

**AWARENESS AND TRAINING NEEDS OF OFFICERS OF
THE DEPARTMENT OF
AGRICULTURE IN WATERSHED PLANNING**

BY
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Thesis
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COLLEGE OF AGRICULTURE
VELLAYANI, TRIVANDRUM

1989

DECLARATION

I hereby declare that this thesis, entitled "Awareness and Training Needs of Officers of the Department of Agriculture in Watershed Planning" is a bonafide record of research work done by me during the course of research, and that the thesis has not previously formed the basis for the award to me of any degree, diploma, associateship, fellowship or other similar title of any other University or State.

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CERTIFICATE

Certified that this thesis, entitled
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Department of Agriculture in Watershed Planning"
is a record of research work done independently by
Miss. Sheela, L. under my guidance and supervision
and that it has not previously formed the basis for
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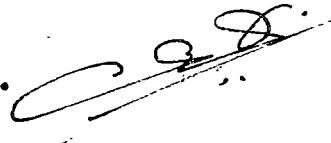
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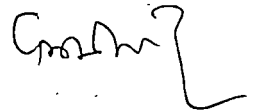
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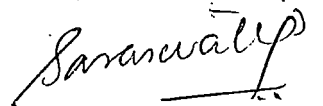
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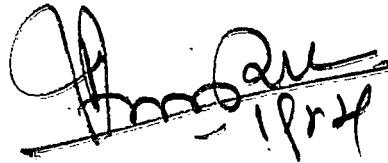
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LIST OF ABBREVIATIONS

- JSCOs : Junior Soil Conservation Officers
- JSSOs : Junior Soil Survey Officers
- AOs : Agricultural Officers
- VLWs : Village Level Workers
- BDOs : Block Development Officers
- JAOS : Junior Agricultural Officers
- AEOs : Agricultural Extension Officers
- CWRDM : Centre for Water Resource Development
Management.
- ADs : Agricultural Demonstrators.

INTRODUCTION

CHAPTER I

INTRODUCTION

In India, after green revolution, there was a hope that there would be a high boost in food grain production to meet the requirement of a very large population. Eventhough we achieved increase in food production, it was not upto the mark and not sufficient to meet the requirement of the highly increasing population. In spite of the distribution of hybrid varieties and increased use of fertilizers and plant protection chemicals, the food problem still remains a hindrance to the overall development of the country. Improved technologies are available, but the farmers are reluctant to use it or may be unaware of these technologies. This may be probably because of the slow rate of diffusion or deficiencies in the professional efficiency of the change agents.

Imbalanced and inadequate mobilization and exploitation of the natural resources lead to the inadequate progress in the agricultural sector. Mismanagement of the resources and lack of awareness of the functionaries are common in many aspects of development efforts. Inadequate linkage of the development departments is another reason for the poor progress. Another serious drawback is the lack of awareness of the policy makers about the scope of the new technologies. The environmental parameters are normally ignored while planning for development. We have to plan a development strategy in which

there is provision for involvement of the actual beneficiaries of the programme. The strategy must be such that we should be able to achieve development with our natural resources. The benefits should be equally shared among the upper and lower classes of the society. Unscientific exploitation of the land should be avoided. Our natural resources should be conserved properly. Development must be possible in all the facets of life. The present approach in socio-economic planning has to be redesigned. Watershed Planning is now considered as the scientific method of planning for achieving maximum and suitable returns from the land and overcoming the hydrologic problems.

A watershed is a land area bounded by a ridge line draining into common outlet.

In a watershed, the soil type, slope and depth of the soil, vegetative cover etc, influence the flow of water. These factors are very distinct in a watershed. Therefore, based on the harvestable rain water in the area and the characteristics of the watershed, water budgetting can be done for each piece of land starting from the ridge down to the valley. We can make a proper use of the land resources available in the watershed. The programmes of soil conservation, afforestation, minor irrigation, animal husbandry, sheep development, fisheries and other rural development activities which are undertaken on an ad-hoc basis can be integrated into the watershed development project after studying the soil and

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climatic peculiarities in the watershed. This will lead to an efficient management of the land and water resources and thus result in the overall development of the area. There is a totality approach in watershed planning.

The major constraints to crop productivity such as soil erosion, rainfed condition, hilly terrain etc warrant development programmes on a watershed basis. If a watershed is well managed for surface water, then it is best managed for the other resources. Thus conservation of natural resources is also possible. This may bring about a totality development of the area. The new concept of watershed management has become too important for development.

This study is undertaken to assess the awareness and training needs of the officers of department of Agriculture ^{in watershed planning}. As watershed development is a recent concept, many of the functionaries may lack awareness and knowledge in watershed planning. When the functionaries themselves are not aware of the programme, we can not expect faster rate of diffusion of watershed management. It is the change agents who are responsible for making the people aware of the new concept and convince them about the utility of the programme. Only by securing the co-operation of the land owners, we can implement the development activities. Only if they are made aware of the group goals in watershed planning, we can achieve success. For this, they should have a thorough knowledge of the watershed concept, the technology behind it, utility of the

scheme and group management approach in watershed planning. Watershed planning at present falls under the responsibility of three categories of change agents in the department of Agriculture, the Junior Soil Conservation Officers, Junior Soil Survey Officers and the Agricultural Officers.

Need for the study.

A watershed, a geomorphological entity can be taken as the basic unit of scientific development. In fact, the socio-economic planning approach in which panchayat is taken as the basic unit for development may not produce a totality development. Kerala is a state, where there is abundance of natural resources. The problem is that we are not able to make economic and effective use ^{of} it. This is due to some limitations in the socio-economic planning approach. By adopting watershed as the basic unit of planning and development, we can make a balanced use of the natural resources. Watershed planning enables us to provide a judicious exploitation and management of the resources. But as this is a rather new concept to the change agents of Kerala, they may lack basic knowledge in this area. Many of them may be aware of the concept, but may not possess basic knowledge and skill in performing the watershed development activities. The Junior Soil Conservation Officers, Junior Soil Survey officers and Agricultural Officers, being the responsible agents for planning and management of mini watersheds, it is necessary to assess their present level of awareness, knowledge and

attitude. It becomes necessary to train the change agents on watershed planning. So the training needs are to be assessed well in advance. A study of the attitude of the officers towards watershed planning is relevant because their attitude towards watershed planning will influence their involvement in the implementation of the scheme. Hence a study to assess the awareness, knowledge about ^{and} attitude towards ^{watershed planning} and training needs of the officers of the department of Agriculture in watershed planning was carried out with the following objectives.

