CHAPTER 3

METHODOLOGY

The present study aimed at studying people's participation in soil and water conservation for sustainable agricultural production on watershed basis. The present chapter discusses the locale of the study, pilot study, population of the study, the research design, construction of tools for data collection, scoring and categorization of data and statistical methods used for measuring independent and dependent variables. Thus, this chapter takes care of the scientific procedures adopted for the present investigation to draw rational, logical and meaningful inferences. The methodology followed for conducting the present study is reported in the following heads:

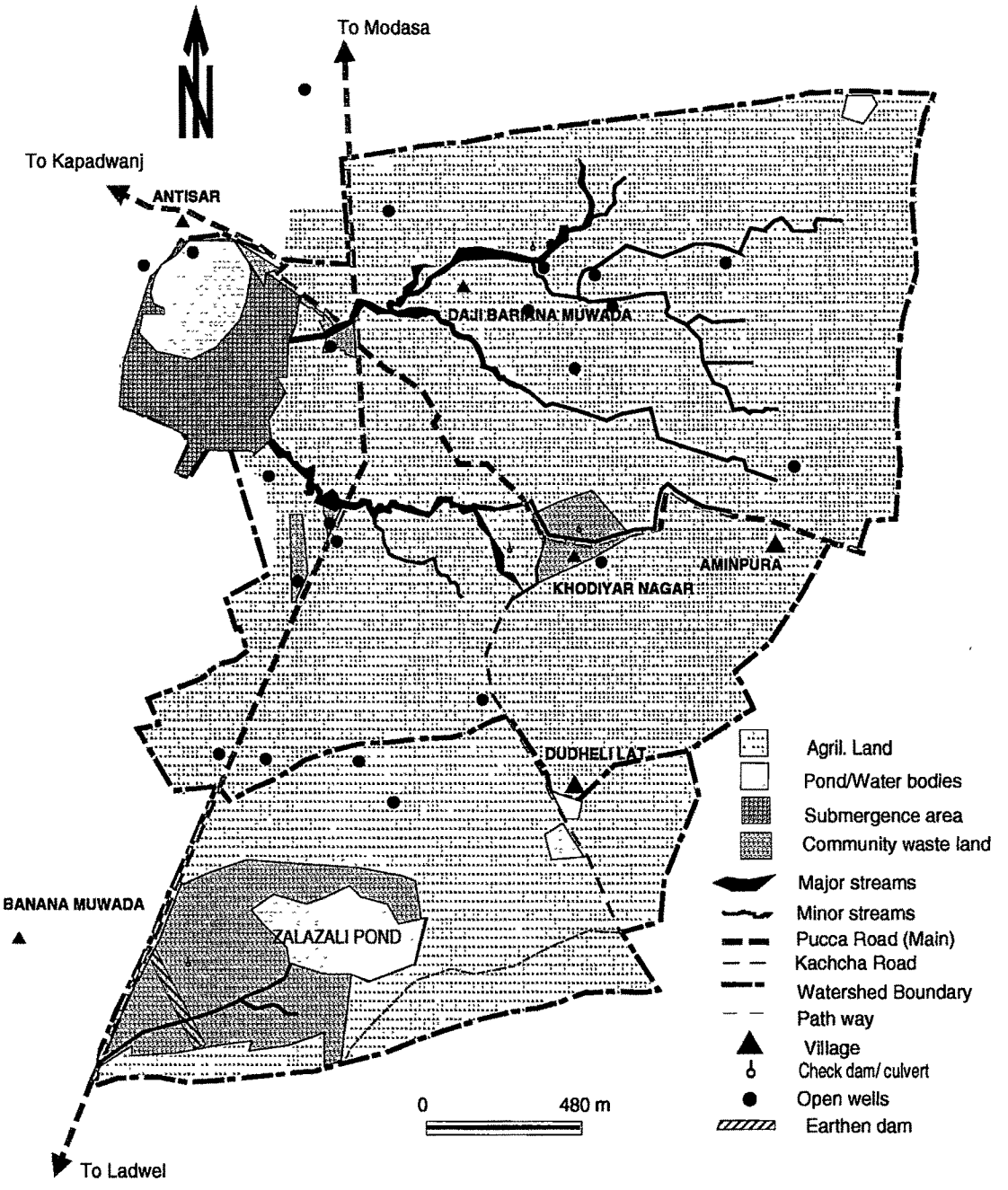
3.1 Locale of the study:

