source has diminished in importance at a time when net farm income is near an all-time high."

Ford's veto had little effect on the cost-share program in Iowa. All but a "very small amount" of Iowa's REAP and RECP monies were spent or committed before January 31, said Bill White of the ASCS. Funds which weren't committed in each county before the deadline cannot be used to start new conservation projects, White said. But they can be used to cover cost-overruns on projects begun before Jan. 31, he said.

Next Year's Money

In his budget request for 1976, Ford proposed zero funding for the 1976 RECP program. Congress can appropriate funds if it so desires. Some observers think it is quite likely that they will do so.

Where Last Year's Money Went

Story County farmers spent $4,383 of state and $81,534 of federal money on approved conservation practices during the last year-and-a-half. The state cost-shared an average of 20 percent of actual construction costs in the 13 Story County projects funded.

The federal government picked up closer to 50 percent of the tab in the 105 Story County projects it funded. Some farmers received both state and federal funds, which amounted to 75 percent of construction costs in a few cases.

Here is a breakdown of how Story County farmers spent the 1973-74 cost-share money: Field tile -- $31,915; terraces -- $17,491; livestock pollution control -- $8,935; reservoirs -- $8,977; sediment and chemical runoff control systems -- $7,100; dams -- $3,003; wildlife food developments -- $2,271; conservation tillage -- $1,186; diversions -- $270; permanent seeding -- $146; windbreaks -- $140.

In the same period, Story County farmers also used $4,383 of state money to partially fund construction of 12,580 feet of parallel terraces.

About Cost Overruns

The county SCS technician should be called in for a second estimate when state or federally funded projects cost more than originally planned. Farmers receive cost-share money on approved projects by turning in construction bills to the state SCS and the federal ASCS. The SCS and ASCS then pay their share of those construction bills, or of the cost that was estimated before construction -- whichever is smaller. It is therefore very important to get an accurate estimate on project costs before construction begins.

Many farmers, however, experienced project cost overruns of up to 100 percent above the estimated cost of construction. The state will pick up its share of the extra expense when the cost overrun is due to legitimate, unexpected complications, like inflation of construction costs, Leon Foderberg of the SCS said. The federal RECP also provides for extra money to cover legitimate cost overruns, if extra funds are available, Bill White of the ASCS said.

Plan Now

Story County farmers who are planning SCS-approved conservation practices and structures may be eligible for cost-share funds. Construction contractors are liable to be swamped with job requests once the state and federal legislative bodies appropriate funds later this spring. Last year, the federal cost-share funds for Story County were not sufficient to cover all the requests, said Henrietta Huhn of the SCS in Nevada.

To avoid the rush, get together now with your local SCS people to discuss your conservation plans and talk about cost-sharing. Call the Soil Conservation District office at 382-2217, for more information.

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TOPIC 6 —

Information Sources

AGRICULTURE

ENVIRONMENT

Conservation Programs Seem Confusing?

If you're sometimes confused by environmental regulations and by trying to figure out who does what in the soil conservation program, you may have good reason. Federal funding programs, state funding programs, state environmental regulations, agencies for general or technical assistance, research, extension service, education, local officials--and much more--all fit into the maze shown on page 2. Actually, the maze deals mainly with conservation and does not show all the relationships involved in environmental regulation and certain other areas.

Some agencies do similar kinds of work, but at different levels. Some cooperate with each other. Others don't. Some things in the maze, especially the programs and personnel, change quite often. It's hard to learn where the money or information originally comes from and how it gets to you, and even harder to keep up with changes in the set-up.

If you know your district conservationist, county extension director, or five elected district commissioners, you can see on the chart where they fit in. If you don't know them, they are good people to get to know. We've listed them in the information directory included with this mailing.

A soil conservation district is the same as a county, except that there are 99 counties and 100 districts. (Pottawattamie has two.) These local people can give you a lot of good advice and assistance--probably all you'll need. But in case you do want to deal with others in the chart--at the state or federal level, for instance--we've also included them in the directory.

Who Does What?

Your questions may fall into several areas, including environmental regulation, technical assistance, and financial assistance. For someone on the "outside," it's not always entirely clear who is responsible for which area.

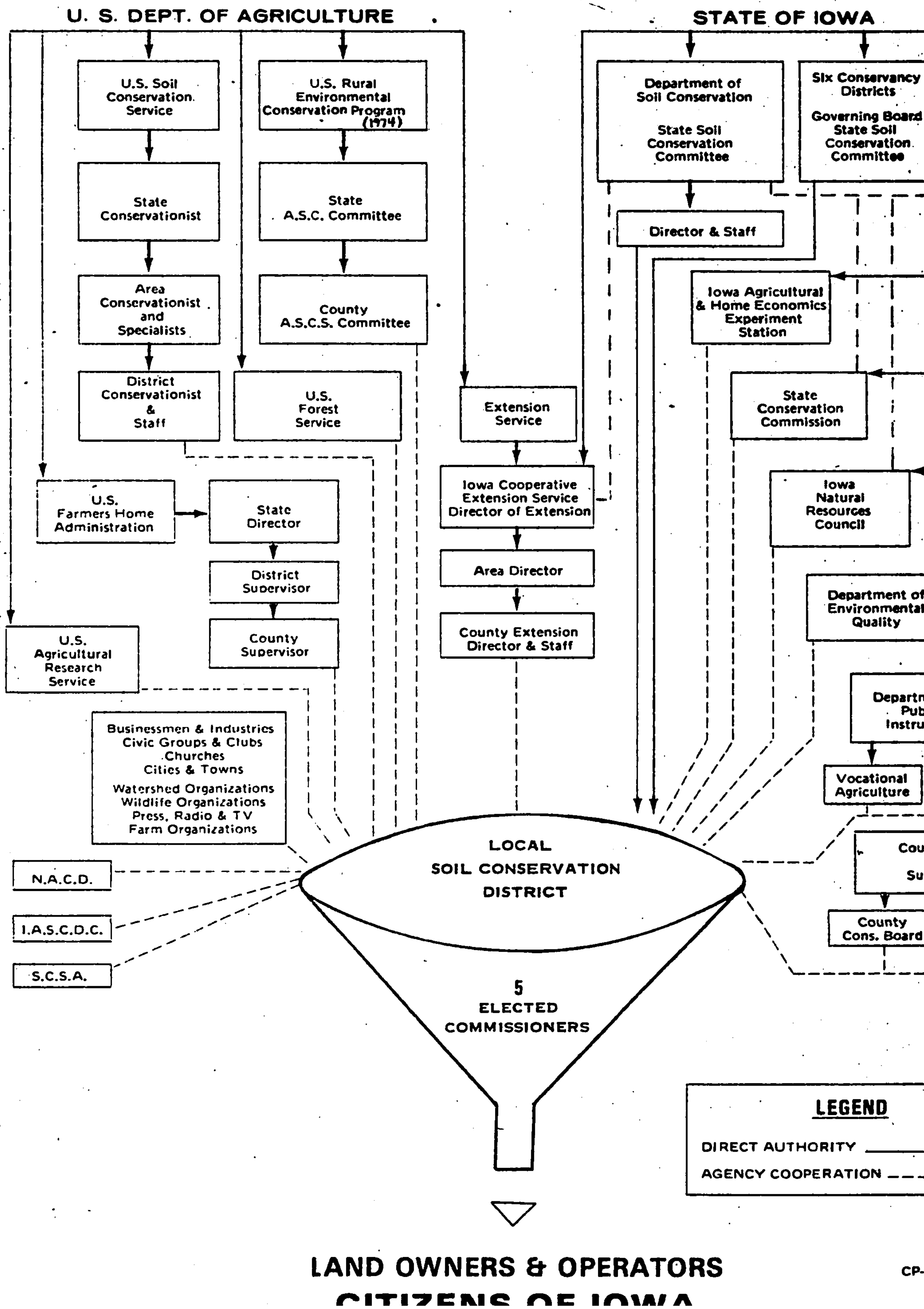
The Iowa Department of Soil Conservation and the Department of Environmental Quality are most involved with environmental regulations.

For technical assistance, the main agency is the U.S. Soil Conservation Service. The Department of Soil Conservation organizes and supervises district activities, and the Cooperative Extension Service serves educational needs.

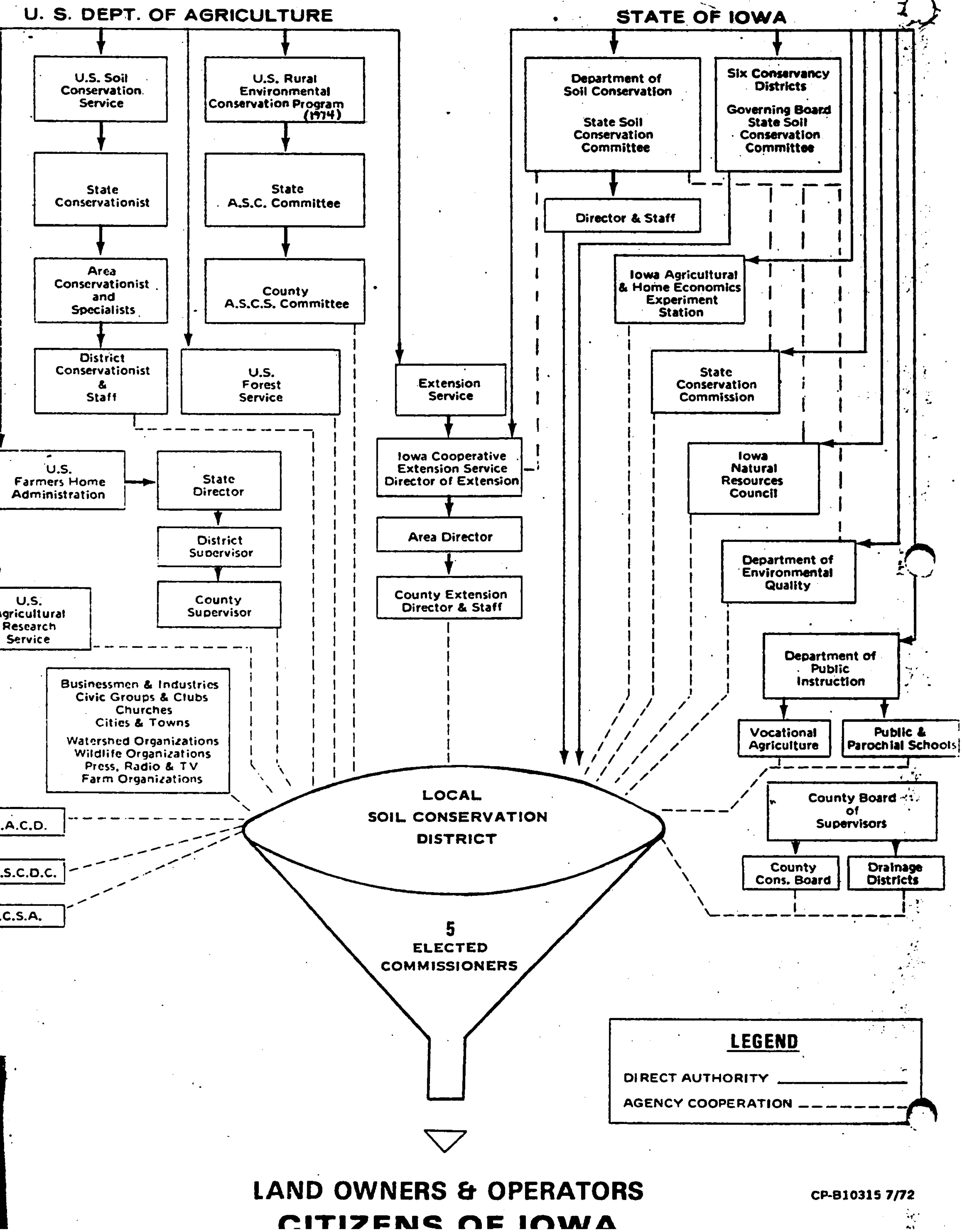
Local groups decide who will get conservation cost sharing funds. The county committee of the Agricultural Stabilization and Conservation Service is the federal funding agency. The district commissioners decide who gets the state money.

