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ABSTRACT

Recently American attention has focused on the problems of pollution and environmental protection. Focusing on the Four Corners Interstate Air Quality Control Region, this study determined which socioeconomic characteristics were associated with concern for environmental quality as measured by willingness to pay for pollution abatement. Sample sites were determined by weighing four pollution concentration zones. Interviews were conducted during the 1972 summer and January 1973 with 747 reservation and nonreservation residents and out-of-region recreationists. Separate questionnaires, designed for each subpopulation, were used to determine willingness to pay via a series of bidding games. To ensure that the means of financing was not a barrier to a respondent's willingness to pay and since no bidding game was appropriate for all, five games were constructed--a sales tax increase; an additional charge to the electric bill; a monthly charge; an increase to the user's fee; or a change in laws. Responses were analyzed by stepwise multiple regression. Some findings were: (1) few consistent relationships existed between concern for environment and socioeconomic characteristics (age, occupation, income, ethnicity, and organizational participation); and (2) a clear majority were willing to pay for pollution abatement. (NQ)

A Socioeconomic Analysis of Environmental Concern:

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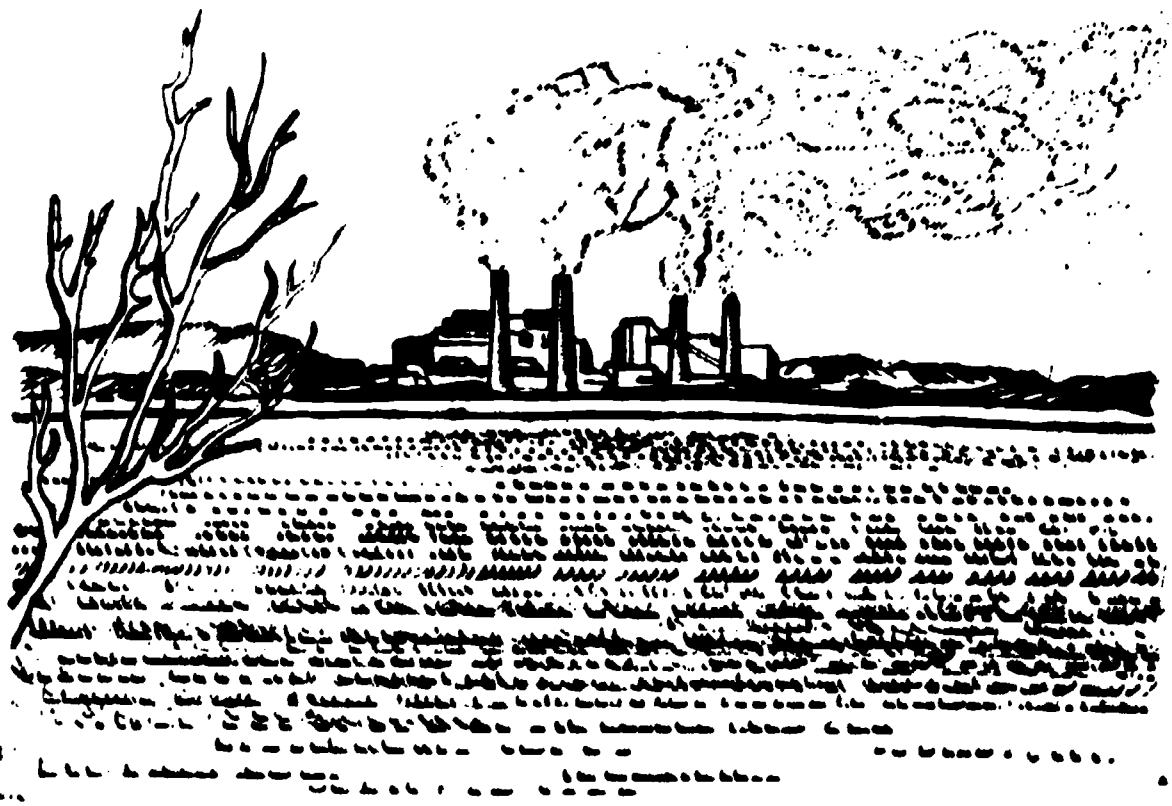

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SUMMARY

In recent years, American attention began to focus on the problems of pollution and environmental protection. This study attempted to determine which socioeconomic characteristics were associated with concern for environmental quality as measured by willingness to pay for pollution abatement. New measurement techniques were required to accomplish this. Five bidding games were designed to obtain monetary estimates of willingness to pay for pollution abatement. Approximately 760 reservation and non-reservation residents and out-of-region recreationists were interviewed during the summer of 1972 and January, 1973. The sample was drawn from the large four-state air-quality-control region.

Results showed a clear majority were willing to pay for pollution abatement. A large majority preferred that the companies bear responsibility for financing the costs of abatement, however, many seemed to perceive that the cost would ultimately be passed on to the consumer. The major finding was that there were few consistent relationships between concern for environment and socioeconomic characteristics such as age, occupation, income, ethnicity, and organizational participation. It seems that this aesthetic concern had little, if any, association with membership in any particular social strata.

September 1974 Las Cruces, New Mexico

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A Socioeconomic Analysis of Environmental Concern:

Case of the Four Corners Electric Power Complex

Clyde Eastman, Peggy Hotter, and Alan Randall[1]

Early in 1970 the American public began to focus serious attention on the problems of pollution and environmental protection. Environmental quality rapidly became a national concern. Scattered governmental activities were pulled together with the creation of the Environmental Protection Agency. National, state, and local laws establishing pollution standards were passed. These acts gave industry and other alleged offenders most of the burden for pollution abatement. Beyond this, there is evidence of the willingness of the American people to pay directly for pollution abatement. Indeed, recent studies indicate that the public might prefer to move faster in making environmental improvements than political leaders have done so far (Browne 1971 6).

The electric power industry, which is moving into the Four Corners region of New Mexico, Arizona, Utah, and Colorado, brings with it a substantial pollution potential. Two plants are currently in operation and five others are under construction or in the planning stage. The total pollution potential rivals or surpasses that produced in our largest cities. Concern over this pollution potential has been expressed both inside and outside the region. The situation provides an excellent setting in which to examine concern for environment and its socioeconomic correlates.

The purpose of this segment of the larger study was to identify the more important socioeconomic characteristics associated with concern for environmental quality. Measurement of environmental concern

[illegible]

required development of special instruments. To provide data for a detailed economic analysis it was necessary to develop a monetary estimate of willingness to pay for cleanup.[2] It was also felt that concern expressed in tangible monetary terms should be more predictive of actual behavior than an abstract, detached, rank-order measure. The measurement instruments are described and evaluated in detail in a later section.