National watershed development projects for rainfed areas were launched by the Government of India under different Five Year Plans. An Integrated Wasteland Development Project (IWDP) was sanctioned by Ministry of Rural Areas and Employment, Department of Wasteland Development, New Delhi, Government of India, to Central Soil and Water Conservation Research and Training Institute, Research Centre, Vasad, in March 1997. The scientific staff of this research centre, Vasad, decided to develop the Antisar watershed through the sanctioned Integrated Wasteland Development Project because the Antisar watershed was not adopted earlier by any other government agency to carry out soil and water conservation works for sustainable agricultural production.

The Antisar watershed is spread over 812 hectares of land. Out of that 736 hectares belong to individual farmers and 76 hectares is owned by Panchayat community/Government. The Antisar watershed is located at 73^0 10' E longitude and 23^0 0' N latitude and 30 mt. above mean sea level. Antisar watershed is located on Dakor-Pankhiya road about 100 km north of Vasad, comes under Kapadvanj taluka of Kheda district in Gujarat. The watershed is about 12 km from Kapadvanj town (Map).

The Antisar watershed comprises of ten villages/hamlets namely, Aminpura, Antisar, Daji-bariya-na-muwada, Dudheli Lat, Kapadivav, Khodiyar Nagar, Motipura, Navafarm, Sukhpura and Vijaynagar. The total population of the watershed comprises of 1362

Map 1: Land Use Map of Antisar Watershed



adults and 533 children. Most of them are Patel, Desai(Rabari), Bariya, Vankar, Parmar, Solanki, Zala and Vasava.

The present study was conducted in the Integrated Wasteland Development Project (IWDP), Antisar watershed purposively, because the Antisar watershed development programme was sanctioned by the Ministry of Rural Area Employment to the Central Soil and Water Conservation Research and Training Institute, Research Centre, Vasad. Moreover, the investigator is also employed in the Research Centre, Vasad. The investigator was interested to study the extent of people's participation in soil and water conservation under Antisar watershed development programme by both the male and female farmers.

3.2 Pilot study:

A pilot study was conducted in Antisar watershed area to measure the feasibility of the study entitled "people's participation in soil and water conservation programme for sustainable agricultural production in Antisar watershed of Gujarat" and feasibility of different variables included in the study. A sample of thirty rural farmers, comprised of 21 male and 9 female farmers was selected randomly from the Antisar watershed area for the purpose. The responses of the respondents were recorded by the investigator on the developed interview schedule by the interview method. The scoring of the different responses of the respondents was done accordingly. The quantitative responses of different variables were categorized and analyzed to assess the different variables included in the study.

The investigator tried to judge the feasibility of the study in the following terms through pilot study:

(i) Cooperation of rural male and female farmers during data collection.
(ii) Ability of rural farmers to respond to the interview schedule.
(iii) Time required by respondent in responding to the interview schedule.
(iv) Extent of mobility possible within the watershed area.
(v) Availability of variation in the variables included in the study.

The pilot study helped in finding out the following:

(i) The farmers of Antisar watershed area were cooperative and showed interest in the research study.
(ii) The rural male and female farmers of Antisar watershed understood the language of the tools prepared for data collection and were able to respond to the questions and statements of the tools.
(iii) The approximate time spent on data collection tools by interviewing one respondent was one and half-hours.
(iv) The transport and mobility within the watershed area was possible. The villages/hamlets of the watershed area were well connected by roads.

(v) There was variation among the respondents in relation to all the variables included in the present study.