Cooperative Extension Service
IOWA STATE UNIVERSITY
June 1975 Ames, Iowa 50010

IOWA SOIL CONSERVATION DISTRICT PROGRAM



IOWA SOIL CONSERVATION DISTRICT PROGRAM



The information directory tells you who to contact in any of these agencies, at whatever level you choose. Although the operation of the system in the maze is much more complicated than we've indicated above, this information should help get you on the right track. And remember, your local SCS and Extension people can help you unravel things, if you have problems deciding which agency to contact.

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Information Directory

This information directory is designed to help you contact specialists at the federal, state, and local level if you would like assistance when dealing with agricultural, environmental, and conservation problems on your farm.

Names, addresses, and phone numbers are included for information resources under four headings -- *Federal Agencies, State Agencies, University Resources,* and *Local Resources*.

There is also a description of state, federal, and private publications which are available through the mails.

Finally, in the *Places to Visit* section, there are descriptions of research work underway at ISU experimental farms in your area. Again, there are listings of addresses of the research farms nearest you, and people to contact for more information.

Federal Agencies

U.S. Soil Conservation Service

Wilson T. Moon, state conservationist (and advisor to Iowa Soil Conservation Committee)
William Brune, deputy conservationist
Lynn Betts, information officer
Keith Glandon, area conservationist

U.S. Soil Conservation Service
823 Federal Bldg.
210 Walnut
Des Moines, Iowa 50309
515-284-4260

Agricultural Stabilization and Conservation Service

Dale Awtry, state executive director
Roy Fagen, program specialist

Agricultural Stabilization and Conservation Service
937 Federal Bldg.
210 Walnut
Des Moines, Iowa 50309
515-284-4210

U.S. Environmental Protection Agency

Region VII, U.S. Environmental Protection Agency
1735 Baltimore Street
Kansas City, Mossouri 64108

State Agencies

Iowa Department of Soil Conservation

William H. Greiner, director
Leon Foderberg, conservancy districts

Iowa Department of Soil Conservation
Grimes State Office Bldg.
Des Moines, Iowa 50319
515-281-5851

State Hygenic Laboratory

Robert Morris, director

State Hygienic Laboratory
University of Iowa
Iowa City, Iowa
319-353-5990

Iowa Conservation Commission

Larry Davis, superintendent of information and education
Donald Bonneau, fisheries
Steve Brenton, lake siltation
Everett Pierce, erosion control

Iowa Conservation Commission
300 Fourth Ave.
Des Moines, Iowa 50319
515-281-5971

Iowa Natural Resources Council

Othie McMurry, director
Charles D. Baker, administrative and information officer

Iowa Natural Resources Council
Grimes State Office Bldg.
East 14th and Grand Ave.
Des Moines, Iowa 50319

Iowa Department of Environmental Quality

Includes Commissions on Air Quality, Water Quality, Solid Waste Disposal, and Chemical Technology.

Joseph Obr, director, Water Quality Management Division
Ubbo Agena, chief, Agricultural Wastes Section (feedlot regulations, facilities, etc.)

Iowa Department of Environmental Quality
3920 Delaware Ave.
P.O. Box 3326
Des Moines, Iowa 50316
515-265-8134

University Resources

Iowa State University
Ames, Iowa 50010

SOIL CONSERVATION PRACTICES, CROPS AND SOILS, FERTILIZERS, ETC.

Min Amemiya or Regis Voss, extension agronomists
117 Agronomy Bldg.
515-294-1923

PEST CONTROL, PESTICIDES, ETC.

Harold Stockdale or Stephen Ryan, extension entomologists
103 Insectary Bldg.
515-294-6360

(University Resources, continued)

LIVESTOCK POLLUTION REGULATIONS

Stewart Melvin
203 Agricultural Engineering Bldg.
515-294-6360

ECONOMICS OF SOIL CONSERVATION

John Timmons
478F East Hall
515-294-2210

GENERAL ENVIRONMENTAL INFORMATION

Roger Bachmann, professor-in-charge, Zoology and Entomology
124 Science II
515-294-6148

Roger Landers, professor, or Craig Davis, assistant professor, Botany and Plant Pathology
Bessey Hall
515-294-3871, or -7252

James O'Toole, associate professor, veterinary pathology
121 ALRR
515-294-2500

Local Resources

Story County
Ph. 515-382-2217

DISTRICT COMMISSIONERS

Noble Partlow, R#2, Story City 50248 (chairman)
Harold Brinkman, 760 14th St. Place, Nevada
Jack Whaley, R#1, Nevada 50201
William Lounsbury, RR, Colo 50056
Leo Elliot, RR, Cambridge 50046

DISTRICT CONSERVATIONIST

Harold Godown
E. Hwy. 30
P.O. Box 97
Nevada 50201

COUNTY EXTENSION DIRECTOR

Jim Christy
437 K Ave.
Nevada 50201

EXTENSION AREA OFFICE

Thomas Robb, area extension director. Staff includes specialists in crop production, farm management, and livestock production.
Room 225
3839 Merle Hay Road
Des Moines 50310
515-276-4597

Publications

The Cooperative Extension Service puts out a wide range of materials, many of which have been available through the *Agriculture and the Environment* program. Your County Extension Director should also have a good selection of these pamphlets.

The Soil Conservation Service has similar materials. Examples are:
Assistance Available from the Soil Conservation Service, AIB345
Facts about Resource Conservation and Development, SCS-CI-14
Know Your Soil, AIB267
What is a Farm Conservation Plan? PA 629

The Iowa Department of Soil Conservation has some pamphlets, such as:
State Cost-Sharing for Soil Conservation in Iowa, PM 582
The Department also puts out a monthly publication called *Iowa Soil Conservationist.*

The Agriculture and Home Economics Experiment Station, ISU, Ames, has some materials of interest. The most recent is *Outlying Experimental Farms (May 1975).*

The Soil Conservation Society of America (7515 Northeast Ankeny Road, Ankeny, Iowa 50021) has an extensive library open to the public. Also, the Society publishes the *Journal of Soil and Water Conservation*, which contains a lot of articles pertinent to agriculture and the environment. Some of the past articles are listed below.

Erosion and Sediment Pollution Control, by R.P. Beasley (1972) is a book with much useful information on many of the topics covered in this communication program.

Environmental Series from Soil Conservation Society

Soil Conservation Society of America, 7515 Northeast Ankeny Road, Ankeny, Iowa 50021.

The Soil Conservation Society has compiled a list of manuscripts that have appeared in the *Journal of Soil and Water Conservation.* Each is related to matters of environmental concern. Reprints are available at $1.00 for each copy. Ten copies are available at $2.00, or one of all copies is $5.00.

Vol. 23 1968

A-102 *Impact of World Food Needs on American Agriculture.* Louis M. Thompson

A-104 *Agriculture's effect on Nitrate Pollution of Groundwater.* B.S. Stewart, F.G. Viets, Jr., and G.L. Hutchinson.

A-106 *Protecting Water Quality Before and After Clearcutting.* J.W. Hornbeck.

A-204 *Agricultural Potential of Latin America's Hot Humid Tropics.* Josė Vicente-Chandler.

A-402 *Technological Change and the Economics of Conservation.* Paul E. Rosenberry, Arthur B. Daugherty, and George A. Pavelis.
A-403 *A Forward Look at Soil Use.* George E. Kellogg.
A-405 *Sedimentation in the Nation's Reservoirs.* Farris E. Dendy.
A-408 *Urbanization's effect on Sediment Yield in New Jersey.* Peter W. Anderson and John E. McCall.
A-502 *Returning Wastes to the Land, A New Role for Agriculture.* Herman Bouwer.
A-503 *Air Pollution, Enemy of Man and His Environment.* John T. Middleton.

Vol. 24 1969
B-102 *Air-Land-Water--An Ecological Whole.* Eugene P. Odum.
B-103 *A Resource Economist Views a Natural Area.* Frederic O. Sargent.
B-201 *Wise Land Use -- An Editorial.* William E. Towell.
B-202 *Challenges to Creative Conservation.* Robert E. Dils.
B-203 *Managing Solid Wastes.* John H. Abrahams, Jr.
B-204 *Hydrogeologic Considerations in Liquid Waste Disposal.* S.M. Born
B-302 *What Price a Quality Environment.* Jack W. Carlson.
B-404 *Water Pollution in Remote Recreational Areas.* Michael A. Barton.
B-406 *Agriculture's Contribution to the Fertilization of Canal Lake* F.R. Campbell and L.R. Webber.
B-502 *Conserving Resources and Maintaining a Quality Environment.* Cecil H. Wadleigh and Clarence S. Britt.
B-503 *The Urbanite's interest in Rural Land Use Planning.* James D. Strange.

Vol. 25 1970
C-203 *Soil as an Animal Waste Disposal Medium.* William P. Martin.
C-205 *Ecological Implications of Riparian Vegetation Management.* C.J. Campbell.
C-402 *Man's Impact on the Biosphere.* Charles F. Cooper.
C-407 *Environmental Pollution From Highway De-icing compounds.* F.E. Hutchinson.
C-603 *Stream Sediment: An Environmental Problem.* Hzrold P. Gray and George E. Ferguson.
C-604 *The Environment Must Be Preserved.* Charles F. Jones.

Vol. 26 1971
D-102 *Managing Natural Resources Through Land Tenure Structures.* John F. Timmons and J.M. Cormack.
D-108 *Environmental Education for Preservice Teachers.* Eldon M. Drake.
D-202 *A Primer On Agricultural Pollution*--A series of 7 papers, D-203 to D-209, inclusive. This publication specially priced @ $1.50 each. Quantity price listings available, SCSA headquarters.

D-203 *Issues in Environmental Quality.* Charles P. Gratto.
D-204 *Animal Wastes.* L.R. Webber.
D-205 *Fertilizers.* Frank G. Viets, Jr.
D-206 *Irrigation Residues.* James P. Law and Jack L. Witherow.
D-207 *Pesticides.* Robert L. Metcalf.
D-208 *Sediment.* A.R. Robison.
D-209 *Summary.* Cecil H. Wadleigh.
D-211 *Environmental Turning Points in Time.* Norman Pearson.
D-309 *Water as a Consumer Commodity.* Roy Tinney and J. O'Riordan.
D-402 *Decision-Making in Common Property Resources.* Edwin T. Haefele.
D-403 *Land Use Planning by Foresight or Hindsight.* L.R. Wohletz and W.E. Wildman.
D-502 *Environmental Programs of the Future.* David D. Dominick.
D-503 *Myths in Wilderness Decision Making.* G.H. Stankey.
D-602 *Economic Implications of Soil Conservation.* Paul F. Rosenberry and W.C. Moldenhauer.
D-603 *Soil Conservation on Agricultural Land.* John M. Laflen and W.C. Moldenhauer.