1. To ascertain the awareness of the Junior Soil Conservation Officers (JSCOs), Junior Soil Survey Officers (JSSOs) and Agricultural Officers (AOs) in watershed planning.
2. To determine the knowledge of JSCOs, JSSOs and AOs about watershed planning.
3. To measure the attitude of the officers towards watershed planning.
4. To study the relationship between selected characteristics of the officers and their knowledge about and attitude towards watershed planning.
5. To assess the training needs of the officers in watershed planning.
6. To study the constraints in watershed planning as perceived by the officers.

scope of the study.

The study is undertaken to assess the awareness, knowledge, attitude and training needs of the officers of the department of Agriculture through objective techniques. By studying these aspects, we can plan a training strategy for imparting knowledge about watershed planning and a favourable attitude of the functionaries and thus increase their efficiency in carrying out the development activities. This will lead to conviction of the beneficiaries about the advantages of watershed planning and achieve their co-operation. A study of the constraints in watershed planning will be helpful to the Department of Agriculture in assessing the situation and perception of the officers. The present study may play a role in adopting a new development approach and help in the overall development of the state.

Limitations of the study.

This study had the limitations of time and other facilities. Because it was conducted as a part of the M.Sc. programme of the researcher, it was not possible to carry out an indepth study of the situation as compared to that of other states. Watershed planning is a new concept to the change agents of Kerala. There were not any past efforts in that area in the state. This caused a difficulty in making a thorough review of the literature and only a limited number of studies were available. In spite of these difficulties, it is expected

that the findings of the study can be of much use in preparing a training strategy for educating the functionaries and increasing their efficiency in the implementation of watershed development programmes.

Presentation of the study.

The presentation of the remaining chapters of the thesis is as follows:

Chapter II deals with the definitions of concepts and the theoretical orientation.

Chapter III deals with the methodology in which location of the study, selection of respondents, selection and empirical measurement of variables, techniques of data collection and statistical methods used are explained.

In Chapter IV the results and discussion are presented.

Chapter V deals with summary of the research work emphasising the salient findings.

The references and appendices are given at the end.

THEORETICAL ORIENTATION

CHAPTER II

THEORETICAL ORIENTATION

Watershed concept is rather new to the change agents of Kerala. The concept of watershed planning and development has, of late, become a thrust area for thought and discussion among planners, policy makers and administrators.

Watershed is a drainage area, having ridge lines in the boundaries and a common drainage out let. It is a geomorphological and topographical entity. In a watershed, by estimating the available resources and carrying capacity, we can plan for the development of that particular hydrologic unit.

Watershed planning enables us to provide a judicious investment of the resources. There is a totality approach in watershed planning. The total biomass in this entity is taken into account and we design plans for the development of the total inhabitants in that area based on the resource inventory. Watershed planning is of great importance to tackle the hydrologic problems and for integrated land use planning.

A review of past works and literature on watershed planning and management is given under the major headings:

- I. Watershed Planning
 - a. Concept of watershed, watershed planning and watershed management
 - b. Need for watershed planning
 - c. Guide lines for the watershed development programme

- d. Steps in watershed planning
- e. Components/Areas of watershed planning.
- f. Data required for watershed planning
- g. The progress of watershed development activities.
- II. Awareness of the officers in watershed planning
- III. Knowledge of the officers in watershed planning
- IV. Attitude of the officers towards watershed planning
- V. Association of knowledge in watershed planning and attitude towards the same with characteristics of the officials.
- VI. Training needs of officials in watershed planning
- VII. Constraints in watershed planning.

I. Watershed Planning

- a. Concept of watershed, watershed planning and watershed management Watershed:

Kulkarni (1980) defined watershed as a drainage area on the earth surface from which run-off resulting from precipitation flows past a single point into a main stream, a river, a lake or an ocean.

Rao (1980) defined watershed as an area which collects the rain water falling on it and allows the water to flow in one or more water courses with a single outlet at the end. It is a geographical separator from adjoining areas.

Viswanathan (1982) defined watershed as a body of land, rounded above by ridge or water divide and below by the level at which water drains from it. Water enters watershed as

precipitation and leaves it as stream flow and flow below ground and through transpiration and evaporation.

Nayak (1986) defined watershed as an area having common drainage.

Watershed planning:

Satterlund (1972) stated that the watershed work plan should set forth a clearly and consistently planned schedule of operations, the estimated cost, proposed cost-sharing arrangements and other responsibilities of those participating in the project and economic justifications for installing, operating and maintenance of those measures needed for the protection and improvement of the watershed. It should contain adequate estimates on the various programme proposals to permit a complete understanding by those involved. The watershed work plan should indicate the anticipated effects on the problems of the watershed and the net effect on the hydrology and problems of the large watershed.

Sharma and Hooja (1980) reported that the presently scattered programme of soil conservation, afforestation, minor irrigation, animal husbandry, sheep development, fisheries and other rural development activities which are undertaken on an ad-hoc basis should be well knit into the watershed project following a study of climate, land, water and plant resources on the one hand and man and animal resources on the other so as to bring about sustained natural resources development based on the principles of ecology,

economics, employment generation and energy conservation.

Planning Commission (1983) suggested that integrated development with watershed as the unit of planning should be undertaken extensively.

Nayak (1986) reported that in the watershed, since we know the soil types, slope and depth of the soil, vegetative cover, grass cover etc which slow down the flow of water based on the harvestable rain water in the area and the characteristics of the watershed, water budgetting can be done for each piece of the land starting from the ridge down to the valley. Thus we can make a proper use of the land resources available in the watershed.

Watershed Management:

Tejwani (1971) stated that watershed management implies rational utilization of land and water resources for optimum and sustained production with the minimum of hazard to natural resources. It essentially relates to soil and water conservation in the watershed which means proper land use and the protection of land against all forms of deterioration and it also implies maintaining soil fertility, conserving water for farm use and the increase of productivity from all land uses.

Satterlund (1972) defined watershed management as the management of all the natural resources of a drainage basin to protect, maintain or improve its water yields.

Purushottam (1980) defined watershed management as the development and management of the watershed resources for achieving optimum production.

Russel (1981) defined watershed management as the control of water and transfer from the upper to the lower parts of a river's catchment area; thus it can directly affect all the people living in the whole region.

Jayakumar (1987) defined watershed management as principally the management of the precipitation in such a way that the maximum use may be made of the same with the minimum loss and the minimum loss to the watershed.

Srivastava (1987) reported that watershed management programmes should combine socio-economic as well as ecological concerns. Interfarm improvements (individual aspects) and intrafarm measures such as improvement in tillage, cropping systems, fertilizer management etc. should go hand in hand.

(b) Need for Watershed Planning

Rao (1980) stated that in any development activity, the watershed approach is more scientific because the inherent potential of soil and water resources in a particular area is controlled by various factors such as physiography, geological base, soil character, climate, present land use, socio-economic and legal aspects etc. It has been observed that there is an optimum interaction between the natural factors of physiography, soil and climate on watershed basis for their optimum utilization and output.