3.3 Population of the study:

The Integrated Wasteland Development Programme (IWDP), taken up at Antisar in Kapadvanj taluka of Kheda district, Gujarat, was sanctioned by Ministry of Rural Areas and Employment, Government of India to Central Soil and Water Conservation Research and Training Institute, Research Centre, Vasad. The IWDP Antisar watershed has adopted a participatory approach of development as per the guidelines for national watershed development project for rainfed areas issued from Ministry of Rural Areas Employment, Government of India. According to watershed guidelines an Antisar Watershed Development society was formed of all the male and female farmers possessing land in the watershed area. An Antisar Watershed Development Committee was formed from the elected members of the Antisar watershed development society. The Antisar Watershed Development Committee has an elected chairman. The society was registered at Assistant Registrar of Societies, Nadiad, by application with formulated set of guidelines for strategies, rules, norms and funding pattern in respect of soil and water conservation works. The society was registered as Antisar Jalastrav Vikas Society (ANJVIS) in 1998. According to the guidelines of National Watershed Development Project for Rainfed Areas (NWDPRA), different types of groups were formed before commencing the development activities. The different groups were formed from the local farmers of the watershed area. The names of the groups were given as

per the developmental activities to be carried out in the Antisar watershed. The Antisar watershed society had made different groups of farmers for their active participation in different development activities. Almost all the members of the watershed society were involved in the activities of the following groups.

Users groups:

a) Bunding and land leveling
b) Water management
c) Animal husbandry development
d) Agricultural development
e) Horticulture development
f) Forestry development

Self-help groups:

a) Grazing and protection
b) Home business development
c) Marketing management

The population of the study consisted of all the farmers and farm women who possessed land in the Antisar watershed area. All the members of Antisar Watershed Development Society including men and women were considered as the respondents for the study. All the 392 respondents comprised of 284 male farmers and 108 female farmers of Antisar watershed development society. Since, the size of the population in watershed area was small, therefore, all the farmers as well as farm women were considered as the sample for the study. Hence, it was a population study. The villagewise distribution of the respondents included in the study is presented in table 1 and figure 1.

Table 1: Villagewise distribution of the respondents in Antisar watershed.

N = 392

Sr. No.	Name of Village	Respondents		
		Male (%) N = 284	Female (%) N = 108	Overall (%) N=392
1.	Antisar	23.94	29.63	25.51
2.	Banana Muwada	28.87	9.29	23.47
3.	Dajibariyana Muwada	8.45	5.55	7.65
4.	Dudheli Lat	22.53	46.29	29.09
5.	Khodiyar Nagar	2.82	0.0	2.04
6.	Motipura	13.38	9.25	12.24
	Total	100.00	100.00	100.00

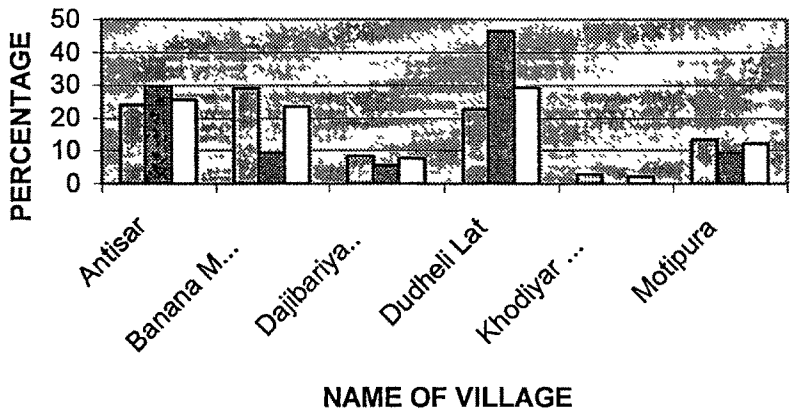


Fig. 1: Villagewise Distribution of Respondents

3.4 Research Design:

Ex-Post-Facto research design was used for this study. Kerlinger (1976) stated that ex-post-facto research design is worthy to apply when the independent variables have already acted upon. Because the integrated watershed developmental works were already carried out in the Antisar watershed area for sustainable agricultural production. The ultimate beneficiary farmers had already participated in planning, implementation and maintenance of soil and water conservation programme in Antisar watershed. Hence, it was imperative to measure the extent of people's participation in the Antisar watershed programme.