Vol. 27 1972
E-102 *The World Food Situation.* Louis M. Thompson.
E-103 *The Council on Environmental Quality.* Richard N. L. Andrews.
E-108 *Harvesting Precipitation for a Dependable Economical Water Supply.* Merle Fairbourn, Frank Rauzi, and H.R. Gardner.
E-202 *An Agricultural View of the World Population Food Crisis.* G.C. Anderson.
E-207 *Soil Loss From Tile-Outlet Terraces.* J.M. Laflen, H.P. Johnson and R.C. Reeve.
E-303 *Agriculture and a Quality Environment.* A.P. Barnett.
E-304 *Use of Forest Attributes in Snow Pack Inventory-Prediction Relationships for Arizona Ponderosa Pine.* David B. Thorud and Peter F. Ffolliott.
E-309 *Hydrologic Model of a Wetland Forest.* Cortland E. Young, Jr., Ralph A. Klawitter and James E. Henderson.
E-310 *Sediment, Fish, and Habitat.* Jerry C. Ritchie.

From Iowa Department of Environmental Quality's Information and Education Resource Manual.

Places to Visit

ISU Field Research Center

Agronomy and Agricultural Engineering Field Research Center of Iowa State University, located six miles west of Ames, Iowa, on U.S. Highway 30.

The center consists of 426 acres and four major buildings specially selected and designed for research in forage crops, annual crops, soils and crop production, and agricultural engineering.

Major agronomy research activities include:

- Corn breeding and genetics
- Corn physiology and cultural practices
- Corn and soybean fertilization
- Soybean breeding and physiology
- Soybean root studies
- Small grain and sorghum breeding
- Forage production and fertilization
- Soil drainage
- Wind energy study

Major agricultural engineering research activities include:

- Tillage and crop planting
- Weed and insect control
- Corn and soybean damage
- Total corn plant harvesting
- Grain harvesting and drying
- Forage harvesting, drying
- Agricultural machinery development
- Weather station
- Tile drainage
- Wind-electric power generation

For more information, contact any of the ISU people listed elsewhere in this directory under agronomy or agricultural engineering. The farm superintendents are Raymond Nicholson (agronomy) and Robert Fish (agricultural engineering).

Experimental Farms

Outlying Experimental Farms of the ISU Agriculture and Home Economics Experiment Station -- field days, demonstration plots, and experimental facilities at these farms give you a chance to see research in action under conditions similar to those on your farm.

The farms nearest Story County are the 93-acre *Northern Iowa Farm* (at the edge of Kanawha in Hancock County) and the 80-acre *Clarion-Webster Farm* (one mile south of Kanawha). Activities include small grain and soybean breeding, fungicide and herbicide testing, studies in brown stem rot control, fertiliation of continuous and rotating systems, late planting, and others.

Field days: *Northern Iowa Farm* June 20, from 9:30 a.m. to noon.
Clarion-Webster Farm September 23, from 9:30 a.m. to noon.

Sy Angstrom is the farm manager. At ISU, H.L. Self or Floyd Ranson (20 Curtiss Hall, 515-294-4260) can give you more information.

...AND JUSTICE FOR ALL

Cooperative Extension Service, Iowa State University of Science and Technology and the United States Department of Agriculture cooperating. Marvin A. Anderson, director, Ames, Iowa. Distributed in furtherance of the Acts of Congress of May 8 and June

AGRICULTURE ENVIRONMENT

For More Information...

I would like additional information. Please send me the publications I have checked below.

____ Iowa Department of Environmental Quality Rules and Regulations for Confined Feeding Operations

____ Federal Environmental Protection Agency Fact Sheet on Agricultural Permits

____ Iowa's New Conservancy Districts and Soil Loss Limit Regulations

Name ____________________

Address ____________________

____

____ My name or address needs to be corrected on your mailing list.

Cooperative Extension Service, Iowa State University of Science and Technology and the United States Department of Agriculture cooperating. Marvin A. Anderson, director, Ames, Iowa. Distributed in furtherance of the Acts of Congress of May 8 and June 30, 1914.

Cooperative Extension Service
IOWA STATE UNIVERSITY
August 1974 Ames, Iowa 50010

For More Information...

I would like additional information. Please send me the publications I have checked below.

____ *Tillage Alternatives for Iowa*

____ *Estimating Farm Fuel Requirements for Crop Production and Livestock Operations.*

Name ________________________________

Address ________________________________

____

Cooperative Extension Service, Iowa State University of Science and Technology and the United States Department of Agriculture cooperating. Marvin A. Anderson, director, Ames, Iowa. Distributed in furtherance of the Acts of Congress of May 8 and June 30, 1914.

Cooperative Extension Service
IOWA STATE UNIVERSITY
February 1975 Ames, Iowa 50010

For More Information...

I would like additional information. Please send me the publications I have checked below.

____ *Farming Terraced Land*

____ *Grassed Waterways and Underground Outlets*

____ *The Alfalfa Weevil in Iowa*

Name ______________________________

Address ______________________________

____

Comments:

Cooperative Extension Service, Iowa State University of Science and Technology and the United States Department of Agriculture cooperating, Marvin A. Anderson, director, Ames, Iowa. Distributed in furtherance of the Acts of Congress of May 8 and June 30, 1914

Cooperative Extension Service
IOWA STATE UNIVERSITY
April, 1975 Ames, Iowa 50010

APPENDIX B: QUESTIONNAIRE

new T C

S 75

CONFIDENTIAL

Iowa State University

Research Project 2009

Hello, my name is _______________. I represent the Iowa State University Agricultural Experiment Station in Ames. You may remember that last year we interviewed you about farmers and conservation. You should have recently received a letter from Dr. Paul Yarbrough, Project Director, asking if we could conduct a much shorter interview with you again.

The interview will take less than 45 minutes. We'll be talking about some of the regulations that affect farmers and we'll find out a little about some of your farm-related activities since we last talked with you.

I'll be leaving a questionnaire with you also. We would like for you to complete the questionnaire and return it to us in the accompanying postage-paid envelope. I think you will find the questionnaire goes quickly; we are primarily interested in learning farmers' attitudes about conservation and environmental issues.

Before we begin the interview, we need to check to make sure you farm 80 acres or more (YES___; NO____) and take part in the major farm management decisions (YES____: NO____). (If "no" to either, terminate interview.)

Please remember, all information you give us on both questionnaires will be completely confidential. You will never be identified with any of the information you give us.

If it is convenient, I can interview you now. If not, may we set up an appointment for a time which is more convenient for you?

	DATE	TIME	RESULTS
1st call			
2nd call			

(CARD 1A) 1. Using one of the responses on CARD 1A, please tell me how important or unimportant a problem you consider soil erosion to be on <u>this</u> farm.

Very important problem (Ask 2) 5
Important problem (Ask 2) 4
Somewhat of a problem (Ask 2) 3
Unimportant problem (Ask 3) 2
Very unimportant problem (Ask 3) .. 1

<u>IF EROSION IS VERY IMPT., IMPORTANT, OR SOMEWHAT IMPORTANT</u>

(CARD 1B) 2. What type of erosion problems do you have on this farm? See Card 1B. (CHECK ALL THAT APPLY)

Gully erosion ____
Sheet erosion ____
Wind erosion ____
Other (specify) ________________________

3. Are you now a cooperator in your local Soil Conservation District?

Yes .....(Ask 5) 2
No ......(Ask 4) 1

<u>IF NOT A COOPERATOR</u>

4. Why didn't you join the soil conservation district program? (PROBE: didn't need it, no monetary incentive, they're too impractical, etc.)

____

____

(GO TO Q. 6)

<u>IF A COOPERATOR</u>

5. Why did you join the soil conservation district program? (PROBE)

____

____

____

6. Has a professional farm plan been worked out for this farm?

Yes .....(ask Q. 7) 2
No ......(ask Q. 9) 1

IF YES TO Q. 6

7. What do you think is the value of a farm plan--how has it helped you?

8. What are the disadvantages or shortcomings of your farm plan?

IF NO TO Q. 6

9. Why didn't you ever have a professional farm plan developed for this farm?

(CARD 1)

10. Would you please look over the practices and structures listed on CARD 1 and tell me which ones you are presently using and to what extent? (FILL IN RESPONSES FOR Q. 10 ON NEXT PAGE)

11. Still referring to the list on CARD 1, are there any of these practices or structures which you aren't using which you think it would be a good idea to use on this farm, given the land you have and the kind of operation you are running? Which ones, to what extent? (RECORD RESPONSES ON NEXT PAGE)

12. (IF A POSITIVE RESPONSE TO Q. 11) Are there any particular reasons why you haven't carried out these needed practices? (RECORD RESPONSES ON NEXT PAGE)

	Q 10. USING	Q11. NEEDED	Q. 12 REASON NOT USING
a. Terraces (acres served)			
b. Grassed waterways (acres served)			
c. Permanent cover (acres)			
d. Contour farming (acres)			
e. Permanent open drainage (acres served)			
f. Winter cover (acres served)			
g. Diversion terraces, ditches, or dikes (number)			
h. Sod-based rotations (acres)			
i. Erosion control dams, pits, or ponds (number)			
j. Underground tile drainage (acres served)			
k. Contour strip-cropping (acres)			

13'. Do you normally use a moldboard plow to prepare land for new crops?

Yes___(Ask Q. 15). . . . .

No___(Ask Q. 14) . . . .

(Card 2A) 14. Instead of a moldboard plow, what tillage practices do you use?

Please refer to Card 2A and tell me on how many acres did you use each tillage practice for 1973 crop year.

a. listing . . . .
b. ridge planting. . . . .
c. chisel planting . . . .
d. rotary tillage (or sidewinder). .
e. till planting . . . .
f. sweep tillage . . . .
g. disk. . . . .
h. slot planting (or No till or Zero
i. other (Specify)________________

____

15. As you know, the fall of 1972 and spring of 1973 were extremely wet in I this hindered field work. Did you change your tillage or planting pract during that period?

Yes___(Ask Q. 16). . . . .

No___(Ask Q. 18) . . . .

(IF YES TO Q. 15)

16. What practices did you use then that you hadn't normally used befor Use the responses on CARD .

a. listing . . . .
b. ridge planting. . . . .
c. chisel planting . . . .
d. rotary tillage (or sidewinder). .
e. till planting . . . .
f. sweep tillage . . . .
g. disk. . . . .
h. slot planting (or No till or Zero
i. other (Specify)________________

____

17. In general, would you say that you were definitely satisfied, somew somewhat dissatisfied, definitely dissatisfied with these practices

Definitely satisfied . . . .

Somewhat satisfied . . . .

Don't know . . . .

Somewhat dissatisfied. . . . .

Definitely dissatisfied. . . . . . .

Do you normally use a moldboard plow to prepare land for new crops?

Yes___(Ask Q. 15) 2

No___(Ask Q. 14) 1

Instead of a moldboard plow, what tillage practices do you use?

Please refer to Card 2A and tell me on how many acres did you use each tillage practice for 1973 crop year.

a. listing . . . . _____
b. ridge planting. . . . . _____
c. chisel planting . . . . _____
d. rotary tillage (or sidewinder). . . . . _____
e. till planting . . . . _____
f. sweep tillage . . . . _____
g. disk. . . . . _____
h. slot planting (or No till or Zero till) _____
i. other (Specify) _________________________

____

As you know, the fall of 1972 and spring of 1973 were extremely wet in Iowa; this hindered field work. Did you change your tillage or planting practices during that period?