The watershed approach is therefore increasingly being employed in various development programmes like soil conservation, command area development, drought prone area programme, dry farm cultivation, reclamation of ravine areas, erosion control in catchments of river valley projects and development of water resources under major, medium and minor irrigation projects. The programmes for water harvesting even on farm level have to be evolved on watershed basis. George (1986) reported that in Kerala, rainfed condition, undulating topography, hilly terrain, soil erosion, high erosivity of rainfall, erodability of land, low moisture holding capacity and high iron-aluminium content of soils are the constraints to crop productivity. These constraints stwarrant development programmes on a watershed basis.

Nayak (1986) reported that if a watershed is well managed for the water, then it is best managed for all the other resources. Thus in the watershed, we can have a good water budgetting and hence make a proper use of the land resources available. Srivastava (1987) reported the following important reasons for using watershed as a unit for resources development and management.

i. Co-ordinated interfarm and intrafarm development

Since different parts of a watershed are treated as inter linked components of a single hydrologic unit, the inter farm and intrafarm development activities can be planned and executed in a co-ordinated manner.

ii. Integrated land use planning

Watershed management takes into account land capability of different categories of land. Since a typical watershed may include lands suitable for annual cropping, trees, pastures etc. the integral land use plans could be conveniently developed.

iii. Assessment of hydrologic problems and evaluation of corrective measures.

Soil and water losses (quantity as well as quality) could be monitored conveniently on watershed basis by stream and reservoir gauging techniques or by installation of flumes and recorders. This helps in assessing the seriousness of the hydrologic problem; impact of corrective measures and efficiency of water resources management.

Ranganathan and Sastry (1988) found that since each field is an integral part of the entire watershed, the individual efforts to develop any particular field either will result in limited and myopic benefits or will become costlier. Therefore a project approach to treat an area will enable to get the benefits of interaction effect due to interplay of integrated effort of different sectors on all the field with inter-relationships.

c. Guidelines for Watershed Development Programmes

Satterlund (1972) proposed the following guidelines for watershed management planning:

1. Recognition of need and formulation of tentative objectives of management.
2. Inventory of basic information, both natural and cultural, that is applicable to specific situation.
3. An input of technical knowledge and human understanding.
4. Analysis of inventory information.
5. Plan formulation.
6. Action to translate plan to practice.
7. Continuing evaluation.

Planning Commission (1983) proposed the following guidelines for watershed development programme:

1. Subdividing the western ghats area in the state into mini/micro watersheds of manageable size, which implies that the area of the watershed can be saturated with prescribed land treatments in a period of not more than five years.
2. Initiating soil and land capability surveys on standard basis.
3. Prescribing appropriate land treatments in accordance with the data and findings of the land capability surveys.

4. Preparing detailed estimates for each type of land treatment on the basis of field surveys and in accordance with the cost norms of the area.
5. Programming and sequencing of the works.
6. Assigning the works for implementation to the concerned departments according to their suitability.
7. Establishing appropriate linkages with other ongoing programmes in the area.
8. Securing public participation for the success of the project.
9. Arrangements should be made for the concurrent monitoring and evaluation of the programme.

Delineation and codification of watersheds:

Planning commission (1987) had suggested the following delineation on all India basis as follows:

Category of Hydrologic unit	Size ranges (lakh ha.)	Base map scale
A. Size ranges and probable base map scale for delineation.		
1. Regions	270 - 1130	Index map (1:10mil.)
2. Basins	30 - 300	1.4 mil. to 1.6 mil.
3. Catchments	10 - 50	1.1 or smaller
4. Sub-catchments	2 - 10	1.1mil & 1:250,000
5. Watersheds	0.5 - 2	1: 2,50,000 and 1: 50,000

B. Further sub division of watersheds (Operational size for Agri. purposes)

	Sub watersheds	Hectares	
1.	Sub-watersheds	10,000 - 50,000	1:50,000
2.	Milli-watersheds	1,000 - 10,000	1:15,000
3.	Micro-watersheds	100 - 1,000	1: 8,000
4.	Mini watersheds	1 - 100	1: 4,000 or larger.

Sreekumar and Pillai (1988) reported that the following factors are to be taken into consideration for delineation of the watersheds.

1. Drainage density
2. Stream grade
3. Stream frequency
4. Slope of watershed
5. Shape index
6. Orientation
7. Time of concentration
8. Vegetal cover.
9. Codifiable past developments.

They reported that Kerala State with its 44 rivers and its drainage systems is delineable into 44 macro watersheds, 151 sub watersheds and 960 micro watersheds. A micro watershed can be subdivided into many smaller units namely mini watersheds.

By codifying the watershed under a specific nomenclature, the identification and priority delineation is made easy. The code number of a mini watershed is described below to provide a brief idea of the codification system.

Code No. BS. 1 a (i)

'B' indicates the macro-watershed of the main river of Bhavani (first letter of first order drain of Bhavani).

'S' indicates sub watershed area of the tributary to Bhavani called Siruvani (First letter of second order drain of Siruvani).