3.5 Research tools for data collection:

Interview schedule having seven sections was constructed as a tool for collection of data (Appendix II). The items of the interview schedule were prepared after the investigator;

(i) Visited the libraries of Indian Agricultural Research Institute, New Delhi, Gujarat Agricultural University, Campus Anand, WREMI, MSU, Baroda, ISRO, Ahmedabad for review of literature and discussion with subject matter specialists

(ii) Reviewed the books related to people's participation in rural development programmes.

(iii) Read research articles which were related to the topic of the present study.

(iv) Reviewed other research studies related to the present study.

(v) Discussed with the subject matter specialists, soil and water conservationists and Extension experts.

(vi) Read the guidelines for watershed development programme issued by ministry of rural development, government of India.

The tools constructed for the study were as follows:

3.5.1 Section I: Background information

The first section of the interview schedule consisted of a checklist of the socio-economic characteristics of the respondents.

The socio-economic characteristics of the respondents included in the study were as follows:

VARIABLES	MEASUREMENT TOOLS
Independent variables:	
1. Gender	Structured checklist prepared
2. Age	Structured checklist prepared
3. Socio-economic status (overall)	Standardized scale developed by Pareek & Trivedi (1963) was used with modifications.

4. Socio-economic status (specific indicators):	Standardized scale developed by Pareek & Trivedi (1963) was used with modifications.
i) Family land holding	Structured checklist prepared
ii) Education	Structured checklist prepared
iii) Farm power	Structured schedule developed
iv) Family size	Structured schedule developed
v) Family income	Structured schedule developed
5. Social participation	The investigator developed structured schedule. The responses were asked to respondents as member or office bearer of any rural social organization in past or present (appendix II).

3.5.2 Section II: Risk Preference

The second section of the interview schedule consisted of a scale of the risk preference of the farmers in adoption of new improved soil and water conservation practices. The investigator developed a risk preference scale considering the following points:

(i) Adoption of new soil and conservation technologies in degraded wasteland.

(ii) Ability of farmers to adopt costly SWC practices.

(iii) Ability of farmers to replace old practices with new SWC practices.

The risk preference scale consisted of total ten statements. There were five negative and five positive statements.

3.5.3 Section III: Knowledge regarding Soil and Water Conservation technologies

The third section of the interview schedule consisted of a knowledge test having fourteen open end type questions on soil and water conservation technologies related to:

(i) Agronomic soil and water conservation technologies for management and sustainable crop cultivation in watershed area.

(ii) Engineering soil and water conservation technologies for control of soil erosion and sedimentation deposition.

(iii) Forestry soil and water conservation technologies for cultivation of trees on boundaries and on slope land to reduce soil erosion.

A scale was developed by the investigator to measure the knowledge level of farmers regarding soil and water conservation technologies. The scale consisted of fourteen statements, with equal number of negative and positive statements. The scale had two point responses system as yes or no.

3.5.4 Section IV: Attitude of respondents towards soil and water conservation programme

The fourth part of the interview schedule consisted of attitude scale towards development of SWC programme. A Likert type attitude scale was developed by the investigator to measure attitude of male and female respondent towards soil and water conservation programme. The scale consisted of thirteen attitude statements comprised of six negative and seven positive statements to measure the attitude of the rural male and female farmers towards:

(i) Participation in planning of soil and water conservation programme.
(ii) Participation in implementation of soil and water conservation programme.
(iii) Participation in maintenance of soil and water conservation programme.

The responses were sought on a three-point continuum as agree, neutral and disagree.

3.5.5 Section V: Adoption of soil and water conservation technologies

The fifth part of the questionnaire consisted of the adoption scale of the different soil and water conservation technologies related to (i) Agronomy (ii) Engineering and (iii) Forestry. An adoption scale having three point response system was developed by the investigator.

3.5.6 Section VI: People's participation in SWC programme

Sixth part of the questionnaire consisted of three point rating scale to measure extent of people's participation in different stages of soil and water conservation programme. It was divided into three parts according to three phases of watershed development programme such as planning, implementation and maintenance stages of rural development programme as follows:

(i) People's participation in programme planning stage.

(ii) People's participation in programme implementation stage.

(i) People's participation in programme maintenance stage.