CULTURAL AND ECONOMIC CHARACTERISTICS OF THE REGION

Population and Geography

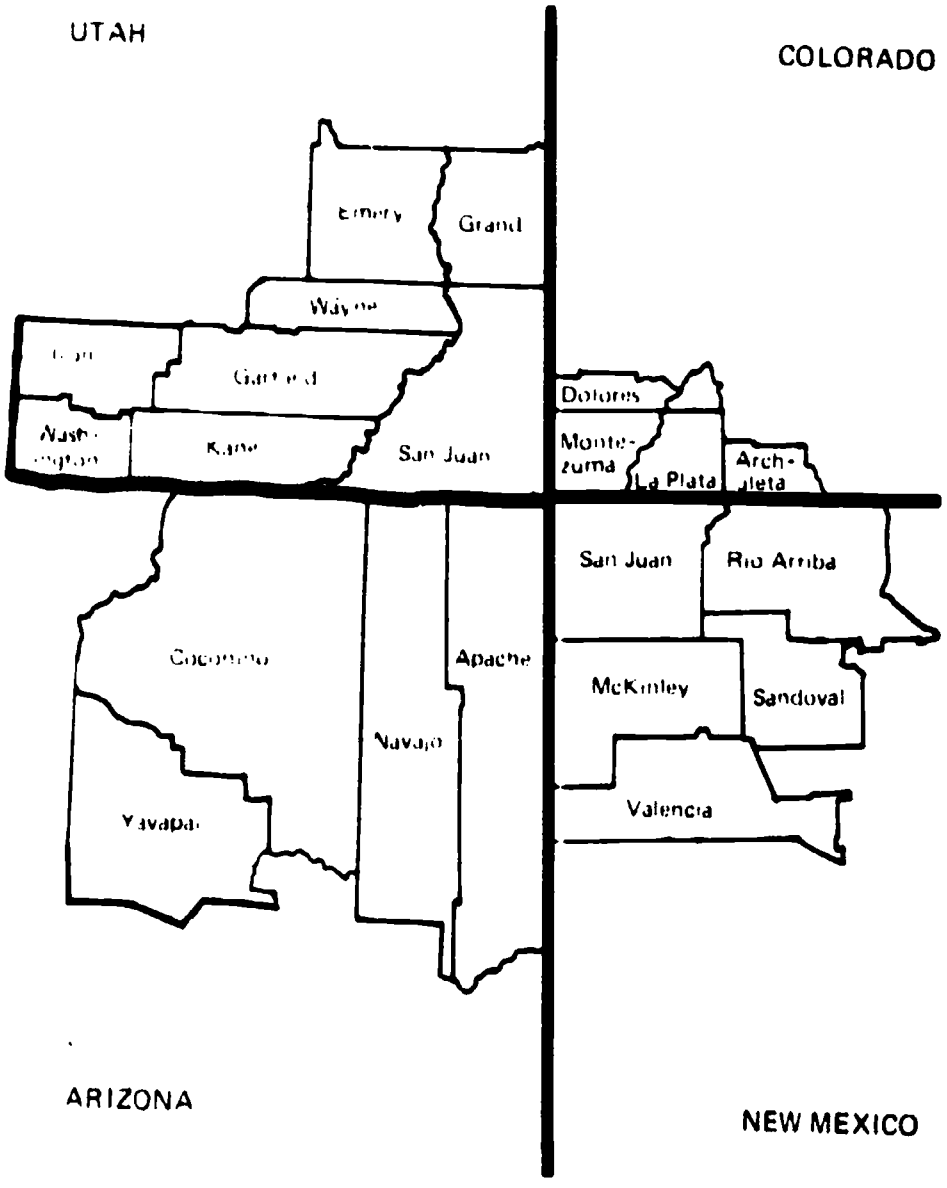
The study focuses on the Four Corners Power Plant near Farmington. Since a number of similar plants are or will soon be in operation in the larger four-state area, the questions it raises are or will soon be relevant throughout the Four Corners region. Accordingly, we settled on the Four Corners Interstate Air Quality Control Region as the study area. (See figure 1 for a map of the region.) To keep the undertaking conceptually manageable for respondents and investigators alike, the scope was limited to the one reasonably representative source of pollution. Results of this study will allow projection of the impact of the other plants currently in the planning and construction stage.

The area covers extensive, sparsely populated areas in New Mexico, Colorado, Utah, and Arizona. The vast Navajo Reservation is included, along with other Indian reservations. With respect to the environmental question, three distinct subpopulations can be identified. One is the Native Americans who reside on reservations (by no means a homogeneous group), the second is the tourists who visit the many recreation areas, and the third is the non-reservation residents. The latter group is mainly Anglo but includes Spanish-Americans, Indians, and Blacks. Of the approximately 400,000 residents in the area, about one-fourth live on the reservations. Tourists spend some 8,500,000 visiting-party-days in the region each year.[3]

[2] [illegible] Aesthetic Environmental Damage from the Four Corners [illegible] New Mexico", Randall, et. al., NMSU Agricultural Experiment [illegible] 1974.

[3] A [illegible] person or group of people who enter together for the purpose of [illegible] user fees are charged by [illegible] Randall. Data on [illegible] were assembled by Berry Ives in his [illegible] New Mexico State University, "The Demand for Abatement of [illegible]" April, 1974.

Fig. 1 Four Corners study region



Some areas within the region are fairly prosperous, but persistent unemployment problems plague many counties. Much of the economy of the region is based on tourism, mining, and power generation, although other industries also play important roles in some localities.

Tourism and Recreation

Recreation could become a significant income-producer in the area. The region encompasses a large portion of the nation's most scenic land and recreational areas: seventeen national monuments, slightly less than one-fourth of all national monuments; six of the country's 35 national parks, including the Grand Canyon; one of the nation's largest national recreation areas at Glen Canyon; and 12 national forests (U. S. Department of Health, Education and Welfare, 1970:35). This list does not include the state parks and other recreation sites scattered throughout the region.

Mining

Every county in the study area, except Garfield County in Utah, has some mining industry. Natural gas, oil, uranium, copper, and coal are extracted on a large scale. The abundant and varied mineral resources of the Four Corners area are an important factor in the establishment and expansion of new industry. Vast reserves of coal will provide an important source of fuel for future power-generating plants. Yet strip mining typically causes great environmental damage. One need only to drive through strip-mined areas on a windy day for evidence of this. The potentials for both pollution and economic benefit are great. Attention will be required to maintain some kind of balance between economy and environment.

Power Generation

The Southwest's demand for electricity has continued to grow many times faster than its population, especially in urban areas such as Tucson, Phoenix, and Los Angeles. It is estimated the total power demand will quadruple between 1970 and 1990 (U. S. Department of Health, Education and Welfare, 1970:48).

Currently two plants are in operation in the Four Corners area: the Four Corners Plant, situated between Farmington and Shiprock, San Juan County, New Mexico and the Cholla Plant near Joseph City, Navajo County, Arizona. Two other facilities are under construction in or around the study area: the huge Navajo generating plant near Page, Arizona; and the San Juan Plant located nine miles north of the Four Corners Plant. Three plants are in the planning stage. Kaiparowitz, with alternative sites at Warm Creek, Utah, 12 miles north of Page, Arizona and Sit Down Bench, Utah, 20 miles northeast of Page, would be the largest of the plants

upon its completion. Two other plants in or around the area are the Mojave Plant, located on the Nevada side of the Colorado River near David Dam, and the Huntington Canyon Plant, located 29 miles southwest of Price, Utah (U. S. Department of Health, Education and Welfare, 1970 53-56).

Early in 1971, pressure was put on the Four Corners Plant management to reduce emissions of pollutants. By the end of 1972, 99.2 percent of the fly ash was to be removed from stack emissions. Wet scrubbers and electrostatic precipitators were installed at a cost of some $30 million. Fly ash standards are to become even more stringent in the future. Work is underway to lower the emissions of sulphur and nitrous oxides. The latter, together with hydrocarbons, are the main contributors to photo-chemical smog. The technology for control of sulphur and nitrous oxides is not well developed. It would be very costly to control sulphur and even more difficult to meet a modest standard of control for nitrous oxides.

The demand for electricity is growing, and there is a desire for economic expansion in the Four Corners area. Since the area is rich in coal and has enough water the essential elements in power generation the power industry will be a vital part of industrial expansion. However, with that industry comes the potential for air, water, and land pollution. Uncontrolled pollution could limit another vital industry in the area, tourism and recreation. Four Corners tourism thrives on clean air, water, and land, and if tourism is to flourish steps must be taken to protect the region's environment.

PREVIOUS STUDIES—ATTITUDES TOWARD POLLUTION

A review of the literature reveals that air and water pollution may have been a problem as early as the late 1800s, but the American public was not widely concerned about it. Only recently has the problem received as much emphasis as other national problems, e.g., civil rights or poverty. In 1965, when some of the first public opinion polls on environmental damage were conducted, only one in ten people considered the problem as being very serious. Environmental damage has rapidly become a priority problem, and willingness to pay for the abatement of pollution seems to be growing.

Many questions have been put to the American public in order to determine their willingness to pay. Hazel Erskine (1972b:120-135) edited several public opinion surveys conducted by such research organizations as the Gallup Poll, the Harris Poll, the California Poll, Roper, the Opinion Research Corporation, and others. She concluded that people from different regions were often concerned about different kinds of pollution. Urban or suburban residence influenced

perceptions of the seriousness of pollution. In several of the surveys conducted over a period of time, recent results showed that people were much more willing to pay than they were earlier, although the amounts were still quite small.

Simon (1971:93-99) conducted a study in Illinois to determine public concern for pollution. A little over one-fifth of her sample specifically pointed to pollution as the most serious problem in the United States, while nearly everyone else said that it could be a serious problem in the future. She found no rural-urban differences in her sample.