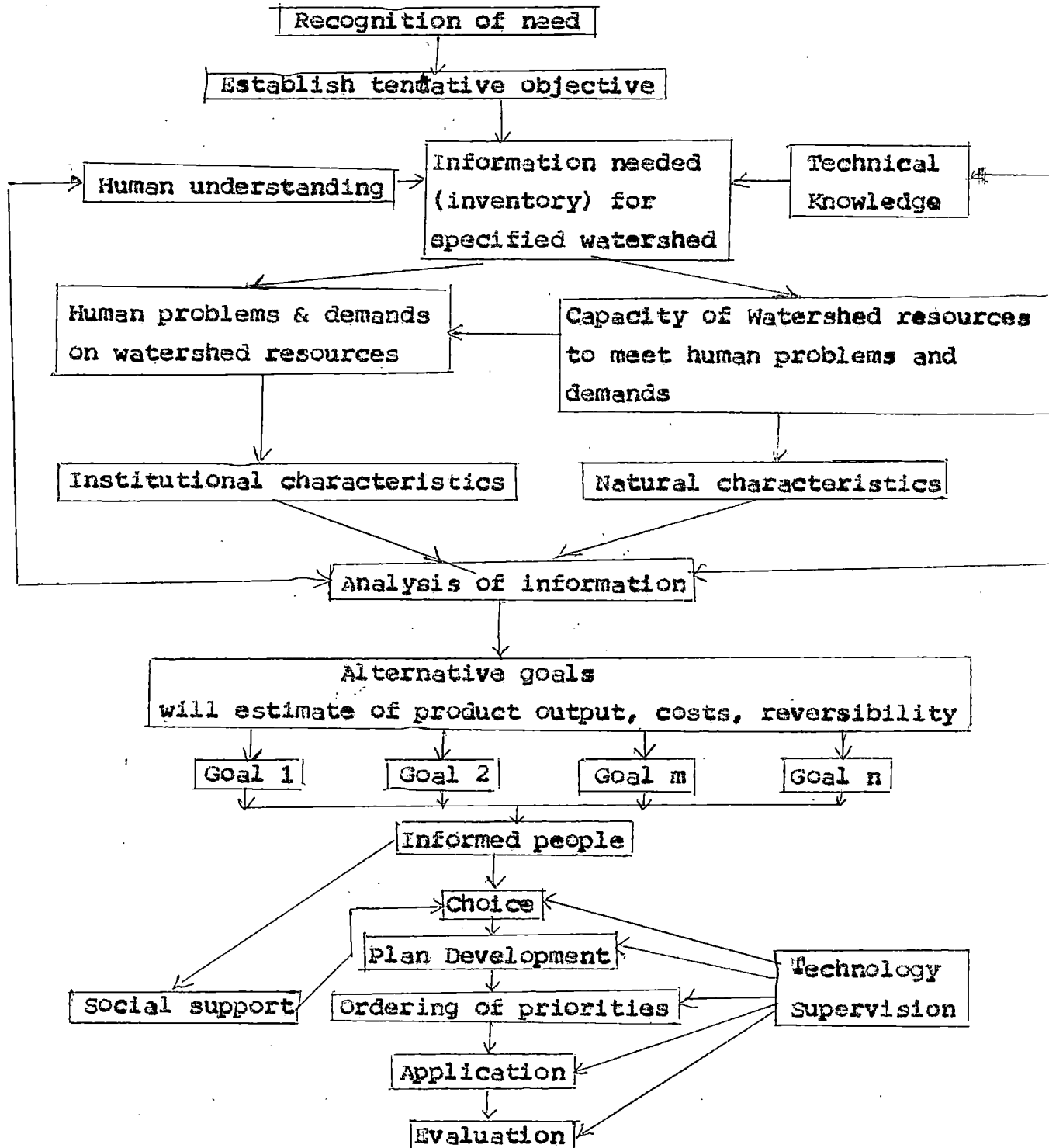
'1' Milli watershed of the third drain flowing to siruvani counted as first in the clock-wise direction (No. of the drain in the third order counted on clock-wise direction).

'a' is the micro watershed area of the 1st rivulet draining in the 3rd order drain.

'i' is the mini watershed of the first rivulet counted in the clock-wise direction draining into the fourth order rivulet (counted in the clock-wise direction).

d. Steps in watershed planning

Satterlund (1972) has worked out a generalised flow chart of a watershed management procedure.



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Planning commission (1983) proposed the following steps in planning for watershed development.

1. The plan of action (yearwise) should be clearly indicated in respect of each programme included in the integrated project (soil conservation, minor irrigation, afforestation, pasture development, horticulture, fisheries etc).
2. The cost involved in each programme should be separately shown (with split up for administrative cost, cost of works, vehicles, equipments etc) for each year.
3. The source of finance for the project viz. Western Ghats Development Programme, Tribal Sub plan, Integrated Rural Development Project etc. should be clearly indicated in the project report.
4. The physical target for each year for each type of activity should be separately included in the project report.
5. The benefits accruing from each type of activity included in the project should be clearly spelt out. A cost-benefit analysis for each programme should be presented.

Sundaram (1985) reported that adequate publicity measures should be undertaken before any watershed development scheme is launched to secure the effective co-operation of the village folk who would be the major beneficiaries of the project.

Srivastava (1987) identified the following steps in watershed planning.

1. Preparation of base maps for carrying out surveys.
2. Reconnaissance survey of the watershed for overall development.
3. Assessing rainfall characteristics.
4. Preparation of soil maps and classification of lands for different uses according to capability for agriculture, forestry, pasture, horticulture etc.
5. Preparation of inventory of existing land uses and farm sizes.
6. Appraisal of agricultural production pattern and potentials present and potential markets and possible group action arrangements.
7. Carrying out topographic & hydrologic surveys for engineering.
8. Geo-hydrological survey to delineate areas suitable for ground water development.
9. Formation of integrated time bound plan for land and moisture conservation, ground water recharge, development of productive and protective afforestation, agricultural production, grass lands and horticulture.
10. Assigning of priorities for implementation of the project.
11. Assessing social costs and benefits.

e. Components/Areas of Watershed planning

Ganguly (1980) reported the following areas of watershed

management programme.

1. Afforestation
2. Construction of check-dams and gully control
3. Stream bank erosion control
4. Scientific cultivation practices like terracing
5. Controlled grazing.

Varadan (1987) reported that the conservation of soil and water assumes special significance in a watershed because of the increased awareness for development of agriculture on watershed basis specially under rainfed condition.

Jayakumar et al. (1988) identified the following areas in watershed planning:

1. Development of water and land resources
2. Effective water management
3. Effective soil conservation measures
4. Suitable cropping pattern.

According to Sreekumar and Pillai (1988) following are the components of watershed planning:

1. Soil Survey

Detailed soil survey should be carried out to obtain the details such as relief, slope, drainage, climate, soil characteristics, vegetative cover, land capability, hydrological aspects etc.

2. Soil and water conservation measures.

3. Agronomic measures

Evaluation of the present cropping system should be done and suitable cropping pattern under the present condition should be suggested.

4. Agriculture

Use of improved varieties, fertilizers, plant protection chemicals, farm implements etc. Mushroom cultivation should be popularised.

5. Animal husbandry

Dairying, establishing piggery, poultry rearing etc.

6. Forestry

Afforestation measures, social fencing etc. should be given importance.

7. Small scale industries

They should be strengthened

8. Allied fields

Sericulture, apiculture, pisciculture etc. should be emphasised.

9. Drinking water facilities

10. Drainage facilities

11. Roads and allied developments

12. Credit institutions

Credit facilities should be provided

13. Health and Housing facilities
14. Transportation facilities
15. Co-operative societies should be established
16. Socio cultural development
17. Tourism
18. Community development.
19. Group management for watershed development

Ranganathan and Sasthry (1988) stated that watershed development calls for the integrated efforts of forest, agriculture and horticulture sectors at the initial stages which can prepare proper ground for implementing other developmental programmes like livestock, cottage industry etc. These three sectors will try to secure the active services of many like departments to ensure proper supply of seeds, fertilizers, plant protection chemicals, equipments etc.

f. Data required for watershed planning

Ullah et al. (1972) proposed the following for preparing a watershed plan.