The scale consisted of thirty statements and equally divided into three sub headings according to the three phases or stages of rural development programme as stated above.

3.5.7 Section VII: Constraints faced by the respondents

Seventh part of the tool consisted of two point rating scale to study the constraints faced by the rural male and female farmers during development through participation in soil and water conservation programme of Antisar watershed. It consisted of total thirteen statements related to the following areas of constraints.

(i) Economical constraints
(ii) Technological constraints
(iii) Input availability constraints
(iv) Situational constraints

3.6 Validity of research tools:

The whole set of data collection tools was translated into Gujarati language to facilitate the respondents to easily understand the quarries because all the respondents of the study area were from Gujarat.

3.6.1 Content validity of the tools:

The developed set of research tools was sent to different subject matter specialists for validation. The experts selected for validation of tools were senior subject matter specialists in the disciplines of soil and water conservation and extension and communication. The experts represented the following departments.

(i) Department of Extension and Communication in Faculty of Home Science, Maharaja Sayajirao University of Baroda
(ii) Water Resource Engineering and Management Institute (WREMI), Samiala.
(iii) Faculty of Engineering from Maharaja Sayajirao University of Baroda.
(iv) Extension Education Institute, Gujarat Agricultural University, Anand campus, Anand.
(v) Department of Extension, B.A. College of Agriculture, GAU, Anand.

(vi) Central Soil and Water Conservation Research and Training Institute, Dehradun.

The experts were requested to check the tools for their appropriateness for the following aspects:

(i) Content validity
(ii) Format
(iii) Response system
(iv) Language
(v) Suitability to the respondents

The suggestions of the experts were incorporated in the tools. It was found that the contents of the tools were according to the topic of the study and the language and response system were also suitable to the respondents of the study.

3.7 Reliability of the tools:

Reliability of the developed set of tools was measured by the test-retest method.

Reliability of tools was measured on thirty rural farmers (i.e. comprised of 21 male and 9 female farmers) by administering test-retest method by keeping one month gap to check the reliability of the tools. The respondents were selected randomly from the members of Antisar watershed development society.

Coefficient of correlation between two sets of scores was computed to see the reliability of tools to measure the risk preference, knowledge regarding SWC

technologies, attitude towards soil and water conservation programme, adoption of soil and water conservation technologies and people's participation in soil and water conservation programme. The coefficient of correlation (r-value) of the tools was found to be as follows:

	Tool	Reliability coefficient
(i)	Risk preference	.87
(ii)	Knowledge regarding SWC practices	.86
(iii)	Attitude towards SWC programme	.89
(iv)	Adoption of SWC practices	.93
(v)	People's participation in SWC programme	.91
(vi)	Overall	.89

Thus, the tools for data collection were found reliable.

3.8 Collection of data:

The respondents were contacted personally at their work places or at their residences in an informal way and data were collected personally by the investigator. The responses of the respondents were tick marked by the investigator in the structured tools made for data collection.

The investigator was accompanied by a technical assistant, temporarily posted under Integrated Wasteland

Development Project, Antisar watershed, who was well-versed with Gujarati language and also known to the area. The data collection was done during October, 2000 to February, 2001.

3.9 CATEGORIZATION AND SCORING OF VARIABLES:

The scoring, categorization and measurement of all the independent and dependent variables were done as follows:

3.9.1 INDEPENDENT VARIABLES:

Sl.No.	Variables	Range of score	Categories
1.	Gender:	--	a) Male
		--	b) Female
2.	Age:	18-30 years	a) Young
		31-50 years	b) Middle
		above 51 years	c) Old
3.	Socio-economic status:	<mean - S.D.	a) Low
		mean $\pm$ S.D.	b) Medium
		>mean + S.D.	c) High
4.	Land holding:	upto 2.5 acres	a) Marginal
		2.51 to 5.00 acres	b) Small
		5.01 to 7.50 acres	c) Medium
		7.51 to 10.00 acres	d) Large
		above 10.00 acres	e) Very large