Yes___(Ask Q. 16) . . . . _____

No___(Ask Q. 18) . . . . _____

(IF YES TO Q. 15)

16. What practices did you use then that you hadn't normally used before? Use the responses on CARD .

a. listing . . . . _____
b. ridge planting. . . . . _____
c. chisel planting . . . . _____
d. rotary tillage (or sidewinder). . . . . _____
e. till planting . . . . _____
f. sweep tillage . . . . _____
g. disk. . . . . _____
h. slot planting (or No till or Zero till) _____
i. other (Specify) _________________________

____

17. In general, would you say that you were definitely satisfied, somewhat satisfied, somewhat dissatisfied, definitely dissatisfied with these practices?

Definitely satisfied 5

Somewhat satisfied 4

Don't know 3

Somewhat dissatisfied. 2

Definitely dissatisfied. 1

18. In light of your planting and tillage experiences in the fall of '72 and spring of '73, did you change any of your tillage practices in either '74 or '75? What did you do?

Use some of the practices listed for Q. 14 and Q. 16 ____

Use mainly moldboard plowing ____

Other (specify) ________________ ____

Suppose the local Soil Conservation Service technician recommended that you should adopt certain erosion control practices on your farm.

19. He estimates that the practices would completely pay for themselves after 20 years. Considering your present situation, would you be more likely to adopt or to reject the recommended practices?

Adopt ____ (Ask Q22) 2

Reject ____(Ask Q20).................... 1

Don't know ____ (Ask Q20).............. 0

20. If the recommended practices would pay for themselves after 10 years, would you be more likely to adopt or to reject them?

Adopt ______ (Ask Q22)................. 2

Reject ______ (Ask Q21)................ 1

Don't know______ (Ask Q21)............ 0

21. What if the recommended erosion control practices would pay for themselves after 5 years. In this case, considering your present situation, would you be more likely to adopt or to reject the recommended practices?

Adopt______ 2

Reject______......................... 1

Don't know_______.................... 0

22. During the past 10 years, have you received any cost-sharing funds from the ACP, REAP, or RECP programs?

Yes (Ask 23) 2
No (Ask 26) 1
Don't Know (Ask 26) ..0

IF YES TO Q. 22

23. Do you recall how many different years you have participated in these cost-sharing conservation programs during the past 10 years?

______________ Years

24. During the past 10 years, about how much money altogether have you received from these cost-sharing conservation programs?

$____________

(CARD 2)

25. Referring to Card 2, please tell me for which of these practices or structures you have received any government funds during the past 10 years? (CHECK IF RECEIVED MONEY)

Within the past two or three years, there has been much discussion of the possibility of regulating practices that result in agricultural pollution. Both state and federal legislation has been passed. Some government agencies have established guidelines and regulations; others have proposed such rules.

26. So far as you know, what environmental regulations are in effect regarding agricultural pollution?

____

____

27. Have you heard about, or are you in any way familiar with the Iowa Conservancy Act passed by the 1971 Legislature?

Yes......................	2
No.......................	1
Not Sure.................	0

28. Are you familiar with the "Soil Loss Limit Regulations" set by the State of Iowa?

Yes......................	2
No.......................	1
Not Sure.................	0

IF YES TO EITHER Q. 27 OR 28

(CARD 3) 29. According to the "Soil Loss Limit Regulations" of the Iowa Conservancy Act, soil loss on agricultural lands cannot exceed what amount? (See CARD 3)

5 tons per acre, per year.........	1
15 tons per acre, per year.........	2
25 tons per acre, per year.........	3
50 tons per acre, per year.........	4
Don't know........................	5

(CARD 4) 30. If a complaint by another results in an administrative order issued to the landowner in violation, how much time does the Conservancy Act allow him to complete the erosion control practices? (SEE CARD 4)

6 months.................	1
12 months.................	2
2 years..................	3
5 years..................	4

(CARD 5) 31. Before an administrative order can be issued under the rules of the Iowa Conservancy Act, cost-sharing assistance must be given for what percent of the cost of the permanent conservation practices ordered? (SEE CARD 5)

None.....................	1
25 percent...............	2
50 percent...............	3
75 percent...............	4
100 percent...............	5
Don't know...............	6

(CARD 6)

32. If your land were being damaged by sediments from someone else's land, would you use the complaint procedure established by the Conservancy Act? Which category on Card 6 describes your probable action?

Definitely yes in most circumstances....	1
Yes, if the problem were moderately serious and he wouldn't cooperate otherwise............................	2
Yes, if the problem were extremely serious and he wouldn't cooperate otherwise............................	3
Probably not in most circumstances......	4
Definitely not in most circumstances....	5

33. Have you heard or read anything about guidelines or regulations which the U.S. Environmental Protection Agency (often called EPA) has created to regulate agricultural pollution?

Yes........	(Ask 34)..........	2
No..........	(Ask 35)..........	1
Not Sure....	(Ask 35)..........	0

IF YES TO QUESTION 33

34. What have you heard about EPA guidelines? (PROBE: As you understand them, what are the main provisions of EPA regulations?)

35. One recent action of EPA has been to propose a set of guidelines related to row cropping and soil management. Have you heard or read anything about these guidelines?

Yes............	(Ask 36)...........	2
No.............	(Ask 39)...........	1
Not Sure.......	(Ask 39)...........	0

IF YES TO QUESTION 35

36. As you understand them, what effect would the proposed EPA guidelines have on farmers around here?

___

___

___

(CARD 7) 37. How soon do you think these regulations might go into effect? Please refer to Card 7.

Already in effect.............	1
Within 6 months...............	2
Within a year.................	3
Longer than 5 years...........	4
Don't know....................	5

(CARD 8) 38. Compared to state regulations, how strict would the proposed federal (EPA) regulations be regarding rowcropping and soil management? Refer to Card 8.

Not as strict as state........	1
About the same as state.......	2
More strict than state........	3
Don't know....................	4

39. Both federal and Iowa governments have proposed regulations regarding pollution control in feedlot operations. As you understand it, which set of feedlot pollution regulations will be in effect for the coming year - state only, federal only, both, or neither?

State only...............	1
Federal only.............	2
Both state & federal.....	3
Neither..................	4
Don't know...............	5

(CARD 9) 40. In general, how strict are the proposed federal regulations on feedlots as compared with the state regulations? Please refer to the categories on Card 9.

Considerably less strict than state.....	1
About the same as state.................	2
Considerably more strict than state.....	3
Don't know..............................	4

41. The way both state and federal feedlot regulations apply to an individual farmer depends on the size of his livestock operation. Size is measured in terms of "animal units". An "animal unit" is equivalent to a 1000 pound beef animal, 1.4 mature dairy cows, 0.4 swine (over 55 pounds), or 0.1 sheep.

(CARD 10) Using the categories on Card 10, would you complete the following statement for me?

"If a farmer's livestock operation is ________ animal units or larger, he must apply for a federal permit and/or state registration."

(CARD 11) 42. If the farmer's operation is smaller than this level, what is the procedure? Please refer to Card 11.

No permit or registration required..	1
Depends on closeness to stream, discharge into lakes, etc.........	2
Must register with state officials, but not federal..................	3
Don't know........................	4

(CARD 12) 43. What is the cut-off point, below which no permit or registration is required? See Card 12.

500 animal units.........	1
100 animal units.........	2
25 animal units.........	3
No cut-off point.........	4
Don't know...............	5

44. Do you think state and federal regulations on farm pollution will have an effect on you personally?

Yes.................	2
No.	1
Don't know..........	0

(CARD 13) 45. In general, how concerned are you about the effects of environmental regulations on farming? Please refer to Card 13.

Not very concerned.......	1
Somewhat concerned.......	2
Very concernerd..........	3
Not sure.................	4

IF SOMEWHAT OR VERY CONCERNED, ASK: Could you tell me a little about the concerns you have about environmental regulations?

46. During the past 10 months, 5 issues of an information program concerning conservation and the environment has been mailed to some farmers in this county. The series was called "Agriculture and the Environment" and was from Min Amemyia of the Extension Service at ISU. Are you in any way familiar with, or have you heard anything about this?

No	1
Don't Know	2
Yes	3

47. Here's an example of the way one of the mailings looked, with examples of five of the 19 articles. Do you recall receiving anything similar to this? (SHOW MAILING ENVELOPE)

No	1
Don't Know	2
Yes	3

48\. In the first mailing, a notebook similar to this (they came in several colors), was mailed so the farmer could accumulate and file the 19 articles. Do you recall receiving anything like this? (SHOW COVER OF NOTEBOOK)

No 1

Don't Know 2

Yes 3

IF RESPONDENT INDICATES UNAWARENESS OF PROGRAM (No or Don't Know) ON ALL THREE ABOVE QUESTIONS (46-48), GO TO Q. 58.

IF RESPONDENT INDICATES AWARENESS ONLY OF THE PROGRAM (Yes to Q. 46, but No or Don't Know to Q. 47 and 48), ASK QUESTION BELOW, THEN GO TO Q. 58.

How did you learn about the information program "Agriculture and the Environment"?

____

____

____

49\. Approximately how many of the 19 articles have you kept--all, about three-fourths, about half, about one-fourth, or none?

None .... 0 (GO TO Q. 51)
About one-fourth ... 1
About half 2
About three-fourths 3
All 4

50\. Did you use the notebook to assemble the separate articles?

No .... 1 (GO TO Q.52)
Yes 2

51. The notebook and dividers, not including the articles, cost about $1.00.
(CARD 14) Did you find this notebook useful enough to recommend that it be used again if the information program is made available to other Iowa farmers? Please refer to Card 14.

Definitely should 1
Probably should 2
Don't know 3
Probably should not 4
Definitely should not 5

52. In all, the 5 mailings of the information program included 19 articles. And as we have mentioned, a notebook was provided to accumulate these articles. Here's a copy of the completed notebook. We would like to
(CARD 15) go through the noteboook and determine for each article whether or not you recall having received it, and, if so, the degree of attention you gave to it. You can use the response categories on CARD 15.

Let's consider article # 1, "Pesticides, Pollution, and the Food Production Push." Which statement on card 15 best describes the attention you gave this article? RECORD ANSWER FOR FIRST ARTICLE AND THEN ASK FOR EACH OF THE REMAINING 18 ARTICLES, THUMBING THROUGH AND ALLOWING RESPONDENT TO BRIEFLY REVIEW EACH ARTICLE BEFORE RESPONDING.