- A. Assembling the available information like
 1. Map of watershed
 2. Aerial photographs
 3. Rainfall and run-off records for the watershed
 4. soil survey report of the area
 5. Previous report
 6. Local unit cost for labour and material

B. Field Survey

1. Reconnaissance Survey
2. Preliminary Survey
3. Maps: Location maps, present land use map, land capability map, proposed land use map with proposed measures, detailed plans, lay out and design specifications.
4. Watershed characteristics: name of watershed, location, size and shape (round, roughly rectangular, fan shaped etc.)
5. Land use and cover conditions-forest lands, range land, agricultural land, miscellaneous, water uses and needs, economic data etc.
6. Problems and needs of the area.
7. Proposed land use.
8. Recommended management programme: agronomic practices, engineering measures, conservation of soil and water, protection against flood, management of forest etc.

Rao (1980) suggested that the basic data required for watershed planning and implementation were:-

1. Size, shape, drainage, geology, soil, climate, surface conditions, land use, ground water, social and legal status of watershed.
2. Run off and sedimentation characters, details of treatment for proper soil and moisture conservation etc.

3. Production potentials of watershed depending on the slopes of the land, various land use and cropping pattern.
4. Basic data and maximum knowledge of field conditions i.e; percentage of sown area, percentage area sown more than once, percentage area irrigated, percentage area irrigated more than once etc.
5. Climatic data
6. Available topo-sheets with aerial photographs.

According to Sathyanarayana (1980), the principal factors which affect the operation of the individual watersheds are:-

1. Shape of watershed
2. Topography of land
3. soils
4. Amount of precipitation and storm patterns
5. Land use patterns
6. Type and quality of vegetative cover
7. Size of watershed
8. Grazing hazard and
9. Cultural practices.

According to Jayakumar (1987), the following particulars are required for the preparation of watershed management plan.

1. A short description of the scheme area.
2. Geographical area and description of the terrain of the tract. (hilly, undulating, forest etc).

3. Area under irrigation, cultivation etc. at the time of preparation of the scheme and after completion of the scheme.
4. Rainfall data.
5. The soil of the area with reference to the depth, texture etc.
6. Crops now cultivated and crops that can be cultivated after the completion of the scheme.
7. Revenue description of the lands with district, taluk boundaries etc.
8. Department or the agency concerned with the finance and implementation of the scheme.
9. Statistics of population, livestock.
10. Pattern of land ownership.
11. Information on existing water resources.
12. Service facilities such as banking, school, markets etc.

The data on development components are also collected.

1. Soil conservation measures for moisture retention, safe disposal of run-off, various mechanical measures for the area.
2. Storage and recycling of run-off, pond and storage reservoirs and conveyance technique for the area.
3. Techniques for improvement of fuel-fodder productions including horticulture and change in land use, if necessary.
4. Optional land use and cropping systems including mid season corrections and appropriate cultivation methods.
5. Ground water recharge and development.
6. Water management including drainage (if necessary), lining of water courses, proper field lay-outs, land levelling and crop saving irrigation methods

7. Development of livestock, poultry and other associate activities.

Sreekumar and Pillai (1988) reported that a data collection schedule was designed to bring out a detailed inventory of the resources computable for optimum mobilisation. It elicits on total understanding of the present stage of the water shed. The main parameters upon which the developmental plans have to be structured can be enumerated as.

- i. Watershed characteristics
- ii. Land use details with existing details
- iii. Socio-economic information
- iv. Source of irrigation
- v. Cropping pattern
- vi. Climatic data
- vii. Incidence of natural calamities
- viii. Marketing and financial facilities
- ix. Developmental schemes
- x. Follow up activities
- xii. Intersectoral planning
- xiii. Government and non-government co-ordination
- xiv. People's participation
- xv. Legislation
- xvi. Evaluation of the project in terms of its components, approaches and achievements.

The concept of watershed planning and management has been

recently introduced in Kerala. Efforts are being made by the Department of Agriculture to identify micro/mini watersheds in every district of Kerala for watershed planning and development. Since no watershed has been so far developed so far as per the principles of watershed management for its totality development, except for soil and water conservation, it is not possible to assess the benefits at this stage. It is expected that watershed management in at least a few selected micro watersheds of Kerala would be started soon. It is in this direction, the department of Agriculture, especially the soil conservation unit is moving now.

9. The progress of Watershed development activities.

Central soil and Water conservation Research and Training institute, Dehradun (1978) has selected an independent forest watershed of 9.12 ha. to demonstrate the concept of a system of development in totality with the major objective of providing supplemental irrigation to 16 hectares of agricultural land. This system of scientific treatment of the catchment, constructing an earthen embankment, storing rain water in the pond and subsequently using water for supplemental irrigation could be replicated over large areas of Siwaliks and could thus become the basis of development of the entire Siwalik region.

In the first phase, a small earthen dam was constructed as a part of the treatment for sediment control. It was possible to demonstrate effectively to the villagers that not only

agricultural land was being saved from being converted into deep gullies but it was also possible to utilize the collected rain water for providing irrigation. Of the 9.12 ha, 1.58 ha was the submergence area, the rest 7.5 ha. was treated. It was proposed to supply supplementary irrigation through gravity by a system of underground pipe line. It had been possible to grow high yielding varieties of maize, sugarcane and wheat with suitable doses of fertilizers. The yield had increased under supplemental irrigation. The study revealed that benefit-cost ratio of 2.9-1 was possible, which is quite high to justify the economic viability of watershed development project.

Nayak (1986) reported the efforts of the Karnataka State Government for watershed development. For the purpose of implementation, each district watershed was divided into sub watersheds whose handling is phased out. Different kinds of treatments were recommended for different types of land in the sub watershed. Adequate soil and moisture conservation practices were adopted. To evaluate the results of these treatments, the productivity of the land in the watershed is taken into consideration. Nineteen watersheds in Karnataka State which are pilot watersheds started in 1984 are to be evaluated by some external agencies, to get an unbiased opinion about the efficiency of this effort.

II. Awareness of the officers in watershed planning.

Lionberger (1960) defined awareness as 'the first knowledge about a new idea, product or practice'. At the awareness stage, a person has only general information about it.

Dictionary of behavioural sciences (1973) defined awareness as being conscious of something as the state of perceiving and taking account of some event, occasion, experience or object.

Cherian (1984) reported that the basic requisite for the success of development programmes is the awareness of the existence of such programmes among the people for whom they are being implemented.

No studies on awareness of officials in watershed planning have been noted by the researcher.

III. Knowledge of the officers in watershed planning.

English and English (1958) defined knowledge as the body of understood information possessed by an individual or by a culture.

Ramsey et al. (1959) suggested that cognitive adoption (covert) includes obtaining knowledge and critical evaluation of the practices in terms of the individual situation. The educational activities tend to increase the knowledge of the participants in these activities.

Sandhu and sohal (1965) found that the knowledge of the Block extension staff about extension programme in planning, on the whole, was partial. The knowledge was partial for BDOs and AEOs, but was low for VLWs.

Menon (1970) found that meetings and trainings helped in knowing about the improved seeds, fertilizers and implements for small farmers.