5.	Education:	0	a) Illiterate
		1	b) Can read only
		2	c) Can read and write
		3	d) Primary
		4	e) Secondary
		5	f) Higher secondary
		6	g) Graduate
		7	h) above graduate
6.	House:	0	a) No own house/rented
		1	b) Own hut
		2	c) Own kutcha house
		3	d) Own semi pucca house
		4	e) Own pucca house
		5	f) Own Mansion
7.	Occupation:	1	a) Labour
		2	b) Business
		3	c) Cultivation
		4	d) Service
8.	Caste:	1	a) Scheduled caste
		2	b) Scheduled tribe
		3	c) Backward caste
		4	d) General caste
		5	e) Dominant caste
9.	Farm power:	<Mean - S.D.	a) Low
		Mean $\pm$ S.D.	b) Medium
		>Mean + S.D	c) High

10. Material possession:

<Mean - S.D.	a) Less
Mean $\pm$ S.D.	b) Average
>Mean + S.D.	c) More

11. Type of family:

Husband, wife and Children	a) Nuclear family
Husband, wife, children, in-laws and relatives.	b) Joint family

12. Size of family:

Upto 5 members	a) Small
6-10 members	b) Medium
More than 10 members	c) Large

13. Income of the family:

Up to Rs. 25000	a) Very low
Rs. 25001 to Rs. 50000	b) Low
Rs. 50001 to Rs. 75000	c) Medium
Rs. 75001 to Rs. 100000	d) High
Above Rs.100000	e) Very high

14. Social participation: The variable social participation is important during development of soil and water conservation programme. Social participation is a voluntary contribution of services by a farmer or farm woman to village level institutions during their village development programme. It can be categorized into the following:

Category	Score
a) No membership	0
b) Membership in one organization	1
c) Membership in more than one organization	2
d) Holding position in organization	3

3.9.2 PSYCHOLOGICAL VARIABLES:

1. Risk preference: It refers to the degree to which an individual rural farmer and farm woman is oriented towards the risk and uncertainty in adoption of soil and water conservation technologies for sustainable agricultural production in watershed management. Risk preference scale was developed by the investigator to measure the degree to which farmers and farm women were oriented towards risk and uncertainty and have a courage to face problems in agriculture, by adopting new improved soil and water conservation technologies.

The scale consisted of 10 statements, out of which second, fourth, sixth, eighth and tenth were negative and rest of the statements were positive. The scores for positive statements were assigned as:

i) 3 for agree
ii) 2 for undecided and
iii) 1 for disagree

Reverse scores were assigned for negative statements. The scale is appended in the Appendix-II. The minimum and maximum obtainable scores were as:

Variable	Minimum score	Maximum score
Risk preference	10	30

The respondents were divided into low, medium and high categories on the basis of total score obtained by them as following method:

Range of scores	Categories
<mean - S.D.	a) Low
mean $\pm$ S.D.	b) Medium
>mean + S.D.	c) High

Intensity indices of statements: Intensity scores of each items of risk preference were calculated. The following ranges were decided to find out and analyze the intensity indices of risk preference statements towards adoption of soil and water conservation practices.

Intensity index range	Risk preference level
1.00 to 1.59	Low risk preference
1.60 to 2.59	Moderate risk preference
2.60 to 3.00	High risk preference

2. Knowledge: The researcher developed a knowledge test consisting of fourteen statements, out of which, seven were negative statements and seven were positive statements. For the correct answer one score and for the incorrect answer zero score was assigned. The possible minimum and maximum obtainable scores were as under:

Variable	Minimum score	Maximum score
Knowledge	0	14

The respondents were grouped into the following categories as below:

Range of score		**Category**
<Mean - S.D.	a)	Low
Mean ± S.D.	b)	Medium
>Mean + S.D.	c)	High

Knowledge index:

The knowledge index of farmers of Antisar watershed was worked out as follows:

$$K = \frac{X_1 + X_2 + X_3 + \text{----------} + X_n}{N} \times 100$$

where,

K = knowledge index of a farmer

$X_1 + X_2 + X_3 + \text{--------} + X_n$ = marks obtained for correct answer

N = maximum possible marks in the schedule

Overall knowledge index: The overall knowledge index of all the respondents included from Antisar watershed area was computed as follows.