	ARTICLE	Don't remember seeing this article.	Only briefly glanced at it.	Skimmed most, read r	Skimmed mc
#1	Pesticides, Pollution, and the Food Production Push	0	1	2	3
#2	Soil Erosion Costs Money--On and Off the Farm	0	1	2	3
#3	Conservation Views: Farmers and Conservation Specialists	0	1	2	3
#4	Landowners Cooperate in Watershed Development	0	1	2	3
#5	Communities Cooperate in RC&D Projects	0	1	2	3
#6	Who Pollutes	0	1	2	3
#7	Soil Loss Regulations	0	1	2	3
#8	Livestock & Pollution; Your Legal Duties	0	1	2	3
#9	New Pesticide Regulations--Some Duties; Some Help	0	1	2	3
#10	Concerned About Pesticide Safety?	0	1	2	3
#11	'75 Fertilizer Outlook--What's New/What You Can Do	0	1	2	3
#12	Changes in Corn Rootworm Treatment	0	1	2	3
#13	Minimum Tillage: Conservation Plus	0	1	2	3
#14	Problem-Solving With Grassed Waterways	0	1	2	3
#15	Terraces Protect the Land, Protect Farming Investments	0	1	2	3
#16	Conservation Cost-sharing	0	1	2	3
#17	Old Funds About Gone--New Monies Debated	0	1	2	3
#18	Conservation Programs Seem Confusing?	0	1	2	3
#19	Information Directory	0	1	2	3

[ARTI]CLE	Don't remember seeing this article.	Only briefly glanced at it.	Skimmed most, read none thoroughly.	Skimmed most, read some thoroughly	Read most parts thoroughly
Pesticides, Pollution, and the Food Production Push	0	1	2	3	4
Soil Erosion Costs Money--On and Off the Farm	0	1	2	3	4
Conservation Views: Farmers and Conservation Specialists	0	1	2	3	4
Landowners Cooperate in Watershed Development	0	1	2	3	4
Communities Cooperate in RC&D Projects	0	1	2	3	4
Who Pollutes	0	1	2	3	4
Soil Loss Regulations	0	1	2	3	4
Livestock & Pollution; Your Legal Duties	0	1	2	3	4
New Pesticide Regulations--Some Duties; Some Help	0	1	2	3	4
Concerned About Pesticide Safety?	0	1	2	3	4
'75 Fertilizer Outlook--What's New/What You Can Do	0	1	2	3	4
Changes in Corn Rootworm Treatment	0	1	2	3	4
Minimum Tillage: Conservation Plus	0	1	2	3	4
Problem-Solving With Grassed Waterways	0	1	2	3	4
Terraces Protect the Land, Protect Farming Investments	0	1	2	3	4
Conservation Cost-sharing	0	1	2	3	4
Old Funds About Gone--New Monies Debated	0	1	2	3	4
Conservation Programs Seem Confusing?	0	1	2	3	4
Information Directory	0	1	2	3	4

53. Did you talk with anyone, or did anyone talk with you about this "Agriculture and the Environment" information series? Your conversations may have been either in person or by telephone, and might have included someone in your immediate family, another relative, friends, business associates, or a county, district, or state official.

No .... (GO TO Q. 54). 1
Yes 2

Who are the persons you talked with about the information program? (RECORD NAME AND/OR RELATION BELOW). PROBE: Did you talk with anyone else? (RECORD NAMES AND/OR RELATION BELOW).

FOR EACH NAME WITHOUT SPECIFIED RELATION, ASK: What is ___(name's)___ relation to you? (CIRCLE APPROPRIATE CATEGORY BELOW)

We would like to know something about the nature of this conversation with ____(name)______--the first conversation you mentioned. (ASK SPECIFIC QUESTIONS FOR #1 CONVERSATION PARTNER).

#1 CONVERSATION PARTNER: Name, if volunteered ______________________

RELATION: Immediate Family | Other Relative | Neighbor, Friend | Business Associate | Official

Who initiated conversation? SELF OTHER DON'T KNOW

As you recall, what did you say to _(name or relation)______?

____

____

What did he (she) say to you?

____

____

What conclusions, if any, did you reach?

____

____

#2 CONVERSATION PARTNER: Name, if volunteered ______________________

RELATION: Immediate Family | Other Relative | Neighbor, Friend | Business Associate | Official

#3 CONVERSATION PARTNER: Name, if volunteered ______________________

RELATION: Immediate Family | Other Relative | Neighbor, Friend | Business Associate | Official

As we mentioned in our initial letter to you, the "Agriculture and the Environment" program was experimental. We have sent information to you and approximately 200 other farmers in Story, Union, and Woodbury counties. We would like your candid evaluation of our effort.

55. First, what changes, if any, should we make if we were to offer an information program to all farmers in Iowa? This might include things like the timing of the program--when and how frequently we send the mailings; maybe you think we should forget some topics or provide information on some we didn't cover; maybe the way the information is presented--too difficult to understand, too abstract, too dull--is a problem. Maybe you find some (maybe even all) the information downright useless. What are your recommendations to the University communicators?

____

____

____

____

56. What aspects of the program would you recommend that we keep pretty much the way they are now presented? In other words, what do you especially like about the program?

____

____

____

____

(CARD 16) 57. We estimate that on a mass-produced basis, an information program such as the current one on agriculture and the environment costs about $4 to $5 per farmer to prepare and distribute. Taking this cost into consideration, and the usefulness of the program to you, do you think the University--definitely should, probably should, probably should not, or definitely should not--offer a similar program to other Iowa farmers? Please refer to CARD 16.

Definitely should 5
Probably should 4
Don't Know 3
Probably should not 2
Definitely should not ... 1

58. In your opinion, if such a program were to be made available to Iowa farmers, should it be offered as a part of the regular University Extension program with no charge to those who participate, should farmers who participate and the University share in the cost of materials, or should participating farmers pay the entire cost ($4 to $5) of preparing and distributing the materials?

Offer at no charge to farmers	___
Share cost between farmers and University ...	___
Participating farmers should pay entire cost	___
Don't know	___

59. A continuing problem for those involved in planning University Extension programs is deciding which information should be conveyed through mass communication techniques such as the "Agriculture and the Environment," radio and television shows, or magazine and newspaper articles.

They must also decide which information should be offered through personal contact between the University specialist and farmers--such as meetings, short courses, and field days.

For both the educator and the farmer there are potential advantages and disadvantages to each approach. The mass communication approaches have the advantage (usually) of providing a relatively permanent record, the farmer can pursue them at his leisure, and, in the case of publications, quite detailed information can be provided and indexed for specific problem solution. Another advantage of mass communication is that it is cheaper for both the University and the farmer. A primary disadvantage of the mass communication techniques is the lack of "feedback" from the farmer to the University specialist. You can't ask questions; you can't get the specialist to focus on specific problems of concern to you. Personal contact excells in this feedback function. Communication can become two-way and focused. However, if you go to a meeting, you have to pay for your travel costs, and you may spend more time acquiring the same amount of information.

(CARD 17) Considering advantages and disadvantages such as these, which of the communication program alternatives listed on CARD 17 do you think should be used by the University to convey information about agriculture and the environment to Iowa farmers?

A. Provide the information primarily through a mass communication program like the "Agriculture and the Environment" series.

B. Provide most of the information through mass communication devices, but provide some opportunity for personal contact with the specialist (such as a toll-free telephone number to call, a local meeting with the specialist during the course of the program).

C. Provide the information primarily through personal contact channels such as meetings, field days, and short courses, but provide plenty of printed materials to take home for future reference.

D. Provide the information primarily through personal contact only.

E. Don't know

IF "C" OR "D" TO Q. 59, ASK Q. 60

60. Why do you prefer personal contact channels?

____

____

____

INTERVIEWER: GO TO P. 19

We now have just a few questions on some of your farm-related activities. First, I'd like to know what specialized farm magazines you usually read? That is, such things as:

61. National Hog Farmer____; Beef Magazine____; The Soybean Farmer; Crops and Soils____; Hog Farm Management____; Feed & Nutrition Review____.

(OTHERS, WRITE IN:)

(CARD 18) 62. Using the categories listed on CARD 18, please estimate how thoroughly you read these specialized farm magazines?

a. Hardly look at 1
b. Skim through, read few things .. 2
c. Read about ½ 3
d. Read about 3/4 4
e. Read cover-to-cover 5

63. Which, if any, publications do you receive from farm organizations or cooperatives? That is, such things as:

Iowa Farm Bureau Spokesman ____; Rural Electric Cooperative Magazine ____;

Nation's Agriculture (Nat. Farm Bureau) ____; Farmer's Union Herald ____.

(OTHERS, WRITE IN:)

(CARD 18) 64. Again, using the categories listed on CARD 18, please estimate how throughly you read these publications from farm organizations and cooperatives?

a. Hardly look at 1
b. Skim through, read few things .. 2
c. Read about ½ 3
d. Read about 3/4 4
e. Read cover-to-cover 5

65. Which, if any, publications do you receive from commercial farm supply or equipment companies? That is, such things as:

The Furrow ____; Ford Farming ____; Farm Profit ____; (OTHERS, WRITE IN:)

66. Using CARD 18 again, please estimate how thoroughly you read these publications from commercial farm companies.
(CARD 18)

a. Hardly look at 1
b. Skim through, read few things .. 2
c. Read about 1/2 3
d. Read about 3/4 4
e. Read cover-to-cover 5

67. Which, if any, of the activities listed on CARD 19 have you done during the past year?
(CARD 19)

	YES	NO	NUMBER
a. Attended a meeting at which County Ext. Director presented information	1	0	____
b. Attended a meeting at which State or Area Extension Specialists presented information	1	0	____
c. Received a bulletin or other publication from County Extension office	1	0	____
d. Visited or talked with a member of County Extension staff	1	0	____

a) About how many times did you do each of these things during the past year? (RECORD NUMBER ABOVE)

68. During the past year, did you attend any short courses, clinics, or agricultural conferences sponsored by the Extension Service or a commercial firm?

Yes ____ 2

No ____ 1

69. During the past year, did you travel to any other farm to look at a new practice or piece of equipment which you were considering trying out yourself?

Yes ____ 2

No ____ 1

69. Using the responses on CARD 20A,how well do you know these county personnel?

(CARD 20A)

	Don't know who he is	Know who he is, but haven't met	Have met only briefly	Have met & talked
A. SCS District Conservationist				
B. County Extension Director				
C. Any of your five elected soil conservation district commissioners				

70. Are you or have you ever been a member of the farm organizations listed on Card 20B?
(CARD 20B)

Yes (Ask a-d) 2
No (Ask Q. 71) 1

a. Which ones are you presently a member of?

b. Do you attend meetings regularly (say, 2 or 3 out of 4)?

c. Which organizations were you a member of in the past but not now?

d. In which, if any, of these organizations have you ever held an an office or served on committees?

	a. Present	b. Mtg. attend.	c. Past	d. Office/ Committee
Farm Bureau				
NFO				
Grange				
Farmer's Union				
ASCS Committee				
Soil Conservation Board				
Cooperative Board				
Commodity Association				

71. Besides farm organizations, to how many formal organizations do you presently belong? (such things as church, service organizations,lodge.)

____

72. Using CARD 20C, please estimate how many times you have served on any local or county agencies or committees such as the school board, hospital board, Extension Council, welfare board, civic fund-raising committees, etc.

(CARD 20C)

a. Never 1
b. 1 or 2 times 2
c. 3 or 4 times 3
d. 5 or more times 4

73. Which of the income categories listed on CARD 20 best estimates your average gross income from the sale of farm products during the past 3 years--that is, 1972, '73, and '74.

(CARD 20)

74. Which of the income categories best estimates your average net income from your farming operation during the past three years? (Before taxes, after subtracting production expenses.)

	Q. 52 (Gross)	Q. 53 (Net)
a. Under 2,500		
b. 2,500-4,999		
c. 5,000-7,499		
d. 7,500-9,999		
e. 10,000-14,999		
f. 15,000-19,999		
g. 20,000-29,999		
h. 30,000-39,999		
i. 40,000 & over		

75. Compared to your net farm income 10 years ago, are you now making more money, less money, or about the same?

More (Ask a) 3
Less (Ask b) 2
Same (Ask Q. 76) 1
No answer 0

76. Would you consider your farming operation during the past year or two to have been successful?

Yes (Ask Q. 77) 2
No (Ask Q. 78) 1
Not sure (Ask Q. 78) 0

77. Referring to CARD 21 , what factor do you feel made the biggest difference in the success of your farming operation during this period?
(CARD 21)

a. Expert technical advice .... ____

b. Funding assistance .... ____

c. Improved equipment .... ____

d. Grain exports .... ____

e. Administration agricultural policies ____

f. Changes in farm operation (specify) . ____

____

g. Other (specify) .... ____

_______________________________.

78. What year were you born? .... ________

79. How many years of formal education have you completed? (CIRCLE)

5 6 7 8 13 14 15 16
1 2 3 4 9 10 11 12 17 18 19 20

IF MORE THAN 12 YEARS EDUCATION

80. What type of education did you have beyond high school?

a. Technical (Ask b) 1
University or College (Ask c) . 2

b. What type of technical course?