Singh and Singh (1970) revealed that knowledge of package of practices was significantly contributing in explaining the adoption behaviour of the farmers.

Regers and Shoemaker (1971) opined that knowledge of innovations could create motivation for their adoption.

Sundaraswamy (1971) found that lack of money and knowledge were the main reasons for non-adoption of recommended farm practices of hybrid jowar cultivation in the selected taluk of Mysore District.

Gill et al. (1977) stated that one of the problems was lack of knowledge about modern farming which affects the execution of extension programmes.

Sandhu and Bilang (1977) reported that agricultural extension officers were lacking knowledge about the use of power driven implements. They also lacked knowledge concerning performance of various service functions, such as helping the farmers in getting loans, helping the marketing

the produce, getting supplies etc. and also is administrative and supervisory functions.

Savarimuth (1981) inferred that farm women possessed medium level of knowledge about maize technology under consideration. They needed intense training on method of sowing, transplanting, weeding, manuring, nutrition and livestock keeping.

Jaiswal et al. (1982) reported that the sectoral officers lacked basic knowledge about watershed concept and its operationalisation at field level. Due to this, integration of activities was not evident.

Surendran (1982) reported that there was significant relationship between knowledge about and attitude towards scientific agriculture of farmers.

Sinha and Sinha (1983) found that the main hindrance in the adoption of soil conservation practices was the lack of knowledge about their utility, which calls for intensive extension programme to make the cultivators understand the benefits and needs of this programme.

Karthikeyan (1986) reported that agricultural labourers had a medium knowledge level in cotton cultivation. They had better knowledge in the areas like irrigation, after-cultivation, preparatory cultivation and harvesting.

IV. Attitude of the officers towards watershed planning.

Allport (1935) defined attitude as a mental and neutral state of readiness organised through experience, exerting a directive or dynamic influence upon the individual's response to all objects and situations with which it is related.

Thurstone (1946) defined attitude as the degree of positive or negative effect associated with some psychological object towards which people can differ in varying degrees.

Krech & Krutchfield (1948) defined attitude as a function of perception.

Newcomb (1950) spoke of attitude as a state of readiness for motive arousal and an individual's attitude towards something is his predisposition to perform, perceive, think and feel in relation to it.

Sharma (1972) defined attitude as a personal disposition which impels an individual to react to some object or situation.

Gosh (1978) reported that majority of the officials had medium or less favourable attitude towards T & V system.

Rao (1979), Sarkar ^{& Reddy} (1980) and Naik (1981) reported that majority of the officials had moderately favourable attitude towards the T & V system.

Studies on attitude of officers towards watershed planning were not available.

V. Association of knowledge in watershed planning and attitude towards the same with characteristics of the officials.

1. Age.

Ross (1961) reported that people became better integrated and some what more extreme in their attitude as they grow/ older.

Bhaskaran and Mahajan (1968) reported that the young and middle aged farmers were superior to the old age group in the matter of retention of knowledge about extension methods.

Singh and Singh (1968) found younger farmers to have significantly favourable attitude towards fertilizers than the old farmers.

Rao (1980) reported that age was not related with the attitude of the officials towards T & V system.

Naik (1981) reported that the attitude of the officials towards T & V system was independent of age.

Vijaya (1982) stated that the knowledge of the farmers about T & V system was independent of their age.

Cherian (1984) reported that attitude of the VLWs towards T & V system was independent of their age.

2. Educational status.

Singh and Singh (1968) reported that educational status

of farmers had positive relationship with the attitude of the farmers towards improved practices.

Das and Sarkar (1970) reported positive relationship of education with the attitude of farmers.

Makkar and sohal (1974) also found positive relationship of education with attitude of farmers towards soil conservation practices.

Supre and Salode (1975) reported that formal education was significantly related to the level of knowledge of farmers on the demonstrated practice.

Kaleel (1978) stated positive relationship of education with the level of knowledge of farmers.

Rao (1980) reported that education was related to the attitude of officials towards T & V system.

Rao and Reddy (1979) suggested that there was no relationship of education with the level of knowledge in improved practices.

Sarkar ^{& Reddy} (1980) found that the attitude of the officials towards T & V system was related to their education.

Ahamed (1981) reported positive relationship of education with the level of knowledge of farmers.

Phillip (1984) reported that there was no significant relationship of education with the level of knowledge and attitude of farmers.

3. Experience in the department.

Patel and Somasundaram (1974) reported a positive relationship between the experience of the respondents with their gain in knowledge.

Rao (1980) reported that attitude of the officials towards T & V system was not related to their service experience.

Sarkar ^{& Reddy} (1980) reported that the attitude of the officials towards T & V system was not significantly related to their service experience.

Naik (1981) reported that the attitude of officials towards T & V system was independent of their experience in agricultural extension service.

Cherian (1984) reported that experience of the officials was positively and significantly correlated with their attitude towards T & V system.

4. Training undergone in Agriculture.

Bhasha et al. (1975) stated that the training undergone had no considerable bearing on the attitude of Deputy Agricultural Officers towards adaptive research.

Rahiman and Menon (1980) reported that there was no change in the attitude of supervisors of primary land mortgage banks due to training.

Cherian (1984) reported that previous training of the officials was positively and significantly correlated with their attitude towards T & V system.

5. Information seeking behaviour.

Ray (1975) reported that extension officers in West Bengal were mostly in contact with official letters, leaflets, pamphlets, agricultural magazines and official meetings.

Sanoria and Singh (1976) revealed that radio broadcast, superior extension personnel and extension publications were the most commonly used sources of information for the VLWs.

Reddy and Singh (1977) reported that package of practices, booklets, leaflets and folders, AEOs, SMS of the department of Agriculture, magazines, newspapers and radio were the popular sources of information with VLWs.

Pandayaraj (1978) found that information seeking behaviour of JAOs was positively and significantly related to their communication behaviour.

Gupta (1982) found that exhibits, posters, field trips, transistors, flash cards, pamphlets, circular letters, charts, folders and booklets were the different sources of information for VLWs in Ludhiana.

Joseph (1983) found positive and significant correlation between information seeking behaviour and communication effectiveness of ADs.

NO relevant study on the influence of information seeking behaviour on the knowledge and attitude of officers regarding watershed planning were available.

6. Job satisfaction.

Katzell (1964) defined job satisfaction as the verbal expression of the incumbent's evaluation of his job.

Sinha et al. (1976) defined job satisfaction as a mental state of an individual in an organization when he feels satisfaction in performing the job of his position.

Anastasi (1979) explained job satisfaction essentially as the degree of correspondence between workers' needs and their need fulfilling characteristics of the job. Job variables may interact with worker characteristics in their relation to job satisfaction.

Sarkar and Patnaik (1967) found that VLWs placed maximum importance on such factors as opportunity for promotion and salary according to work achievement.