A North Carolina study by Murch (1971:100-106) revealed that there was an inclination for community residents to identify pollution as a significant problem as the reference moved away from their immediate surroundings. The researchers suggested this may be due partially to the influence of mass media, which has presented a much broader view of the problem. They also suggested that the more attached a person was to his community, the less willing he was to see faults in it, including those of pollution. The more satisfied the resident was with his community, the less he reported significant pollution in the area. Homeowners perceived less pollution than did renters; length of residence seemed to have no significant effect. As would be expected, those who saw pollution as a serious problem in their community were far more willing to pay than those who perceived no such problem. The researchers also felt that race, education, occupation, and social upbringing were related to people's concern for environmental improvements.

Erskine (1972a:263-264), in another series of polls, found that people usually reported industry as the pollution culprit. Again she found differences among city and rural people as well as among geographic regions of the country. According to Erskine, the American public is much more upset about water pollution than it is about air pollution. Electric power is one of the industries that have received the fastest growing censure, especially in the Southwest. Most people felt that real improvements could only be handled through governmental action. A majority of the people favored some kind of tax incentive for private industry, but a surprisingly large number of people preferred to shut a plant down rather than to have to put up with the pollution it created.

Gerlach and Hine (1970:274), in a study conducted in the summer of 1970, found that younger people (under 30), women over 30, and men over 30 in professional, educational, or social service occupations tended to view environmental pollution as a significant problem. Those most concerned about the environment were also the most active in organizations and were those with the highest education and income.

HYPOTHESES

The objectives of the study were to determine the concern over environmental pollution and improvements as measured by willingness to pay for environmental improvements, and to determine important socioeconomic variables associated with the respondents' expressed concern for environmental pollution and to order them into a stepwise regression model.

In addition to the general hypothesis that people are concerned about environmental pollution and are willing to pay directly for its abatement, the following hypotheses were formulated. Some were suggested by the previous research findings; others were logical extensions from sociological knowledge.

1) Younger people are more willing to pay for the abatement of pollution than are older people.

2) Willingness to pay is directly related to levels of education, occupational status, and income.

3) Spanish-Americans, Blacks, and other minority groups are less willing to pay than Anglos.

4) Willingness to pay is directly related to political participation and organizational participation.

5) Willingness to pay is directly related to time spent using the mass media (reading papers and magazines, watching T.V., listening to radio).

6) Willingness to pay is directly related to time spent in outdoor and or wilderness recreation.

7) People who lived previously in suburbs and smaller cities are more willing to pay than those who lived previously in rural areas or in larger cities.

8) Those oriented toward the collective are more willing to pay than those oriented toward the individual.

9) Activistic people are more willing to pay than fatalistic people.

In addition to the variables in the above hypotheses, a number of additional variables were included in preliminary analyses to control for unanticipated relationships.

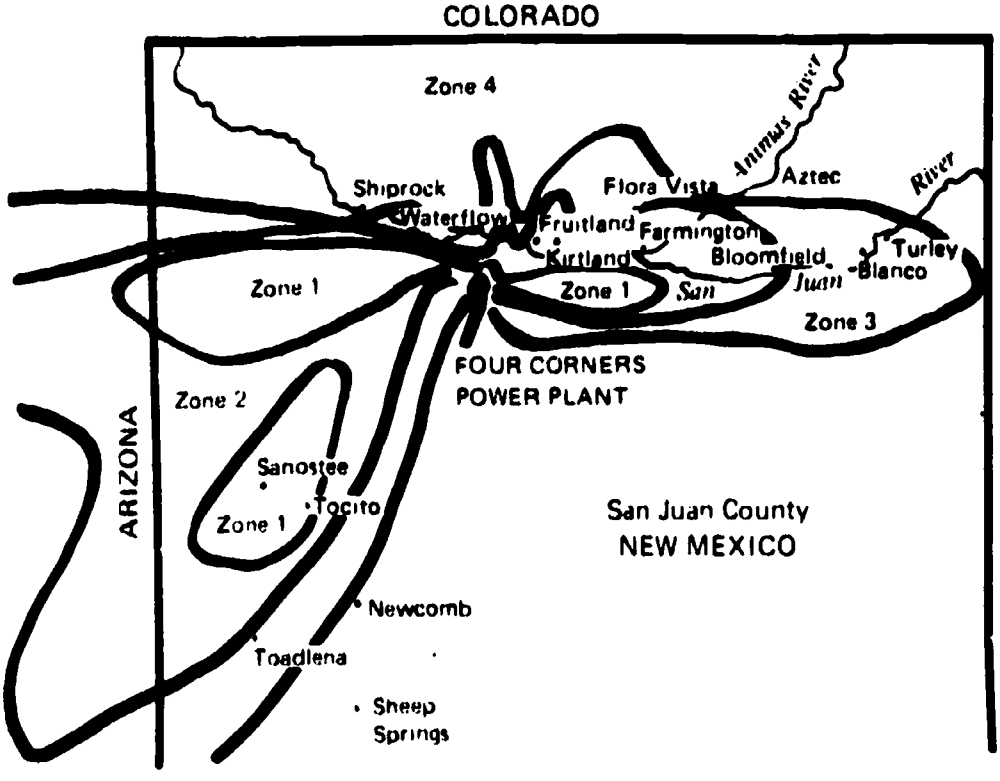
SAMPLE

Separate questionnaires were prepared for each of the three sub-populations in the area: 1) reservation residents (Indians), 2) non-reservation residents, and 3) recreationists (visiting from outside the region). Recreationists were considered because tourism in the area is vital to economic development in the area. Data were collected by personal interviews. A target sample of 800 interviews was established before the work began. Of these, a quota of 150 was established for recreationists with the remainder being reservation and non-reservation residents.

The recreation sample was drawn from state parks and national parks, national forests, national monuments, and national recreation areas. Each site was given a weight based on the number of visitors in 1971, and locations were drawn at random from the weighted list of sites.

Four zones of pollution concentration predicted from an atmospheric diffusion model are shown in figure 2. The zones of greater pollution were sampled more heavily. A randomized sample of seven percent was drawn from Zone 1, five percent from Zone 2, three

Fig. 2: Zones of pollution concentration from Four Corners Power Plant



percent from Zone 3, and two-tenths of a percent from Zone 4. The census enumeration districts and cities were listed and weighted according to the number of households in each. A random sample was drawn from this weighted list to determine sample sites. The same procedure was followed both on and off the reservations.

Only one interview was taken per household. Two call-backs were made at houses if no one was at home. Only those who had assumed an adult role as evidenced by work or marriage were interviewed. Refusal was only approximately eight percent of all houses contacted.

Interviews were conducted with 526 residents and 150 recreationists during the summer of 1972. Seventy-one Indians were interviewed during January of 1973. Of the 526 residents interviewed, 41 percent (215) were male and 59 percent (311) were female. Of the reservation respondents, 38 percent (27) were male and 62 percent (44) were female. In the recreation sample, 71 percent (107) were male and 29 percent (43) were female. Ninety-seven percent (69) of the Indians on the reservations were Navajo; 95 percent (143) of the recreationists and 86 percent (452) of the residents were Anglo. Ten percent (55) of the resident sample were Spanish-Americans.

BIDDING GAMES

Each questionnaire was designed to determine people's willingness to pay for environmental improvements through a series of bidding games. Since each sub-population occupies a unique situation, no one game was appropriate for all of them. Five bidding games were constructed in all.

The first bidding game suggested an increase in sales taxes for everyone in the affected area. The sales tax game was used for both the reservation and non-reservation samples. Every cent was to be used for environmental improvements, and all citizens would be required to pay. The game was presented as a number of choices where a person could pay as much or as little as he wanted for environmental improvements. Photographs were used to show three levels of pollution: A, the worst kinds of pollution created by the power plant; B, a midway point between the worst kinds of pollution and a natural environment; and C, an environment unharmed by pollution. The photographs can be seen in the Appendix. The respondent was asked if he would be willing to pay one cent more in additional sales taxes to move from the worst situation to a midway point with some improvements, i.e., situation A to B. If the respondent agreed to pay the starting bid, the bids were increased until the respondent would go no higher. If the response was "no" to begin with, the amount was decreased by fractions of a cent until a "yes"

response was illicited. If the respondent would not give a "yes" answer, he was questioned by the interviewer and a reason for the "no" answer was noted. The game was replayed with the bidding going from the worst situation, A, to the natural environment, C.