$$\text{Overall knowledge index} = \frac{\sum_{i=1}^{N} K}{N}$$

where,

K = Knowledge index for i^{th} respondents

N = Total number of respondents

3. Attitude: The attitude scale towards soil and water conservation programme was developed by the investigator. The responses were asked on a three point continuum as agree, neutral and disagree. The scores were assigned as 3, 2 and 1 for positive attitude statements and reverse scoring was done for negative statements. The possible minimum and maximum scores were as under:

Variable	Minimum score	Maximum score
Attitude	13	39

All the respondents were grouped into three categories on the basis of total score obtained by them as follows.

	Category	Range of scores
a)	Unfavourable	<mean - S.D.
b)	Neutral	mean $\pm$ S.D.
c)	Favourable	>mean + S.D.

Intensity indices of statements:

Intensity index scores of each items or statement of attitude scale was calculated by sum of scores of all the persons on each attitude statement and divided by total number of respondents. The following ranges were decided to find out the intensity indices of attitude towards soil and water conservation programme.

Attitude level	**Range of intensity index**
Unfavourable	1.00 to 1.59
Neutral	1.60 to 2.59
Favourable	2.60 to 3.00

Individual Attitude Score:

The individual attitude score of a respondent is equal to sum of scale values obtained by respondent on all responses and divided by total number of responses. The individual attitude score of a respondent was also computed by following formula.

$$\text{I.A.S.} = \frac{\text{Sum of scale values obtained by respondent}}{\text{Total number of responses}}$$

where,

I.A.S. = Individual Attitude Score

The overall group attitude score towards soil and water conservation programme in Antisar watershed was also computed with the following formula.

$$\text{Group attitude score} = \frac{\sum_{i=1}^{N} \text{I.A.S.}}{N}$$

Where,

I.A.S. = Individual attitude score
N = total number of respondents

4. Adoption:

The investigator prepared a three-point continuum structured adoption scale. It comprised of twelve practices related to soil and water conservation. The scores were assigned as 1, 2 and 3 for responses viz. not known, known but not adopting and adopting SWC practices respectively. Thus, total score secured by an individual for their responses was used to calculate the adoption behaviour towards SWC technologies. The possible minimum and maximum scores were as under:

Variable	**Minimum score**	**Maximum score**
Adoption	12	36

All the respondents were grouped into three categories on the basis of total score obtained by them as follows.

	Categories	**Range of scores**
a)	low adopters	<mean - S.D.
b)	Moderate adopters	mean $\pm$ S.D.
c)	High adopters	>mean + S.D.

How to calculate intensity indices?

Adoption intensity indices of statements: Intensity indices of statements related to each technology adoption behaviour was calculated. On the basis of intensity indices, the respondents were categorized as follows.

Intensity index range	**Adoption level**
1.00 to 1.59	Low adoption
1.60 to 2.59	Moderate adoption
2.60 to 3.00	High adoption

Adoption quotient (A.Q.):

An adoption quotient was developed to compute the adoption score of individual farmer and also overall adoption level of farmers of Antisar watershed as follows.

$$\textbf{A.Q.} = \frac{\textbf{No. of SWC practices adopted}}{\textbf{No. of SWC practices recommended}} \times 100$$

where,

A.Q. = Adoption Quotient

Overall adoption level in the area was also worked out by calculating the arithmetic mean of the adoption quotients of all the respondents.

$$\textbf{Overall adoption level} = \frac{\sum_{i=1}^{N} A.Q.}{N}$$

where,

A.Q. = Adoption quotient of the respondents

N = Total number of respondents

3.9.3 DEPENDENT VARIABLES:

People's participation:

A detailed structured three-point continuum scale was developed by the investigator to assess the extent of people's participation in soil and water conservation programme in the different phages. The people's participation of respondents was measured in the following stages of rural development programme.