Subalakshmi and Singh (1974) found that nearly two third of the gramasevaks were either very much satisfied or satisfied with their job, nearly 20 per cent were dissatisfied or very much dissatisfied and the remaining gramasevaks were neutral.

Sinha et al. (1976) found that job satisfaction had significant and positive relationship with communication

effectiveness of district and block level officials only in intensive area, and in other areas there was no significant relationship.

Sanoria (1977) found positive and significant relationship between job satisfaction and communication efficiency of JAOs.

Here also no relevant study has been obtained about the relationship self confidence with the knowledge and attitude of officers pertaining to watershed planning.

7. Self confidence.

The Readers digest great encyclopaedic dictionary gives the meaning of self confidence as the confidence in oneself.

Muthayya and Gnanakannan (1973) obtained positive relation between self confidence and job satisfaction.

Subalakshmi and Singh (1974) reported that effective gramasevaks were more confident and ineffective gramasevikas were not confident compared to effective gramasevikas.

Khare (1976) opined that self confidence would play an important role in the success of a creator and/or innovator.

Pandayaraj (1978) found positive and significant relation between self confidence and communication behaviour of JAOs in Kerala.

Joseph (1983) opined that self confidence was positively and significantly correlated with communication effectiveness of ADs.

VI. Training needs of officials in Watershed Planning.

Ganesan (1978) operationally defined training need as the expressed level of training as required by the respondents in the field of agriculture.

Bhatnagar (1987) defined training need as the discrepancy between the actual estimated job requirements and the estimated or measured attributes of the employees incorporated judiciously in the training objectives.

Sabapathi (1988) defined training need as the discrepancy between what is and what ought to be.

a. Concept.

Bhatnagar (1987) reported that training needs could exist at any time when an actual condition of work behaviour differs from the desired conditions in any aspect of organisational performance. It also exists whenever there is a change of emphasis in organisational objectives or in the introduction of new practices, programmes, tools and techniques etc. or at the time when efforts are directed to impart related new knowledge, skills and attitudes oriented to the desired performance standards.

b. Identification of training needs.

Singh and Singh (1968) found that the agricultural extension officers needed training in programme planning, development communication and subject matter in agriculture.

singh (1967) stated that inservice training programme was essential for VLWs to keep them abreast of the latest research findings in agriculture and allied disciplines.

Sinha and Gill (1967) stated that VLWs needed training in the following aspects: agricultural implements, soil management, crop husbandry, farm management and miscellaneous aspects. Top priority was given to plant protection aspects.

singh (1970) stated that AEOs indicated their need for inservice training in preparing sound cropping scheme, land reclamation, soil and water conservation and improved plant protection measures.

sohal and Yanakai (1970) felt that the top priority should be given to agronomy, plant protection and farm machinery in farmers' training programmes.

Sunderarajan (1970) observed the AEOs' opinion that the training programmes on minor irrigation and water use, plant protection, training and refresher course in subject matter had all provided latest information fully. But they were not adequate and problem oriented.

singh (1971) located the following areas of training for small farmers:

1. New technologies of production, time of sowing, irrigation, plant protection, soil conservation etc.
2. The knowledge about new inputs.
3. Economics of production and marketing such as net return or maximum output.

Williams (1971) reported that job description and job analysis for all levels of positions in the extension organisation help to identify the training needs. Job description is a detailed statement of the duties and responsibilities of position. Job analysis is the process of identifying the contents of the job.

Patil and Kale (1972) stated that farmers needed training on the subjects such as use of fertilizers, pests and diseases and their control measures, soil analysis, preparatory cultivation, nutrient components of fertilizers, horticulture and irrigation method.

Mani (1974) pointed out that plant protection measures, seed and seed distribution, manures and manuring, farm management and crop planning had been given priority in that order. The inservice training should be more practical and problem oriented than being theoretical.

Menon and Annamalai (1975) reported that the subject matter in agriculture was given maximum importance by the VLWs for their training.

Pandey and Singh (1976) reported that small farmers of both irrigated and unirrigated tracts identified the subjects like high yielding varieties of wheat, plant protection and fertilizer application as most needed for training. They further reported that the small farmers of irrigated tract cultivating wheat perceived that water management also was most needed.

Anantharaman (1977) reported that small farmers needed training in plant protection measures, manures & manuring, soil conservation & reclamation^m, seeds and sowing and cropping pattern.

Jha and Jani (1977) inferred that more than two-third of the VLWs under study needed training mostly in disease control of high yielding varieties. It was followed by hybrid seed production, pest control in the high yielding varieties and communication techniques.

Sandhu and Bilang (1977) reported that agricultural extension officers required training in the use of power driven equipment, in various items under programme planning, in the areas of organisational services and supervision and administration.

Ganesan (1978) revealed that gramasevak's greatest training need was in the major area of plant protection. Second preferences went to manures and manuring while third and fourth ranks were secured by soils and soil management and crop husbandry and farm management respectively.

Mathlathagan (1978) concluded that banana growing farmers mostly needed training in main areas such as manures and fertilizers, propagation, pruning and desuckering, plant protection, improved varieties^e and storage.

Singh and Mohammed (1979) reported that extension workers needed training in extension methods, programmes

planning, technical subjects (especially fertilizers and plant protection) etc.

Ganesan et al. (1980) reported that Gramasevaks should be given inservice training in the following areas: Plant protection, manures and manuring, soils and soil management, crop husbandary and farm management.

Sangha and Sandhu (1980) reported that agricultural extension officers should be given refresher training in the selection and use of extension methods such as the four of the farmers, campaigns, exhibitions, farm and home visits and group meetings on regular basis.

Chandrasekharan (1981) stated that the untrained small tea growers lacked more knowledge in the subject matter area, plant protection followed by pruning, care of young plants, manures and manuring, after cultivation, soil conservation, planting and propagation.

Gupta (1982) reported that farmers needed training mostly in crop husbandary, then in poultry and dairying.

Sharma and Singh (1984) reported that the most needed areas of training as expressed by Block officials were project management and project evaluation. Equal importance was given to areas like giving and seeking co-operation and working as a team, improving human relations with staff, deciding line of action, co-operation with other departments, organisational communication and acquaintance with agriculture and allied programmes.

Karthikeyan (1986) reported that agricultural labourers needed training in plant protection, manures and manuring and seeds and sowing.

Sharma and Shukla (1986) identified the areas of training for Agri. Extn. Officers viz. communication of information, extension teaching methods, farmers' training, programme planning, execution, monitoring and evaluation.