The second bidding game differed only in its means of financing the improvements. An additional charge was to be added to the electric bill of everyone who uses electricity produced in the Four Corners area (this included even people in Southern California, Tucson, and Phoenix). The electric bill game was used only for the residents of the area.

In the recreation questionnaire, a similar bidding game was used; the difference again lay in the vehicle for financing environmental improvements. The recreationists were asked if they would be willing to pay an additional charge in user's daily fees. The rest was conducted similarly to the sales tax and electric bill games.

The fourth bidding game was designed for reservation residents. It asked how much the respondent would pay each month to clean up the environment.

The fifth game was quite different in its approach. The hypothetical situation suggested a change in our laws so that everyone had a legal right to a clean environment. If one has this legal right to a clean environment, he can conceivably rent or sell this right to others, if he so chooses. The question put to the respondent was whether or not he would be willing to rent his clean environment to the electric power industry. One would be paid according to the amount of smoke in the air above his home on an average day, and the extent to which his view was ruined by spoil banks and transmission lines. Photographs were referred to in reverse order from a clean environment to the worst environment, C to A, and from a clean environment to some midway point, C to B. A starting point of $5.00 per month was selected, which the company would pay the citizen. The respondent was not obligated to accept it, nor was he obligated to ask only $5.00. He could charge as much or as little as he wanted. The rent-the-air game was used for both the non-reservation and recreation samples.

The purpose of using several methods of financing was then to insure that the means of financing was not a barrier to a respondent's willingness to pay. For example, some respondents were against any increase in sales taxes but were not against paying additional increases in their monthly electric bills. The "zero" response that would have been obtained by only using the sales tax means of financing would not have been truly indicative of the respondent's willingness to pay, for his objection was aimed at the means of financing and not at the goal of environmental improvements. The bidding games are shown in the Appendix.

RESULTS

Responses to all the bidding games were analyzed by stepwise multiple regression. All independent variables were in dummy format; dependent variables were continuous. It was necessary to distinguish between two kinds of zero bids in all the games. Some respondents bid zero because they felt there were no ill effects from the power generation and mining activities. These responses were treated as true zeroes and were retained in the analyses. Other respondents refused to bid because they objected to the particular vehicle of payment i.e. they thought taxes, electric bills, or users' fees already too high and refused to pay for that reason. These responses were deleted from the analyses. This accounts for the seeming discrepencies in sample size from one analysis to another.

Concern for Environment

There is consistent support for the general hypothesis people in the Four Corners are concerned about environmental pollution and are willing to pay substantial amounts (compared with estimated costs) for its abatement.[4] Table 1 shows the proportion of people

[4]Other analyses indicate that the aggregate amount of these bids exceeds the estimated costs of pollution abatement. See Alan Randall et. al., "Some Tentative Estimates of the Benefits and Costs of Controlling Air Pollution from the Four Corners Power Plant" Article in process of publication.

Table 1. Willingness to pay for pollution abatement by subpopulation and by vehicle of payment

Subpopulation (Game)	Willingness to Pay Some Amount	Mean Amount Bid*
	percent	
Non reservation residents		
(Sales tax)	63	1.48 ¢/dollar
(Electric bill)	73	$1.91/month
Reservation residents		
(Sales tax)	62	0.77 ¢/dollar
(Monthly amount)	48	$1.52/month
Recreationists		
(User fees)	82	$1.84/day

*The means include those who bid zero because they felt no abatement was necessary. It excludes those who refused to bid because taxes or electricity were already too expensive or for some other reason.

willing to pay some amount for pollution abatement and the mean amount bid for each game.

Who Should Pay

Integral in willingness to pay is the question of who should pay. Each respondent was asked this question after he or she had gone through the bidding process. Table 2 shows that a great majority think that the mining and power companies should pay either all or a major share of abatement costs. At the same time, their comments indicated that many seemed to think that ultimately the burden would be passed on to the consumer.

Table 2. Frequency of responses to "Who should pay?" for abatement of aesthetic environmental damage associated with the Four Corners Power Plant, 1972 by subsample.

Response[a]	Non-reservation	Indian Reservation	Recreators	Total
1	11[b]	2	4	17
2	45	19	17	81
3	174	11	40	225
4	6	0	3	9
5	6	0	1	7
1, 2, 3	12	1	0	13
1, 3, 2	4	0	2	6
2, 1, 3	6	1	1	8
2, 3, 1	29	10	5	44
3, 1, 2	2	1	0	3
3, 2, 1	196	25	72	293
No response	35	1	5	41
Totals	526	71	150	747

Response code
1 = the people affected
2 = the final user of electric power
3 = the mining and power companies
4 = all equally responsible
5 = the federal government (volunteer response)

[a]More than one entry indicates a preference ordering, such as 3, 2, 1.

[b]Number of respondents.

Residents

Residents were interviewed through the use of the sales tax and electric bill games. As can be seen in the questionnaire in the Appendix, socioeconomic data were collected on the respondents. Variables not expected to be related to environmental concern were included in the regression along with all those which are mentioned in the hypotheses and deal specifically with environmental concern.

Results of analysis of the sales tax and the electric bill bids are presented in tables 3 and 4, respectively. The regression coefficient for the Spanish-Americans, for example, estimates that they were willing to pay 0.43 (43 100) cent more than other ethnic groups for pollution abatement. The standard error of .22 indicates that for a sample of this size and variability the true value of the above amount is somewhere between about zero and 0.87 cents (0.43 + 2 x 0.22). The 3.86 value for F to remove means that the Spanish-American bid was just significant at the .05 level.

Analysis of the sales tax bids shows that Spanish-Americans, people 30 years of age and younger, and those with previous residence in towns and smaller cities were willing to pay more for pollution abatement. Those who spent one to seven hours per week in indoor recreation were less willing to pay than those who spent more or less time in this kind of recreation activity. Household income was also related to willingness to pay: those earning $10,000 to $15,000 annually were willing to pay more than those earning more or less; the residual income category (those who had no earned income), primarily students, and those who refused to disclose their incomes were also significantly higher than the other income groups.

Analysis of electric bill bids indicates that those with household incomes above $20,000 (the base category in this case) were willing to pay more than all those with lower incomes. Also those with 13 to 16 years of education, those who did not vote in the past four years, and those who spend 15 to 30 days annually in open-space, outdoor recreation were willing to pay more. About 18 percent of the variance was accounted for in both the sales tax and the electric bills bids.

Recreationists

Recreationists' concern for environment was measured by their expressed willingness to pay for increased user's fee. Results of user's fee bids are presented in table 5. Those who belonged to no organizations at all and those who belonged to two organizations

Table 3. Stepwise multiple regression of non-reservation resident's willingness to pay for abatement of pollution by increased regional sales tax

Dependent Variable:	Amount of money respondent is willing to pay for the abatement of pollution by an additional charge in sales tax.	
Sample:	349 Residents	
Special Characteristics:	Multiple correlation coefficient (R)	.4222
	Fraction of explained variance (R^2)	.1782
	F Ratio	6.644*****
	Constant term	1.15
	Regression Degrees of Freedom	11
	Residual Degrees of Freedom	337

Independent Variable		Regression Coefficient	Standard Error	F to Remove
X_{10}	Age (< 30)	.94	.18	26.03*****
X_4	Size city lived in before (2,500 - 99,999)	.51	.15	11.95****
X_{26}	Household income	1.67	.59	8.14***
X_{48}	Indoor recreation (1-7 hrs/wk)	-.41	.14	8.68***
X_{29}	Household income ($10,001 - 15,000/yr)	.34	.15	4.91*
X_{32}	Ethnicity (Spanish-Americans)	.43	.22	3.86*
X_{50}	Limited-space outdoor recreation (0 hrs/wk)	-.24	.16	2.40
X_{11}	Age (31-45)	.29	.18	2.62
X_3	Size city lived in before (100,000 - 999,999)	41	.23	3.19
X_{38}	Times voted (once last 4 years)	-.32	.20	2.61
X_{54}	Open-space outdoor recreation (1-7 days/yr)	-.28	.18	2.44

*Significant at the .05 level, ** .01 level; *** .005, **** .001; ***** .0005 level.

were willing to pay less than those who belonged to one or to three or more organizations. Those with household incomes of $15,000 to $20,000 were willing to pay more than those with higher or lower incomes. Those employed outside the power, agricultural, gas, and oil industries were willing to pay less than those employed in these industries. About 22 percent of the variance was accounted for by this analysis.