1. People's participation in programme planning
2. People's participation in implementation of programme
3. People's participation in maintenance of soil and water conservation programme

The responses of the respondents were recorded in the specially developed three point continuum scale viz., great extent, some extent and least extent. The scores were assigned as:

i) 3 for great extent

ii) 2 for some extent and

iii) 1 for least extent

The possible minimum and maximum obtainable scores of people's participation in different stages SWC programme were as under:

Variables	Minimum score	Maximum score
a) People's participation in planning	10	30
b) People's participation in implementation	10	30
c) People's participation in maintenance	10	30
d) Overall people's participation	30	90

All the respondents were grouped into three categories on the basis of the total scores obtained by them in development of all the three stages of SWC programme as follows.

Range of scores	Categories
<Mean - S.D.	a) less participation
Mean $\pm$ S.D.	b) Moderate participation
>Mean + S.D.	c) More participation

Intensity indices of statements: Intensity indices were calculated for people's participation in soil and water conservation programme. The level of participation for each activity was decided as follows.

Range of intensity index	Participation level
1.00 to 1.59	Less participation
1.60 to 2.59	Moderate participation
2.60 to 3.00	More participation

To measure the extent of people's participation in different stages of watershed programme the People's Participation Index (PPI) was developed by the investigator as follows.

People's Participation Index (PPI):

$$PPI = \frac{\text{Mean participation score (P)}}{\text{Maximum participation score}} \times 100$$

where,

$$P = \sum_{i=1}^{N} P_i / N$$

where,

N = Total number of respondents

$$P_i = \sum_{j=1}^{K} (PP_j + PI_j + PM_j)$$

where,

PP_j = Total scores of people's participation in programme planning.

PI_j = Total scores of people's participation in programme implementation.

PM_j = Total scores of people's participation in programme maintenance.

K = Total number of statements on which responses of the respondents were recorded.

3.10 Statistical analysis:

The following statistical tests were used in the present research study.

1. Percentage:

Simple interpretations were made on the basis of frequency and percentage.

2. Mean:

The mean was obtained by dividing the sum of scores by the total number of respondents.

3. Standard Deviation (S.D.):

The standard deviation was obtained by the square root of the average of the square deviation from mean.

4. Pearson's coefficient of correlation(r):

The most often used and most precise coefficient of correlation is known as the Pearson product-moment coefficient of correlation (r). Coefficient of correlation was used to find out the relationship between each of the independent variable and the dependent variables by employing following formula (Best & Kahn, 1999).

$$r = \frac{N*\sum XY - (\sum X)*(\sum Y)}{\sqrt{N*\sum X^2 - (\sum X)^2}\sqrt{N*\sum Y^2 - (\sum Y)^2}}$$

Where X = independent variables
Y = dependent variables
$\sum X$ = sum of the X scores
$\sum Y$ = sum of the Y scores
$\sum X^2$ = sum of the squared X scores
$\sum Y^2$ = sum of the squared Y scores
$\sum XY$ = sum of the products of paired X and Y scores
N = number of paired scores

5. Point Biserial Correlation:

To compute the coefficient of correlation between independent variable gender and different dependent variables, the Point Biserial correlation was used. The formula for point biserial r is (Ferguson,1981):

$$r_{pbi} = \frac{\bar{Xp} - \bar{Xq}}{s_x}\sqrt{pq}$$

In this formula s_x is the standard deviation of scores on the continuous variable, defined as $(X - X)^2/N$. If the continuous variable is a test, s_x is the standard deviation of test scores. The quantities of the

dichotomous variable. If the dichotomous variable is a test item, p is the proportion of individuals who pass the item and q is the proportion who fail. X_p and X_q are the mean scores on the continuous variable of individuals within the two categories. Again, if the continuous variable is a set of test scores. X_p is the mean score of those who pass the item and X_q is the mean score o those who fail.

6. Spearman ranks coefficient of correlation $p^{(rho)}$:

To compute the correlation between ranks assigned by male and female farmers towards constraints faced by them during development of Antisar watershed by adopting soil and water conservation practices. To compute the spearman rank order coefficient of correlation, the following simple formula was used (Best & Kahn, 1999).

$$p = 1 - \frac{6 \sum D^2}{N (N^2 - 1)}$$

where,

D = the difference between paired ranks

D^2 = the sum of the squared differences between ranks

N = number of paired ranks