____

c. Major subject? ________________

THANK YOU VERY MUCH!

INTERVIEWER: INTRODUCE QUESTIONNAIRE TO BE LEFT WITH RESPONDENT. STRESS POINTS MENTIONED ON COVER OF SCHEDULE. ARRANGE A RETURN MAIL DATE & RECORD ON COVER SHEET.

TO BE FILLED IN BY INTERVIEWER IMMEDIATELY AFTER INTERVIEW:

NAME OF RESPONDENT ______________________________

ADDRESS OF RESPONDENT ______________________________

____

PHONE NUMBER OF RESPONDENT ______________________________

AGREED RETURN DATE FOR PART 2 OF INTERVIEW ____________

TIME PERSONAL INTERVIEW BEGAN: ________ ; TIME ENDED ______ ;

ELAPSED TIME OF INTERVIEW: ________ .

COOPERATIVENESS OF RESPONDENT: ______________________

INTERVIEWER SIGNATURE ____________________ DATE _________.

COUNTY #______________ #__________

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CONFIDENTIAL

Iowa State University

Research Project 2009

Respondent Name ________________ Respondent Address ______________

____

This is the second part of the interview being conducted with you by the Agricultural Experiment Station at Iowa State University. As with the personal interview we conducted, all information will be kept strictly confidential.

Included in this section are some brief questions about your farming operation itself and about farming practices. The bulk of the questionnaire deals with your attitudes about farming, conservation, and sometimes just life in general.

For the most part, the questions are structured so that you can just circle or check the answers you select. In a few cases, we have asked you to list figures or to discuss questions on lines provided for you. Each question contains directions on the correct way to respond. The questionnaire goes quickly.

It is very important that only you, the selected respondent, answer these questions; we need to be assured that the same person who answered our personal interview is the same one responding to these questions. Also, the questionnaire will go more quickly for you if you complete it alone, without consulting with others.

Please return this questionnaire in the envelope provided; it should be mailed on or before June ______. Please answer all the questions as best you can; if you want to make additional comments on the back or on a separate page, we would welcome hearing from you.

If you have questions about completing or returning the questionnaire, you may place a collect call to Barb Warning or Dr. Paul Yarbrough at Iowa State University; their number is 515-294-4340.

Thank you very much for your time and cooperation.

PLEASE RETURN TO: Dr. Paul Yarbrough, 124 Press Building, Iowa State University, Ames, Iowa 50010.

First we would like some information about your farm operation and plans for the future.

1. Excluding woodlands, ditches, and lanes, how many acres are you farming in 1975? PLEASE WRITE NUMBER OF ACRES IN THE BLANK:

____

2. Has the size of your operating unit increased, decreased, or stayed the same during the past 5 years? PLEASE CHECK ONE:

2 ____ INCREASED

1 ____ DECREASED

0 ____ SAME

FOR Q. 3 THROUGH 5, WRITE NUMBER OF ACRES IN THE BLANKS:

3. Of the total acres you are farming in 1975, how many do you own? ____________

4. How many acres are you renting in 1975? . . . . ____________

5. How many acres, if any, do you operate as a hired manager? . . . ____________

6. Approximately how many acres do you have in each category listed below for 1975? PLEASE WRITE NUMBER OF ACRES IN THE BLANKS:

a. Corn . . . . ____________

b. Soybeans . . . . ____________

c. Oats . . . . ____________

d. Wheat . . . . ____________

e. Other small grains . . . . . . ____________

f. All hayland . . . . ____________

g. Permanent pasture . . . . . . ____________

h. Soil bank, feed grain, or other government programs . . ____________

7. How many of each of the types of livestock listed below do you have on hand now? PLEASE WRITE NUMBER OF HEAD IN THE BLANKS:

a. Feeder cattle . . . . ______________

b. Breeding stock (cow-calf) . . ______________

c. Dairy cows-heifers . . . . . ______________

d. Brood sows . . . . ______________

e. Market hogs . . . . ______________

f. Feeder pigs . . . . ______________

g. Chickens . . . . ______________

h. Turkeys . . . . ______________

i. Sheep and lambs . . . . ______________

8. Choosing from the responses below, what are the chances that you will be operating this farm 5 years from now? PLEASE CHECK ONE:

5 ____ FEEL POSITIVE I WILL BE FARMING HERE

4 ____ FEEL FAIRLY CERTAIN I WILL BE FARMING HERE

3 ____ FEEL UNCERTAIN ABOUT WHETHER OR NOT I WILL BE FARMING HERE

2 ____ FEEL THAT I MAY NOT BE FARMING HERE

1 ____ FEEL CERTAIN THAT I WON'T BE FARMING HERE

9. Do you plan to increase or decrease the number of acres you farm during the next 3 years? PLEASE CHECK ONE:

2 ____ INCREASE

1 ____ DECREASE

0 ____ REMAIN THE SAME

OWNERS AND PART-OWNERS ONLY ANSWER Q. 10.

10. What do you plan to do with this farm when you quit farming? PLEASE CHECK ONE:

4 ____ RENT IT OUT

3 ____ SELL

2 ____ LEAVE AS AN ESTATE

1 ____ SELL TO RELATIVE

0 ____ OTHER

TENANTS AND PART-TENANTS ONLY ANSWER Q. 11 - 14.

11. What type of rental arrangements(s) do you have? PLEASE CHECK AS MANY AS APPLY:

4 ____ CASH

3 ____ CASH, CROP SHARE

2 ____ CROP SHARE

1 ____ CROP-LIVESTOCK SHARE

0 ____ OTHER (PLEASE LIST:) ____________________

12. What is the length of your present lease(s)? PLEASE LIST YEARS IN BLANK:

____

13. Does your rental arrangement provide for sharing the costs of erosion control practices? PLEASE CHECK ONE:

2 ____ YES

1 ____ NO

14. Do you intend to change your rental arrangements in the next 3 years? PLEASE CHECK ONE:

2 ____ YES

1 ____ NO

IF "YES," PLEASE EXPLAIN: ____________________________

____

15. Following is a list of statements about farming and life in general. We ar interested in your opinion on each of these statements - to what extent you agree or disagree with each one. There are no right and wrong answers; the best answers are the ones that reflect your feelings about each statement.

After each statement is a set of responses: STRONGLY AGREE, AGREE, DON'T KNOW, DISAGREE, and STRONGLY DISAGREE. You may choose from these responses to indicate your opinion on each statement. BESIDE EACH STATEMENT, PLEASE CIRCLE THE RESPONSE WHICH BEST DESCRIBES YOUR FEELING ABOUT THAT STATEMENT. PLEASE CIRCLE ONE RESPONSE FOR EACH STATEMENT.

a. There are so many unpredictables in farming that a farmer wastes his time planning for the future..............	STRONGLY AGREE	AGREE	DON'T KNOW	DISAG
b. It is very important to consider different ways of doing a job before deciding which one to use............	STRONGLY AGREE	AGREE	DON'T KNOW	DISAG
c. When replacing a piece of equipment a farmer is smart to just get the same thing again since he know it works....	STRONGLY AGREE	AGREE	DON'T KNOW	DISAG
d. It is better to live pretty much for today and let tomorrow take care of itself................................	STRONGLY AGREE	AGREE	DON'T KNOW	DISAG
e. When faced with a farm management decision, the smart farmer only considers those choices which will pay-off within a year or so.........................	STRONGLY AGREE	AGREE	DON'T KNOW	DISAG
f. I really enjoy learning about new farming practices and technologies even if I can't use them right away...........	STRONGLY AGREE	AGREE	DON'T KNOW	DISAG
g. Farmers really don't have to think a great deal about what they are going to do on their farms since this is largely decided for them by their land and the practices generally followed in the neighborhood..........	STRONGLY AGREE	AGREE	DON'T KNOW	DISAG
h. I really admire a person who picks out one goal and concentrates on accomplishing it.............................	STRONGLY AGREE	AGREE	DON'T KNOW	DISAG
i. If I thought I could make a better income in a non-farm job I would take it	STRONGLY AGREE	AGREE	DON'T KNOW	DISAG
j. With the rapid changes in the agricultural situation, setting long range goals is hardly worth the effort.....	STRONGLY AGREE	AGREE	DON'T KNOW	DISAG

owing is a list of statements about farming and life in general. We are rested in your opinion on each of these statements -- to what extent you e or disagree with each one. There are no right and wrong answers; the answers are the ones that reflect your feelings about each statement.

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en replacing a piece of equipment a rmer is smart to just get the same ing again since he know it works....	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGLY DISAGREE
is better to live pretty much for day and let tomorrow take care of self.............................	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGLY DISAGREE
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rmers really don't have to think a eat deal about what they are going do on their farms since this is rgely decided for them by their nd and the practices generally llowed in the neighborhood.........	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGLY DISAGREE
really admire a person who picks out e goal and concentrates on accomplish- g it...........................	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGLY DISAGREE
I thought I could make a better in- me in a non-farm job I would take it	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGLY DISAGREE
ith the rapid changes in the agri- ultural situation, setting long range oals is hardly worth the effort.....	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGLY DISAGREE

k.	The best approach to farm management is to take each season as it comes...	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGLY DISAGREE
l.	The best time to find out about new equipment is when you have to replace it..................................	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGLY DISAGREE
m.	Usually when a farmer has a problem, a specialist or extension agent just confuses the issue by suggesting too many possible things to do................	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGLY DISAGREE
n.	The only important consideration about a new pesticide is its effectiveness.	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGLY DISAGREE
o.	A farmer should continuously seek information about new farm developments even if he isn't sure he can use it at the moment............................	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGLY DISAGRE
p.	Generally, extension clinics and short courses are only worth while when they deal with a problem which a farmer has on his farm.........................	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGL DISAGRE
q.	The only important consideration about a new farm practice is whether it will make money.........................	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGL DISAGRE
r.	In making farm decisions it's a good idea to consider advice gotten from many people and different sources....	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGL DISAGRE
s.	I'm really only interested in new ways of doing things when the old ways aren't working well.........................	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGL DISAGRE
t.	Much of the information sent out by Iowa State is just too complicated to be of much use to the farmer.........	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGL DISAGRE
u.	As long as a new practice is economical, a farmer needn't worry much about how or why it works..................	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGL DISAGRE
v.	A farmer should give serious consideration to any useful new practices even if adopting them might require other changes in his operation............	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGI DISAGRE
w.	Although scientific research is necessary, a farmer doesn't need to understand research results to make good management decisions.............	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGI DISAGRI

x. There are so many desirable things about farming that I really don't mind if I make a somewhat lower income than I would in a non-farm job........... STRONGLY AGREE AGREE DON'T KNOW DISAG

16. We want to learn a little about how farmers evaluate their farms. Pretend you were going to buy this farm, had looked over the land and buildings, an had seen the records. What things would impress you most about the farm an land? What disadvantages would you notice? PLEASE DISCUSS:

____

____

____

17. In recent years the federal government has made numerous policy changes whic have affected farmers. How do you rate the over-all performance of federal agencies and departments which determine and/or enforce agricultural policie excellent, good, fair, poor, or very poor? PLEASE CHECK ONE:

5 ____ EXCELLENT

4 ____ GOOD

3 ____ FAIR

2 ____ POOR

1 ____ VERY POOR

18. There has been much written and said about the problems of pollution and environmental quality during the past few years. What are your general reactions to all this talk? Have the problems been overly exaggerated, have some reasonable points been made.....? PLEASE DISCUSS:

____

____

____

e so many desirable things
rming that I really don't mind
e a somewhat lower income than
in a non-farm job...........

STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGLY DISAGREE

earn a little about how farmers evaluate their farms. Pretend
ng to buy this farm, had looked over the land and buildings, and
records. What things would impress you most about the farm and
disadvantages would you notice? PLEASE DISCUSS:

____

____

____

ars the federal government has made numerous policy changes which
d farmers. How do you rate the over-all performance of federal
departments which determine and/or enforce agricultural policies -
ood, fair, poor, or very poor? PLEASE CHECK ONE:

5 ____ EXCELLENT

4 ____ GOOD

3 ____ FAIR

2 ____ POOR

1 ____ VERY POOR

en much written and said about the problems of pollution and
quality during the past few years. What are your general
all this talk? Have the problems been overly exaggerated,
asonable points been made.....? PLEASE DISCUSS:

____

____

____

19. There has been some recent activity in Iowa about pollution control. For example, the Legislature has created an Iowa Department of Environmental Quality. Do you think Iowa, since it is an agricultural state, really needs to do very much about pollution and environmental quality, or not? PLEASE DISCUSS:

____

____

____

20. Using one of the responses below, please tell me how important or unimportant a problem you consider soil erosion to be on <u>this</u> farm. PLEASE CHECK ONE:

5 ____ VERY IMPORTANT PROBLEM

4 ____ IMPORTANT PROBLEM

3 ____ SOMEWHAT OF A PROBLEM

2 ____ UNIMPORTANT PROBLEM

1 ____ VERY UNIMPORTANT PROBLEM

<u>IF YOU FEEL EROSION IS VERY IMPORTANT, IMPORTANT, OR SOMEWHAT IMPORTANT, ANSWER QUESTION 20A:</u>

20A. What type of erosion problems do you have on this farm? CHECK ALL THAT APPLY:

____ GULLY EROSION

____ SHEET EROSION

____ WIND EROSION

____ OTHER (PLEASE LIST)

<u>PLEASE CHECK "YES" OR "NO" FOR PARTS a, b, c, and d of QUESTION 21.</u>

21. In either 1974 or 1975 did you:

a. plant continuous corn on any part of your farm?

2 ____ YES

1 ____ NO

b. fall plow land that had been in corn?

2 ____ YES

1 ____ NO

c. fall plow land that had been in soybeans?

2 ____ YES

1 ____ NO

d. turn under any green manure?

2 ____ YES

1 ____ NO

22. Minimum tillage indicates different practices to different people. What does the term Minimum Tillage mean to you? PLEASE DISCUSS:

____

____

____

23. What does the term "Conservation Tillage" mean to you? PLEASE DISCUSS:

____

____

____

24. Did you use a moldboard plow to prepare all your land for new crops in this crop year? PLEASE CHECK ONE:

2 ____ YES

1 ____ NO

IF YOU ANSWERED "NO" TO QUESTION 24, PLEASE ANSWER QUESTION 24A.

24A. Below is a list of tillage practices that you may be using instead of only a moldboard plow. IN THE BLANK BESIDE EACH PRACTICE, PLEASE INDICATE HOW MANY ACRES YOU ARE USING THAT PRACTICE ON IN THE CURRENT CROP YEAR:

a. listing.............................____
b. ridge planting......................____
c. chisel planting.....................____
d. rotary tillage (or sidewinder)......____
e. till planting.......................____
f. sweep tillage.......................____
g. disk................................____
h. slot planting (or No till or Zero till)_
i. other (PLEASE LIST).................____

____

25. What do you feel are the biggest advantages and disadvantages of minimum t (or conservation tillage or reduced tillage)? PLEASE DISCUSS:

Advantages: ____________________________

____

Disadvantages: ____________________________

____

26. Has the fuel shortage affected your tillage practices in any way? PLEASE

2 ____ YES

1 ____ NO

27. During the past few years there has been considerable discussion about env mental quality and pollution. We would like to know what farmers think ab some of these things which have been said.

FOR EACH STATEMENT, PLEASE CIRCLE ONE RESPONSE THAT BEST DESCRIBES YOUR OP ON THAT STATEMENT:

a. Industries which pollute our air and water are really getting something for nothing..............................	STRONGLY AGREE	AGREE	DON'T KNOW	DISAG

F YOU ANSWERED "NO" TO QUESTION 24, PLEASE ANSWER QUESTION 24A.

24A. Below is a list of tillage practices that you may be using instead of only a moldboard plow. IN THE BLANK BESIDE EACH PRACTICE, PLEASE INDICATE HOW MANY ACRES YOU ARE USING THAT PRACTICE ON IN THE CURRENT CROP YEAR:

a. listing............................______
b. ridge planting.....................______
c. chisel planting....................______
d. rotary tillage (or sidewinder)......______
e. till planting.......................______
f. sweep tillage.......................______
g. disk................................______
h. slot planting (or No till or Zero till)______
i. other (PLEASE LIST).................______

____

do you feel are the biggest advantages and disadvantages of minimum tillage conservation tillage or reduced tillage)? PLEASE DISCUSS:

ntages: ______________________________________

____

dvantages: ______________________________________

____

the fuel shortage affected your tillage practices in any way? PLEASE CHECK ONE:

2 ____ YES

1 ____ NO

ng the past few years there has been considerable discussion about environ-al quality and pollution. We would like to know what farmers think about of these things which have been said.

EACH STATEMENT, PLEASE CIRCLE ONE RESPONSE THAT BEST DESCRIBES YOUR OPINION HAT STATEMENT:

ndustries which pollute our air and ater are really getting something for othing..................................	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGLY DISAGREE

b.	Although small amounts of agricultural chemicals are found in foods, these present no hazard to human health....	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGLY DISAGREE
c.	Some of the tax money now spent on highways should be used instead to help industries and farmers reduce pollution............................	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGLY DISAGREE
d.	A landowner should be free to use his land just about any way he wants to..	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGLY DISAGREE
e.	Most of the money for cleaning up air and water pollution should come from government sources..................	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGLY DISAGREE
f.	Sediments resulting from soil erosion are pollutants similar to industrial wastes or harmful car exhausts.......	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGLY DISAGREE
g.	I'm pretty skeptical about most of the problems and harmful effects that environmentalists talk about...........	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGLY DISAGREE
h.	Factories should be required to clean up their waste products before releasing them into the air or water.......	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGLY DISAGREE
i.	It would be a good idea to take some of the tax money now spent on education and use it to help industries and farmers fight pollution..............	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGLY DISAGREE
j.	Landowners have a moral obligation to use their land wisely and maintain its productivity......................	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGLY DISAGREE
k.	Sediments from soil erosion cost the taxpayers money in maintaining streams drainage ditches, lakes, and reservoirs	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGLY DISAGREE
l.	Strip-mining companies should be required to regrade and replant an area after mining it.........................	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGLY DISAGREE
m.	The virtually total ban on DDT use really is not justified.............	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGLY DISAGREE
n.	Public funds should pay for those erosion control practices whose primary benefits occur off the farm......	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGLY DISAGREE
o.	We must proceed slowly in working against pollution, otherwise we will interfere with our production of food and goods at reasonable prices.......	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGLY DISAGREE

p.	We should reduce the tax money spent on welfare and use it instead to help industries and farmers prevent pollution..............................	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGLY DISAGREE
q.	A landowner should be held legally responsible for any damage which soil erosion on his land causes to others.	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGLY DISAGREE
r.	Although they will cost some extra money for owners, anti-pollution devices on cars are a good thing for everyone.............................	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGLY DISAGREE
s.	If one remembers that man has been changing his environment throughout history, all the recent fuss over environmental quality seems pretty exaggerated..........................	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGL DISAGRE
t.	Generally, those causing serious pollution should pay to clean it up..	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGL DISAGRE
u.	It really seems idiotic that man keeps pouring tons of chemicals into the air, soil, and water with almost no idea of where they will all end up...........	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGL DISAGRE
v.	A landowner is really only a passing tenant with society as a whole holding the basic rights in land............	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGL DISAGRE
w.	Environmentalists often use scare tactics in arguing for more pollution controls.............................	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGL DISAGRE
x.	Some of the money now spent on agricultural price support programs should be used instead to help farmers reduce soil erosion........................	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGL DISAGRE
y.	The government has the right to require landowners to practice soil conservation when it is necessary to maintain the long-term productivity of the land...	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGL DISAGRE
z.	The pesticide control agencies often don't pay enough attention to the farmer's problems...................	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGL DISAGRE
aa.	Governmental regulations for disposal of farm animal wastes are necessary, otherwise many farmers wouldn't worry too much about the waste problem.....	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGL DISAGRE

bb. The big metropolitan areas which have most of the pollution problems are forcing overly strict regulations on the rest of the country.............. STRONGLY AGREE AGREE DON'T KNOW DISAGR

cc. Because of the competitive situation in agriculture, the conscientious farmer who practices soil conservation suffers for it economically.......... STRONGLY AGREE AGREE DON'T KNOW DISAGR

dd. The most logical way to minimize soil erosion would be to not permit the growing of row crops on land susceptible to serious soil erosion.............. STRONGLY AGREE AGREE DON'T KNOW DISAGR

ON QUESTIONS 28 THROUGH 34, PLEASE CHECK ONE ANSWER FOR EACH QUESTION:

28. In terms of total amounts, which of the substances listed below do you thi contributes the most to water pollution in the U.S.?

1 ____ PESTICIDES AND PLANT NUTRIENTS
2 ____ WASTES FROM FACTORIES AND INDUSTRY
3 ____ SEDIMENTS FROM SOIL EROSION
4 ____ MUNICIPAL SEWAGE
5 ____ DON'T KNOW

29. Below are listed several possible sources of pollution associated with agriculture. Which do you think causes the greatest amount of water pollut

1 ____ RUN-OFF OF PESTICIDES
2 ____ ANIMAL WASTES
3 ____ RUN-OFF OF PLANT NUTRIENTS
4 ____ SEDIMENTS FROM SOIL EROSION
5 ____ WIND EROSION
6 ____ DON'T KNOW

30. Recent news articles have discussed complaints about odors from large lives operations. In your opinion, how important a problem is feedlot odor in af the quality of our environment?

1 ____ VERY IMPORTANT PROBLEM
2 ____ IMPORTANT PROBLEM
3 ____ DON'T KNOW
4 ____ UNIMPORTANT PROBLEM
5 ____ VERY UNIMPORTANT PROBLEM

e big metropolitan areas which have st of the pollution problems are rcing overly strict regulations on rest of the country.............	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGLY DISAGREE
cause of the competitive situation agriculture, the conscientious rmer who practices soil conservation ffers for it economically.........	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGLY DISAGREE
e most logical way to minimize soil osion would be to not permit the owing of row crops on land susceptible serious soil erosion.............	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGLY DISAGREE

NS 28 THROUGH 34, PLEASE CHECK ONE ANSWER FOR EACH QUESTION:

rms of total amounts, which of the substances listed below do you think ibutes the most to water pollution in the U.S.?