Table 4. Stepwise multiple regression of non-reservation residents' willingness to pay for abatement of pollution by an increase in monthly electric bills

Dependent Variable.	Amount of money respondent is willing to pay for the abatement of pollution by an additional charge in monthly electric bills	
Sample:	415 Residents	
Special Characteristics:	Multiple correlation coefficient (R)	.4213
	Fraction of explained variance (R^2)	.1775
	F Ratio	5.739*****
	Constant term	2.92
	Regression Degrees of Freedom	15
	Residual Degrees of Freedom	399

Independent Variable		Regression Coefficient	Standard Error	F to Remove
X_{26}	Household income (No earned income, refusals)	-2.76	.61	20.25*****
X_{29}	Household income ($10,001 - $15,000)	-1.43	.30	22.76*****
X_{28}	Household income ($5,001 - $10,000)	-1.35	.30	20.72*****
X_{27}	Household income ($1,000 - $5,000)	-1.43	.36	15.97*****
X_{30}	Household income ($15,001 - $20,000)	-1.03	.34	8.98***
X_{16}	Education (13-16 yrs)	.38	.15	6.27*
X_{56}	Open space outdoor recreation (15-30 days/yr)	.35	.15	5.28*
X_{37}	Times voted (0)	.32	.16	4.08*
X_{10}	Age (< 30)	.30	.16	3.69
X_{43}	Reading (< 7 hrs/wk)	-.26	.14	3.59
X_8	Region lived in before (Midwest, East, and outside U. S.)	.49	.27	3.36
X_{51}	Limited-space outdoor recreation (1-7 hrs/wk)	.24	.13	3.20
X_{21}	Employer (other industry)	-.24	.14	3.01
X_{61}	Neutral collective individual attitude	.26	.15	2.90
X_{13}	Education (1-8 yrs)	-.37	.28	1.76

*Significant at the .05 level, *** .005; ***** .0005 level

Table 5. Stepwise multiple regression of recreationist's willingness to pay for the abatement of pollution by an increase in user's fees.

Dependent Variables.	Amount of money respondent is willing to pay for the abatement of pollution by an additional charge in user's fees	
Sample.	126 Recreationists	
Special Characteristics:	Multiple correlation coefficient (R)	.4686
	Fraction of explained variance (R^2)	.2196
	F Ratio	4.115*****
	Constant term	3.18
	Regression Degrees of Freedom	8
	Residual Degrees of Freedom	117

Independent Variable		Regression Coefficient	Standard Error	F to Remove
X_{33}	Organizational member (0)	-1.01	.35	8.30*****
X_{35}	Organizational member (2)	-.78	.30	6.61*
X_{29}	Household income ($15,001-$20,000)	.74	.30	6.22*
X_{21}	Employer (other industry)	-.67	.30	4.92*
X_8	Region came from (Midwest, East, other)	-.54	.30	3.19
X_{42}	Reading (≤ 7 hrs/wk)	-.46	.27	2.79
X_{25}	Number of children (3-4)	-.53	.34	2.46
X_{65}	Distance traveled to recreation site (501-1,000 miles)	.39	.29	1.74

*Significant at the .05 level. *****.0005 level

Reservation Residents

The Navajo reservation residents responded to the sales tax game and to the straight-forward inquiry, "How much would you pay each month for pollution abatement?" Results can be seen in tables 6 and 7. Those who had previously lived off the reservation in cities of one million or more, those in skilled occupations, and those 30 years of age or younger were willing to pay more in additional sales tax. Those who speak both Navajo and English in the home were willing to pay less than those who speak only one language usually Navajo.

Table 6. Stepwise multiple regression of reservation residents' willingness to pay for the abatement of pollution by an increase in sales tax

Dependent Variable	Amount of money respondent is willing to pay for the abatement of pollution by an additional charge in sales tax.	
Sample	70 Indians	
Special Characteristics:	Multiple correlation coefficient (R)	.6487
	Fraction of explained variance (R^2)	.4209
	F Ratio	6.437*****
	Constant term	-0.092
	Regression Degrees of Freedom	7
	Residual Degrees of Freedom	62

Independent Variable		Regression Coefficient	Standard Error	F to Remove
X_2	Lived off reservation (City of 1,000,000)	1.16	.26	19.60*****
X_{13}	Employment (professional and skilled)	1.49	.36	16.78*****
X_{25}	Language (mixed)	-0.48	.17	7.88**
X_{14}	Employment (clerical)	0.95	.34	7.62**
X_7	Age (< 30 yrs)	0.47	.20	5.21*
X_{15}	Employment (housewife)	0.55	.35	2.42
X_{28}	Voted (yes)	-0.25	.23	1.20

*Significant at the .05 level, ** .01 level; ***** .0005 level

In the monthly amount bid, military service, contributions to campaign funds, and holding of organizational offices were all directly related to willingness to pay. However, those who voted in past elections were willing to pay less than those who had not. In the sales tax game, some 42 percent of the variance was accounted for, in the other game, it was about 35 percent.

About twice as much of the variance was accounted for in the Navajo sample as in the other subpopulations. Generally, the common dimension underlying the variables related to Navajo willingness to pay seem to be contact and participation in the larger society. Except for language use among the reservation residents and voting behavior among both resident groups, all variables indicate involvement and association with the dominant culture.

Table 7. Stepwise multiple regression of reservation residents' willingness to pay for the abatement of pollution by some additional amount per month

Dependent Variable:	Amount of money respondent is willing to pay for the abatement of pollution by an additional amount per month.	
Sample:	70 Indians	
Special Characteristics:	Multiple correlation coefficient (R)	.5891
	Fraction of explained variance (R^2)	.3471
	F Ratio	8.638*****
	Constant term	1.79
	Regression Degrees of Freedom	4
	Residual Degrees of Freedom	65

Independent Variable		Regression Coefficient	Standard Error	F to Remove
X_5	Military (yes)	4.70	1.09	18.72*****
X_{31}	Contribute money to political campaign (Yes)	4.70	1.53	9.45***
X_{27}	Organization officer (yes)	1.54	0.54	8.20**
X_{28}	Voted (yes)	-1.49	0.68	4.76*

*Significant at the .05 level, ** .01 level, *** .005; ***** .0005 level

Compensation Games

The games reported to this point are based on the assumption that citizens of the region or consumers of the electricity must pay the costs of abating aesthetic damages caused by the coal-power complex. It seemed possible that such games might meet with resistance from respondents who feel strongly that the "victims" of environmental damage ought not be expected to pay the costs of abatement. Further, there are good theoretical reasons to expect that "demand" for abatement would be lower when the affected population must pay than when the producers of damage must pay the costs of abatement (Randall, 1972:175-183).

Bidding games were developed to conform with the concept that the creators of the damage, the industries, must either abate that damage at their own expense or compensate the affected parties. Some extra difficulties were anticipated with this approach because

the situation is not rooted in the habits or experience of the respondents. Pretest results were encouraging, however, and it appeared worthwhile to use this game.

The results for situation A (the worst damage) for both samples are shown in table 8. The percentage of non-response was lower with the compensation game than with the willingness to pay games (table 1). More than one half the respondents indicated that, if they had the right to insist on environmental preservation, they would demand a sufficiently high level of

Table 8. Results of the compensation games: amount of compensation acceptable to non-reservation residents and to recreationists

Compensation dollars month	Non-reservation No. (%)	Recreationists No. (%)
No response	61 (12)	9 (6)
0	52 (10)	16 (11)
1-10	47 (9)	20 (13)
11 50	46 (9)	7 (5)
51 100	11 (2)	0
Some specific amount greater than 101	36 (7)	6 (5)
Infinity	273 (52)	92 (61)
TOTAL	526 (101)*	150 (101)*

*Due to rounding error

compensation that the power companies would find abatement more profitable. The distribution and nature of the responses made correlation with socioeconomic variables difficult. These difficulties, coupled with difficulties in comprehension in the game, dictated that further analyses be postponed until the methodology is refined.