1 ____ PESTICIDES AND PLANT NUTRIENTS

2 ____ WASTES FROM FACTORIES AND INDUSTRY

3 ____ SEDIMENTS FROM SOIL EROSION

4 ____ MUNICIPAL SEWAGE

5 ____ DON'T KNOW

are listed several possible sources of pollution associated with ulture. Which do you think causes the greatest amount of water pollution?

1 ____ RUN-OFF OF PESTICIDES

2 ____ ANIMAL WASTES

3 ____ RUN-OFF OF PLANT NUTRIENTS

4 ____ SEDIMENTS FROM SOIL EROSION

5 ____ WIND EROSION

6 ____ DON'T KNOW

t news articles have discussed complaints about odors from large livestock tions. In your opinion, how important a problem is feedlot odor in affecting uality of our environment?

1 ____ VERY IMPORTANT PROBLEM

2 ____ IMPORTANT PROBLEM

3 ____ DON'T KNOW

4 ____ UNIMPORTANT PROBLEM

5 ____ VERY UNIMPORTANT PROBLEM

31. Which of the farming practices listed below do you think has the most effect or influence on soil erosion?

1 ____ TILLAGE PRACTICES
2 ____ RATES OF FERTILIZER APPLICATIONS
3 ____ TIMING OF PLANTING
4 ____ WEED CONTROL PRACTICES
5 ____ DON'T KNOW

32. Which of the factors listed below do you think has the least effect or influence on soil erosion?

1 ____ RAINFALL
2 ____ NITROGEN LEVEL IN SOIL
3 ____ SOIL TYPE
4 ____ CROPPING SEQUENCE
5 ____ DON'T KNOW

33. Which of the conditions listed below do you think is most likely to increase soil erosion?

1 ____ INCREASED ORGANIC MATTER IN THE SOIL
2 ____ HIGHER SOIL WATER INTAKE
3 ____ WELL-PULVERIZED SMOOTH SOIL SURFACE
4 ____ MULCH-TILLED FIELDS
5 ____ DON'T KNOW

34. On moderate slopes from 1-7% grade, about how much do you think contouring reduces soil erosion?

1 ____ ABOUT 5%
2 ____ ABOUT 20%
3 ____ ABOUT 50%
4 ____ ABOUT 80%
5 ____ DON'T KNOW

35. Following are some statements about farm practices. FOR EACH STATEMENT, P
CIRCLE ONE RESPONSE THAT BEST DESCRIBES YOUR OPINION ON THAT STATEMENT:

a.	In order to kill pests which have become resistant to present chemicals, new chemicals have to be made more poisonous....................................	AGREE	DISA
b.	Soil productivity can be maintained through the proper application of nitrogen and phosphate..............	AGREE	DISA
c.	Ridge planting is a type of tillage system that provides good erosion control and high water intake...	AGREE	DISA
d.	For a fast knockdown of pests attacking livestock, one should use a combination spray made up of all the recommended livestock insecticides............	AGREE	DISA
e.	Scientists can calculate quite accurately the amount of soil lost from water erosion......................	AGREE	DISA
f.	One disadvantage of all terraces is that many point rows are usually formed..............................	AGREE	DISA
g.	Sheet erosion is a natural process in which plant nutrients and minerals are washed from the soil as water drains through it.............................	AGREE	DISA
h.	Other things being equal, a corn-corn-soybean rotation generally leads to greater soil erosion than continuous corn..	AGREE	DISA

36. Here are several statements farmers have made, some favoring soil conserva
others against it. We would like your opinion on each statement - to what
you agree or disagree with each one.

FOR EACH STATEMENT, PLEASE CIRCLE THE RESPONSE WHICH BEST DESCRIBES YOUR O
ON THAT STATEMENT:

a.	I feel obligated to reduce soil deterioration and maintain the long-term productivity of the land.................	STRONGLY AGREE	AGREE	DON'T KNOW	DISAG
b.	I think farmers will be faced with strict laws regulating soil erosion if they don't voluntarily control it	STRONGLY AGREE	AGREE	DON'T KNOW	DISAG
c.	I think the SCS people often exaggerate the seriousness of soil erosion.	STRONGLY AGREE	AGREE	DON'T KNOW	DISAG
d.	Usually, investments in erosion control don't pay off quickly enough for me..	STRONGLY AGREE	AGREE	DON'T KNOW	DISAG

g are some statements about farm practices. FOR EACH STATEMENT, PLEASE
NE RESPONSE THAT BEST DESCRIBES YOUR OPINION ON THAT STATEMENT:

rder to kill pests which have become resistant resent chemicals, new chemicals have to be made poisonous....................................	AGREE	DISAGREE	DON'T KNOW
productivity can be maintained through the proper ication of nitrogen and phosphate.............	AGREE	DISAGREE	DON'T KNOW
e planting is a type of tillage system that pro- s good erosion control and high water intake...	AGREE	DISAGREE	DON'T KNOW
a fast knockdown of pests attacking livestock, should use a combination spray made up of all recommended livestock insecticides............	AGREE	DISAGREE	DON'T KNOW
tists can calculate quite accurately the amount il lost from water erosion.....................	AGREE	DISAGREE	DON'T KNOW
isadvantage of all terraces is that many point are usually formed............................	AGREE	DISAGREE	DON'T KNOW
erosion is a natural process in which plant ents and minerals are washed from the soil as drains through it............................	AGREE	DISAGREE	DON'T KNOW
things being equal, a corn-corn-soybean rotation ally leads to greater soil erosion than continuous	AGREE	DISAGREE	DON'T KNOW

several statements farmers have made, some favoring soil conservation and
gainst it. We would like your opinion on each statement - to what extent
e or disagree with each one.

STATEMENT, PLEASE CIRCLE THE RESPONSE WHICH BEST DESCRIBES YOUR OPINION
STATEMENT:

el obligated to reduce soil deterior- n and maintain the long-term produc- cy of the land..................	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGLY DISAGREE
ink farmers will be faced with ct laws regulating soil erosion ney don't voluntarily control it	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGLY DISAGREE
ink the SCS people often exagger- he seriousness of soil erosion.	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGLY DISAGREE
ly, investments in erosion control pay off quickly enough for me..	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGLY DISAGREE

e.	Many erosion control practices are just too much of a nuisance for me to bother with them................	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGLY DISAGREE
f.	I really don't think the individual farmer should be responsible for paying for erosion controls............	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGLY DISAGREE
g.	I don't want to use any of my credit to finance investments in erosion control............................	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGLY DISAGREE
h.	Unless all farmers whose land needs erosion control were required to practice it, I can't economically justify such investments for myself	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGLY DISAGREE
i.	I take a lot of pride in the wise management of my land, not simply making money off of it...............	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGLY DISAGREE
j.	I think the time has come for everyone, including landowners, to stop exploiting our natural resources....	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGLY DISAGREE
k.	I feel obligated to reduce the possible damage caused to other persons resulting from soil erosion on my land.	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGLY DISAGREE
l.	Effective erosion control measures, especially terracing, are too expensive for me............................	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGLY DISAGREE
m.	I don't think a farmer should have to use erosion control measures which make him change his accustomed ways of farming	STRONGLY AGREE	AGREE	DON'T KNOW	DISAGREE	STRONGLY DISAGREE

37. Now we are going to discuss a federal program which provides cost-sharing to help farmers carry out conservation practices. This program was called the Agricultural Conservation Program (ACP) when it was created in 1935, but in 1971 its name was changed to REAP (Rural Environmental Assistance Program). Recently there have been a number of governmental policy changes affecting this program, including another name change. Now it is called RECP (Rural Environment Conservation Program).

If you are aware of some of the governmental actions that have been taken regarding this cost-sharing program during the past two years, would you explain these actions, as you understand them? PLEASE DISCUSS:

IF YOU ARE AWARE OF THESE PROGRAMS, ANSWER QUESTION 37A:

37A. What sort of feelings do you have concerning these program changes? PLEASE DISCUSS:

____

____

____

38. One of the changes in these cost-sharing programs has been a shift towards practices with long-term conservation benefits instead of practices which rather quickly improve production. Please tell whether you think this shift in emphasis is a good idea or not. PLEASE CHECK ONE:

1 ____ DEFINITELY YES
2 ____ YES
3 ____ DON'T KNOW
4 ____ NO
5 ____ DEFINITELY NO

39. Listed below are information sources from which you may have received infoı about conservation and the environment during the past six months. PLEASE EACH SOURCE YOU HAVE RECEIVED INFORMATION FROM AND LIST SPECIFIC SOURCES Iı

a ________ SCS DISTRICT CONSERVATIONIST

b ________ COUNTY EXTENSION DIRECTOR

c ________ AREA OR STATE EXTENSION SPECIALISTS

d ________ ORGANIZATION MEETINGS (PLEASE LIST:) ____________________

____

e ________ WRITTEN MATERIALS (PLEASE LIST:) ____________________

____

f ________ FRIENDS

g ________ TV OR RADIO

h ________ SHORT COURSES, CLINICS, CONFERENCES

i ________ FIELD DAYS, DEMONSTRATIONS, TEST PLOTS

j ________ OTHER (PLEASE LIST:) ____________________

____

YOU ARE AWARE OF THESE PROGRAMS, ANSWER QUESTION 37A:

37A. What sort of feelings do you have concerning these program changes? PLEASE DISCUSS:

____

____

____

the changes in these cost-sharing programs has been a shift towards es with long-term conservation benefits instead of practices which quickly improve production. Please tell whether you think this n emphasis is a good idea or not. PLEASE CHECK ONE:

1 ____ DEFINITELY YES
2 ____ YES
3 ____ DON'T KNOW
4 ____ NO
5 ____ DEFINITELY NO

below are information sources from which you may have received information onservation and the environment during the past six months. PLEASE CHECK URCE YOU HAVE RECEIVED INFORMATION FROM AND LIST SPECIFIC SOURCES IF NECESSARY:

____ SCS DISTRICT CONSERVATIONIST

____ COUNTY EXTENSION DIRECTOR

____ AREA OR STATE EXTENSION SPECIALISTS

____ ORGANIZATION MEETINGS (PLEASE LIST:) ____________________

____

____ WRITTEN MATERIALS (PLEASE LIST:) ____________________

____

____ FRIENDS

____ TV OR RADIO

____ SHORT COURSES, CLINICS, CONFERENCES

____ FIELD DAYS, DEMONSTRATIONS, TEST PLOTS

____ OTHER (PLEASE LIST:) ____________________

____

40. Listed below are farm organizations; we need to know your involvement with these groups in the past year. Did you attend meetings regularly (say half of the meetings held)? In the past year, did you hold an office in any of these groups?

PLEASE CHECK APPROPRIATE BOXES TO INDICATE INVOLVEMENT DURING PAST YEAR ONLY:

	Attended meetings regularly	Held office or was on committee
FARM BUREAU	☐	☐
NFO	☐	☐
GRANGE	☐	☐
ASCS COMMITTEE	☐	☐
FARMER'S UNION	☐	☐
SOIL CONSERVATION BOARD	☐	☐
COOPERATIVE BOARD	☐	☐
COMMODITY ASSOCIATION	☐	☐

THANK YOU VERY MUCH FOR COMPLETING THE QUESTIONNAIRE. WHEN YOU HAVE COMPLETED ALL THE QUESTIONS, PLEASE RETURN TO: DR. PAUL YARBROUGH, 124 PRESS BUILDING, IOWA STATE UNIVERSITY, AMES, IOWA 50010.