CONCLUSIONS

On Hypotheses

The evidence is consistent on one hypothesis: i.e., a clear majority of people are willing to pay substantial amounts (relative to the estimated cost of abatement) for the abatement of pollution. For the hypotheses relating the socioeconomic variables to willingness to pay, the evidence is checkered. Several expected variables appeared to be significantly related to willingness to pay, as measured by one game or another, but there was little consistency. No variable was consistently related to all bids. Also, the amount of variance accounted for was low, except in the Indian subsample.

When examined singly in an analysis of variance, some of the expected relationships appeared. For example, age was inversely related to willingness to pay, and number of organization memberships was directly related. Income was also directly related to willingness to pay. However, the effects of these variables are not clear. First one, then another variable appeared in the regression equations, but none satisfactorily explained the phenomenon. Although some of the expected relationships emerged, individual behavior was poorly described by any of the common socioeconomic variables. Apparently this aesthetic concern was randomly distributed throughout the population. A tentative explanation of this randomness may be that attention has focused on environment only recently and attitudes have not yet fully crystalized. With time, a more patterned relationship may emerge. Or it may be that aesthetic concerns are inherently less patterned than many other phenomena.

It was mildly surprising that the bids were somewhat more highly associated with socioeconomic characteristics in the Indian subsample than in the predominantly Anglo subsample. Explained variances of the Indian subsample were about double those of the Anglo subsamples. Generally speaking, the variables which emerged were indicators of acculturation: those with more contact with the dominant culture were willing to pay more.

On Bidding Games

Determination of a price for an aesthetic condition like clean environment is complex and difficult. First, there is no established market for the item. There is no customary "value" which can be readily attached; furthermore, people are not used to paying for clean environment. Then, there is the crisis atmosphere surrounding the environmental issues. Most people have probably formulated their initial attitudes as much in reaction to extreme descriptions of instances of pollution as on the basis of deliberate informed judgments.

If expressions of willingness to pay are to be reliable or predictive of behavior, the measurement items should be framed in concrete terms that represent established, routinized behavior. They should quickly and clearly develop both the object (pollution) and the situation (electric-power generation) in the minds of the respondents. While people are not used to paying for pollution abatement, they are accustomed to paying for many other types of useful services and utilities, so it was not impossible to find an appropriate vehicle for payment.

Each of the bidding games was successful to some degree, in that each revealed a significant demand for environmental improvements in the Four Corners region. When bids were aggregated over the relevant populations (i.e., all residents and vacationing visitors, or all users of electricity produced in the region), willingness to pay for environmental improvements amounted to sums in the tens of millions of dollars annually. However, the relevant questions are: Which games worked best, and what improvements in the games might be possible?

One measure of the effectiveness of the games is the willingness of the sample members to respond. Non-response rates amounted to 6 percent of the recreationists and 12 percent of the non-reservation residents in the compensation game; 13 percent of the non-reservation residents in the electricity bill game; 32 percent of the non-reservation and 37 percent of the reservation residents, in the sales tax games, and 49 percent of the reservation residents in the monthly payment game. It must be concluded that the questions on who should bear the cost significantly affect response rates to these bidding games. This was true even though the games were worded to minimize this effect. Respondents were asked to treat each game as though it referred to the only possible way environmental improvements could be financed.

The compensation games had high response rates, but many of the responses were that no amount of compensation would be sufficient to induce the respondent to accept a polluted environment.

If real money were offered, many might find some amount less than infinity acceptable. This approach has appeal and certain advantages, but it also carries some formidable problems.

One opportunity existed for comparison of the results from two games played with the same subsample: the electricity bill and sales tax games were played with the non-reservation residents. The mean bids, converted to dollars per household per year for situation C, amounted to $23 with the electricity bill game and $85 with the sales tax game. Compared with the electricity bill game, the sales tax game resulted in both a higher rate of non-response due to ethical objections to the vehicle of payment and a higher mean dollar bid from those who did respond. No evidence was found to explain the disparity in these mean annual bids, but there are two possible sources of the difference. The sales tax game required bids based on percentages of household expenditures for sales-taxable items and was clearly more complex than the electricity bill game, which was expressed in dollars per month. The game rules required that payments be collected from the residents of the region in the sales tax game, and from all users of Four Corners electricity in the electricity bill game. The latter group is much larger. Respondents may have correctly perceived that, to collect the same total amount of money, the electricity bill game would require much smaller bids per household. In fact, when the bids were aggregated over the relevant populations, the total income from the electricity bill game exceeded that from the sales tax game.

The following suggestions are offered for those who might make a similar study:

- Tie the measuring instrument as directly as possible to the phenomena that cause the environmental damage. If the pollution is caused by generation of electric power, as in this case, frame the questions in terms of price of electric power. Make the vehicle for payment a concrete, routine behavior: for example, the payment of the monthly household electric bill.

- Devise an instrument that offers the possibility of sharing the burden of payment among the groups involved. This should cut down the refusal-to-play rate.

- Use more than one instrument where feasible. Many respondents who are offended by one particular vehicle for payment may well respond to the alternative instrument. Each instrument thus provides a reasonably accurate method for estimating the bids of non-respondents to the other instrument.

• A good, non-monetary, rank-order, environmental-concern scale should also be useful in estimating bias resulting from resistance to the dollar instrument(s).

The science of measuring concern for environmental quality and willingness to pay for pollution abatement is in its infancy. The conclusions and suggestions offered are thus tentative and subject to change as the science develops.

Implications and Applications

A clear majority of the affected population favor some abatement of the pollution caused by coal mining and the generation of electric power in the Four Corners. These people prefer to have the companies involved bear the burden of responsibility for abatement, but they indicated a willingness to pay substantial sums if that were the only way pollution could be avoided. Presumably this attitude of the population could be translated into political support for environmental cleanup. The support, however, seems to be scattered throughout the population; no identifiable socioeconomic group either supports or opposes abatement more strongly than any other group.

The game did make a difference in the amount bid. In addition, each game put the responsibility on a different segment of the population. The sales tax and user-fee games put the burden on the victims—those who suffer the damages; the electric bill game put the burden on the beneficiaries—those who use the electricity. Not unexpectedly, the vehicle of payment seems to make some difference in its acceptability to the population.

The approach allows the estimation of the total demand for pollution abatement by the aggregated population. This demand can be weighed against estimated abatement costs to give an estimate of the benefits that could be expected from such an effort. These calculations are the subject of forthcoming articles by the authors of this bulletin.

LITERATURE CITED

1. Browne, Alan D. 1971. A Way to Finance Environmental Protection. The American City, 86 (January):6.

2. Erskine, Hazel. 1972a. The Polls: Pollution and Industry. Public Opinion Quarterly, 36, No. 2 (Summer):263-280.

3. Erskine, Hazel. 1972b. The Polls: Pollution and Its Costs. Public Opinion Quarterly, 36, No. 1 (Spring):120-135.

4. Gerlach, L. P., and Virginia Hine. 1970. You and the Ecology Movement. Natural History Magazine, 79, No. 6 (June-July):27-29.

5. Murch, Arvin W. 1971. Public Concern for Environmental Pollution. Public Opinion Quarterly, 35 (Spring):100-106.

6. Randall, Alan. 1972. Market Solutions to Externality Problems: Theory and Practice. American Journal of Agricultural Economics, Vol. 54:175-183.

7. Simon, Rita J. 1971. Public Attitudes Toward Population and Pollution. Public Opinion Quarterly, 35 (Spring):93-99.

8. U. S. Department of Health, Education and Welfare, Public Health Service, Report for Consultation on the Four Corners Interstate Air Quality Control Region, October, 1970. Washington, D. C.: National Air Pollution Control Administration.

APPENDIX: Survey Questionnaire

TRAVEL PLANS

Number ___

1. Where is your home? _____
   (1) City of 1,000,000
   (2) Smaller City
   (3) Town 2,500 to 100,000
   (4) Rural

2. How many miles is that from here _____

3. How long have you lived there? (Years) _____

4. How many days do you intend to spend at this recreation site (i.e., this National Park, this National Forest, etc.)? (Days) _____

5. In the Four Corners area? (Days) _____

6. On this trip (from day left home to day returned home)? (Days) _____

7. How many people are in your party? _____

8. How many recreation areas do you intend to visit on this trip (e.g., National, State and County Parks, National Monuments, National Forests, Wilderness Areas, etc.)? _____

9. Name them (Circle those already visited this trip) _____

ENVIRONMENTAL CONCERN

10. What is the primary reason that you are here? _____
    1. To get away from urban environment to rural environment
    2. Sightseeing and touring
    3. To gain an historical and cultural experience
    4. Outdoor recreation (hunting, fishing, hiking, boating, water skiing, etc.)
    5. To get away from noise, congestion and pollution
    6. Other (Specify) _____

11.	Have you visited any parks in this area, including this one, before this trip? If "No", skip to question 14.	No 0	Yes 1
12.	Over what period of time? (Years)	_____	
13.	Do you feel the quality of the environment in this area has decreased since you started coming (e.g., air pollution, water pollution, strip mines, transmission lines)?	No 0	Yes 1
14.	If the environment deteriorated in this area, do you expect that you and your family may be less likely to visit recreation sites like this in the future?	No 0	Yes 1
	Would you say that you are the kind of person that		
15.	Is offended by the sight of people throwing trash out of a car window or disfiguring landmarks?	No 0	Yes 1
16.	Says something to other people you see littering or vandalizing?	No 0	Yes 1
17.	Goes around picking up litter (paper, bottles, etc.)?	No 0	Yes 1
18.	Joins environmental groups?	No 0	Yes 1

BIDDING GAME

We have some questions which will require your special cooperation. We want to find out how strongly you feel about the need for environmental improvements. Since environmental improvements cost money, we would like to get a dollar estimate of how much a cleaner environment is worth to you. We have some questions which consider different ways of financing environmental improvements. After we finish these questions, you will have the opportunity to say who you think should bear the costs of environmental improvements.

Let us consider three levels of environmental damage from the Four Corners coal mining and power generation complex:

A. (Show photographs) A is the most severe environmental damage. Note the spoil banks, air pollution and transmission lines.

B. (Show photographs) B shows considerable reduction in environmental damage. The spoil banks have been leveled and air pollution reduced.

C. (Show photographs) In C, environmental damage has almost been eliminated. Air pollution has nearly disappeared. The spoil banks have been reclaimed and transmission lines placed underground. (This is hypothetical; it has not really happened yet).

Our first question deals with user fees:

19. How much does your party spend per day in user fees for recreational services here?

Entrance fees	$ /day
Camp site	$ /day
Hook-up fee	$ /day
Boat docking and marina fee	$ /day
Others	$ /day
Total	$ /day

Suppose user fees in all the recreation areas in the Four Corners area were increased. All the additional money collected would be spent on environmental improvements. All recreators would pay. (Also, year-round residents of the Four Corners area would contribute to environmental improvements through increased sales taxes.)

20. Do you think it would be reasonable to add $1/day to users fees in this recreation area, if that would result in an improvement from situation A to situation C?

    Play bidding game in 25 ¢ steps, until the very highest "Yes" answer is received. $ /day

21. Do you think it would be reasonable . . . . . from A to B?

    Play bidding game. $ /day

22 Ask this question only if answers to questions 20 and 21 (above) were both "Zero".

Did you answer "Zero" because
(Choose only one)

(1) You do not suffer any ill effects from environmental damage and therefore see no reason to pay to reduce it?

(2) You believe it is unfair to immoral to expect the victims to pay the costs of reducing environmental damage?

Now let's consider a rather different approach to improving the environment. Let us imagine that the law was changed so that everyone has a legal right to a clean environment. People rent all kinds of things like houses, buildings, land, automobiles, lawnmowers. So, if we all had a right to a clean environment, we could rent that, too. We would like to know if you would be willing to rent your right to a clean environment to the electric power industry. Under such a scheme, you would be paid according to the amount of smoke in the air over this recreation area and the extent to which strip mines and transmission lines spoiled your view. Of course, if the companies found your charge too high, they could always choose to clean up the environment themselves, thus saving the cost of excessive payments to you.

23 Would you allow as much environmental damage as in B in return for a rent of $1 day?

Play bidding game. $____/day

24 Would you allow as much environmental damage as in A in return for a rent of $1 day?

Play bidding game. $____/day

25 Finally, please tell me who you think should pay the costs of environmental improvements? _____

(1) The people affected by it, i.e., the local residents and recreationists and tourists in the area.

(2) The final user of electric power.

(3) The companies which operate the mine and power plant.

(4) Some combination. If this alternative is chosen, ask "Which bears primary responsibility?"

Rank order _____ _____ _____

Questions on pages 27-31 were asked in the Recreationist's Questionnaire only.

RESIDENCE

Number ____

1. How long have you lived at this address? (Years) _____

2. In the Four Corners area? (Years) _____

3. Where did you live before you moved to this area? _____
   (1) City of 1,000,000
   (2) Smaller city
   (3) Town of 100,000 to 2,500
   (4) Rural area

4. Why did you come here to live? Rank the three most important.
   (1) Job & income
   (2) Family
   (3) Cost of living
   (4) Climate
   (5) Recreation opportunities
   (6) Health
   (7) Pollution
   (8) Congestion

   4. ____
   5. ____
   6. ____

Comments _____

ENVIRONMENTAL CONCERN

7. Have you noticed any environmental problems in this area, e.g., air pollution, water pollution, land pollution (junk, dumps)? No 0 Yes 1

8. Have any of these environmental problems caused harm to other people in this area or to your family, e.g., health, plants, livestock, esthetics, costs? Nobody 0, Other people 1, Family 2

   Would you say that you are the kind of person that:

9. Is offended by the sight of people throwing trash out of a car window or disfiguring landmarks? No 0 Yes 1

10. Says something to other people you see littering or vandalizing? No 0 Yes 1

11.	Goes around picking up litter (paper, bottles, etc.)?	No 0	Yes 1
12.	Joins environmental groups?	No 0	Yes 1

BIDDING GAME

We have some questions which will require your cooperation. We want to find out how strongly you feel about the need for environmental improvements. Since environmental improvements cost money, we would like to get a dollar estimate of how much a cleaner environment is worth to you. We have some questions which consider different ways of financing environmental improvements. After we finish these questions, you will have the opportunity to say who you think should bear the costs of environmental improvements.

Let us consider three levels of environmental damage from the Four Corners coal mining and power generation complex:

A. (Show photographs) A is the most severe environmental damage. Note the spoil banks, air pollution and transmission lines.

B. (Show photographs) B shows considerable reduction in environmental damage. The spoil banks have been leveled and air pollution reduced.

C. (Show photographs) In C, environmental damage has been almost eliminated. Air pollution has nearly disappeared. The spoil banks have been reclaimed and transmission lines placed underground. (This is hypothetical; it has not really happened yet.)

Our first question deals with a sales tax. Suppose a sales tax was collected from citizens of the Four Corners area for the purpose of financing environmental improvements. Every cent of the additional tax would be used for environmental improvements, and all citizens would pay the tax.

13. Do you think it would be reasonable to add one cent to the dollar to present sales taxes, if that resulted in an improvement from situation A to situation C?

If "Yes", increase the amount in 1-4 cent steps until the very highest "Yes" answer is reached.

If "No", reduce amount in 1-4 cent steps, until the first (i.e., highest) "Yes" answer is reached.

Record highest "Yes" answer (cents on the dollar) _____

14. Do you think it would be reasonable to add one cent on the dollar . . . from situation A to situation B?

Repeat bidding game.

Record highest "Yes" answer: (cents on the dollar) _____

15. Ask this question only if the answers to questions 13 and 14 (above) were both "Zero." Did you answer "Zero" because: (Choose only one). _____

(1) You do not suffer any ill effects from environmental damage, and therefore see no reason to pay to reduce it?

(2) You believe taxes are already too high?

(3) You believe it is unfair or immoral to expect the victims to pay the costs of reducing environmental damage?

Now, let's look at a completely different way of paying for environmental improvements.

16. How much is your monthly bill for electricity? $ _____/mo

Imagine that an additional charge was added to your electricity bill, and the electricity bills of everyone who uses electricity produced in the Four Corners area, that is, people as far away as Southern California. All of the additional money collected would be used to repair the environmental damage caused as a result of electricity production in the Four Corners area.

17. Do you think it would be reasonable to add $2/month to everyone's electricity bill if that would result in an improvement from situation A to C.

Play bidding game in 50 ¢ intervals. $ _____/mo

18. Do you think it would be reasonable to add $2 month to everyone's electricity bill if that would result in an improvement from situation A to B.

Play bidding game. $ _____/mo

19 Ask this question only if answers to questions 17 and 18 were both "Zero". Did you answer "Zero" because (Choose only one):

1) You do not suffer any ill effects from environmental damage, and therefore see no reason to pay to reduce it?

2) You believe it is unfair or immoral to expect the victims to pay the costs of reducing environmental damage?

Now, let's consider a rather different approach to improving the environment. Let us imagine that the law was changed so that everyone has a legal right to a clean environment. People rent all kinds of things, e.g., houses, buildings, land, automobiles, lawnmowers. So, if we all had a legal right to a clean environment, we could rent that too. We would like to know if you would be willing to rent your right to a clean environment to the electric power industry. Under such a scheme, you would be paid according to the amount of smoke in the air above your home on an average day and the extent to which your view was spoiled by strip mines and transmission lines. We want to know what rent you would charge. Of course, if the companies found your charge too high, they could always choose to clean up the environment themselves, thus saving the cost of excessive payments to you.

20. Would you allow as much damage as B in return for a rent of $5 month?

Play bidding game $ _____/mo

21. Would you allow as much damage as in A in return for a rent of $5 month?

Play bidding game. $ _____/mo

22. Finally, please tell me who you think should pay the costs of environmental improvements.

1) The people affected by it, i.e., the local residents and recreationists and tourists in the area.

2) The final user of electric power.

3) The companies which operate the mine and power plant.

4) Some combination. If this alternative is chosen, ask "Which bears primary responsibility?"

Rank order _____

(23, 24, and 25 do not exist)

Questions 1-22, pages 32-36, were used in the Resident's Questionnaire only.

	Relationship	Sex	Age	Yrs. of School	Employment	Employer
26						
27						
28						
29						
30						

CODING

Head	1	Power complex	1	Professional	1
Spouse	2	Other industries	2	Skilled	2
Adult	3	Ag., gas and oil	3	Clerical	3
Adult	4	Unemployed	0	Unskilled	4
Adult	5			Housewife	5
				Other	6
Male	1				
Female	2				

31. How many school and preschool children live in the household? _____

In order to analyze the results of our survey, we must have an estimate of your annual household income (before taxes). Into which of the following ranges does it fall?

32. Under $2,500
$2,500 $5,000
$5,000 $7,500
$7,500 $10,000
$10,000 $15,000
$15,000 $20,000
More

_____

33. Would you be willing to tell me the exact amount, as nearly as you can estimate it? (Annual gross income) (No = -1)

34. Ethnicity?

Anglo	1	Jicarilla Apache	6
Navajo	2	Zuni	7
Mountain Ute	3	Spanish American	8
Southern Ute	4	Black	9
Hopi	5	Other	0

_____

35. Primary language used in household?

E	S	I	M	O
1	2	3	4	5

ORGANIZATIONS

	Organization	Local 1, State 2, or National 3	How often you attend, How often group meets	Ever held office or been committee member
36			/	
37			/	
38			/	
39			/	
40			/	
41			/	

CODING

Church	1	Social & Hobby	5
Political Party	2	Labor Unions	6
Professional	3	Environment & Conservation	7
Civic & Service	4	Other	8

POLITICAL ACTIVITY

42. How many of your organizations take stands on political issues? _____

43. How many times have you voted in National, State or Tribal elections in the past four years? (Circle one) 0 1 2 3 4 5 6 7+

44. Did you write or talk to your congressman or other high public official about some important issue in the past four years? (Number of times) _____

45. Did you work for the election of any political candidate or contribute to any campaign fund in the past four years? (Circle one) No 0 Yes 1

MASS MEDIA

46. How many hours per week do you spend reading newspapers, books and magazines? _____

47. How many hours per week do you spend listening to or watching radio and television? _____

RECREATION ACTIVITIES

How much time do you spend doing these things?			How well do you like doing them? 1. Dislike very much 2. Dislike 3. Indifferent 4. Like 5. Like very much	
		INDOOR SPORTS AND HOBBIES		
48	_____ hours/ week	Basketball, volleyball, bowling, pool, gym, pingpong, etc., reading, writing, stamps, coin collecting, etc.	1 2 3 4 5	52
		OUTDOOR ACTIVITIES Limited Space (Backyard or city park)		
49	_____ hours/ week	Baseball, football, golf, tennis, gardening	1 2 3 4 5	53
		Open Space		
50	_____ days/ year	Camping (general, auto, trailer, tent, picnicing, traveling, touring, sightseeing, hiking, bicycling, motorcycling, boating, swimming, waterskiing, fishing, and hunting	1 2 3 4 5	54
		Wilderness		
51	_____ days/ year	Wilderness camping, back packing, canoeing, rafting, wilderness fishing and hunting	1 2 3 4 5	55

ATTITUDES

The following questions give you the opportunity to express your opinions about how the economy is run. Please listen while I read

each statement, and then tell me if you strongly agree, agree, have no opinion, disagree or strongly disagree. There is no right or wrong answer; we only want your opinion.

	SA	A	?	D	SD
56. Poor people are poor because they have been treated unfairly.	5	4	3	2	1
57. Environmental damage is a reasonable price to pay for economic progress	1	2	3	4	5
58. A person's income is a fair measure of the amount of good he does in the community.	1	2	3	4	5
59. Incomes above $25,000 year should be taxed more than they are now.	5	4	3	2	1
(Next four questions on community relations)					
60. What is good for this community is good for me.	5	4	3	2	1
61. Everyone should handle his own business as he pleases and let others handle theirs as they please.	1	2	3	4	5
62. We can maintain or improve the environment only when the whole community is interested and concerned.	5	4	3	2	1
63. The first responsibility of each citizen is to look after himself.	1	2	3	4	5
(Next four questions on fate and destiny)					
64 A man can change his own fate (destiny)	5	4	3	2	1

	SA	A	?	D	SD
65. The secret of happiness is being content with what comes to you and not expecting too much out of life.	1	2	3	4	5
66. A person can plan his future so that everything will come out all right in the long run.	5	4	3	2	1
67. When a man is born, the success he is going to have is already in the cards, so he might as well accept it and not fight against it.	1	2	3	4	5

TO BE COMPLETED BY INTERVIEWER

68. Interviewer (Code Number) _____

69. Location _____

70. Pollution concentration zone (Code) _____

71. How long did the formal interview take? (Minutes) _____

72. Conversation? (Minutes) _____

73. Degree of cooperation? Hi (3) Med (2) Lo (1) _____

74. Degree of understanding? _____

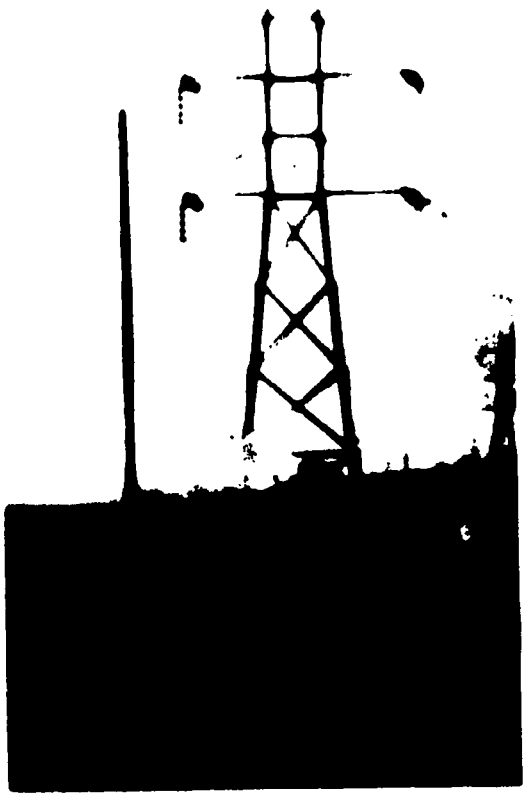
75. Degree of evasion? _____

76. Degree of suspicion? _____

77. Degree of enthusiasm? _____

COMMENTS _____

Situation A --the worst kinds of pollution created by the power plant



Situation B -a midway point between the worst kinds of pollution and a natural environment

Situation C – an environment unharmed by pollution