Sabapathi (1988) reported that training needs existed in the case of tribal farmers mostly in plant protection, manuring, intercultural operations, seeds and sowing and land preparation.

c. Assessment of training needs

Sharma and Singh (1970) used the Index of consensus for assessment of training needs.

$$C_q = \frac{F' - c'f}{F(c-1)}$$

Where C_q = the index of consensus

F the mean frequencies of persons preferring each category. n being the total frequency and c is the total number of frequency categories.

c' = number of categories with frequencies exceeding f

f' = category frequency larger than f

Sharma and Singh (1970) used the training need quotient (TNQ) for assessing training needs.

$$TNQ = \frac{\sum OS_{ij}}{\sum MS_{ij}} \times 100$$

OS_{ij} is the sum of observed scores of j th individual for the i th item.

MS_{ij} is the maximum score attributable to the i th item rated by the j th individual.

TNQ is the training need quotient.

Anantharaman (1977) measured the training needs to each subject matter area and the specific items by the use of a three-point rating scale with points 'much needed', 'some what needed' and 'not at all needed' with scores of 2, 1 and 0 respectively. The frequencies of each response categories were found out and the respective frequencies were multiplied by the score allotted to it. The scores were summed up and divided by the total weights so as to get weighted mean score for each subject matter area.

Genesan (1978) also adopted more or less the same procedure for assessing training needs of Gramasevaks. The responses were noted to rate the training needs in the three-point continuum. Then the overall mean score for each of the specific areas was individually worked out and ranking was done. The three-point continuum had points 'much needed', 'some what needed' and 'not needed'.

Gill and Sandhu (1981) worked out the training needs of prospective poultry farmers of Punjab using the following formula:

Training need score = 1 - Average knowledge score

where the average knowledge score =

$$\frac{\text{Total knowledge score}}{\text{No. of questions} \times \text{No. of respondents}}$$

Singh and Gill (1982) measured training needs of farmers by using the following formula:

Training need score = 1 - obtained knowledge and skill score.

Sharma and Singh (1984) measured the training needs of development personnel on a three-point continuum and a single simple numerical procedure was used. Each item was provided with three alternative responses: 'most needed' (3) 'needed' (2) and 'not needed' (1). The score for each item was worked out by multiplying the number of respondents selecting the response times, the value assigned to the response and by summing upto the scores of all the three categories of responses. The total training need score of an individual was computed by summing his scores in all items. The training need scores and mean scores were worked out by multiplying the number of respondents opted for the response times and the value assigned to the response and summing up the scores of all the 3 categories against each item. Rank order was determined for each item based on mean scores. The classification on the basis of which rating was done was as follows:

2.25	-	3.00	Most needed
1.50	-	2.25	Needed
0.75	-	1.50	Not needed

Verma and Verma (1985) assessed the training needs of rural women as follows:

The trainees preferences were recorded under need and interest categories and to most needed/interested, some what needed/interested and least needed/interested categories.

Karthikeyan (1986) measured training need as follows: The frequencies of each response categories were found out and the respective frequencies were multiplied by the score allotted to it. The scores were summed up and divided by the total weights so as to get weighted mean for each subject matter area. Then they were ranked to find out the important areas in which farmers required training. Total training need score was worked out to study the relationship between the training needs of respondents and their socio-personal characters. This total score for each respondent was arrived at by summing up the scores of all the specific items of all the major areas as related by the respondent.

Mary and Nancy (1986) measured the training needs of 4 - H volunteers as follows. They listed 23 aspects of leadership and asked the respondents to indicate if they wanted or needed training in each one. Group training sessions at country or multicounty level, one to one help from county staff or another leader, or printed materials in the form of a news letter or handbook were the choices. If they did not want training on a particular aspect of leadership, respondents were asked to circle 'none'.

Bhatnagar (1987) quoted the choice score method for assessing the training needs. On the basis of the responses of the people priorities based on the first, second and third choices may be tabulated and identified as training areas. Following this, Total choice scores (TCS) and average choice scores (ACS) may be worked out by the following formula:

$$ACS = \frac{(CI \times 3) + (CII \times 2) + (CIII)}{3}$$

Where CI is the first choice, CII is the second choice and C III is the third choice. ACS is the average choice score. Based on this the training needs can be ranked to determine priority.

VII. Constraints in watershed planning.

Satterlund (1972) reported the following factors with respect to the constraints in watershed planning.

1. Basically existing water rights laws.

They are regulatory and remove most incentives for improving water yields by private and public watershed owners.

2. Cultural barriers like religion, tradition, mores or folkways.

These may influence the decision making process.

3. Resistance to loss of long held privileges.

Privileges tend to become accepted as rights.

4. Attitude of land owners.

Favourable attitude may create a willingness to do things with no economic rewards.

5. The economic and social background of the area.

This may sometimes create a resistance to change.

6. Local and regional organisations, political, economic, fraternal, social and so on.

These may sometime work against the development efforts.

7. The nature of community leaders.

Community leaders can influence the public's decision making in a favourable or unfavourable direction.

8. Technological and educational status of interest groups.

9. Existing and planned developments, roads, commerce, communication, industry and so forth.

Literature on the constraints in watershed planning are only limited. So, constraints reported in some of the other developmental areas are also given.

Jaiswal et al. (1978) observed that the important administrative constraints perceived by the officials under T & V system were lack of promotional avenue, lack of allotment of incentives and improper supervision.

Rajendran (1978) studied the constraints in the adoption of improved practices in the cultivation of rice and found that non availability of supply and service at the proper time and inadequate quantities of inputs were the major constraints.

Dhillon and Paul (1980) stated the following problems relating to watershed management:

1. Malpractices in the watershed responsible for soil erosion
 - a. Uncontrolled/over grazing.
 - b. Felling of trees/deforestation
 - c. Burning of forests
 - d. Cultivation on steep slopes
 - e. Shifting cultivation.
2. Cures for abuses of watershed.
 - a. Reforestation
 - b. Control ^{of} over grazing
 - c. Plantation of quickgrowing trees.

Pandey (1980) found that the extension personnel had no regular contact or link with researchers in the command area.

Purushottam (1980) identified the following constraints in watershed management:

1. Interstate aspects the close co-operation of the states is required for efficient watershed management since the river basins are spread over a number of states.
2. Over exploitation of forests, accompanied problems of erosion and sedimentation and floods in the down stream areas.
3. Excessive grazing.
4. Sedimentation of reservoirs.

Kulhari (1981) reported the following administrative, constraints under T & V system.

1. Extensive jurisdiction of field level workers.
2. Under staffing increasing the quantum of work.
3. Undertaking responsibilities from other ongoing developmental programmes in the department which reduces the concentration on T & V system.
4. Non provision of office facilities.
5. Lack of conveyance facilities.
6. Lack of support from parallel departments reduces farmer's participation.
7. Absence of contact farmers in their fields during visits
8. Poor facilities for using teaching aids during VLW's field visit.

Arokoya (1982) reported that lack of credit and labour, nonavailability of inputs, lack of sufficient information and lack of knowledge were the main reasons for the nonadoption of paddy technology.

Jaiswal et al (1982) identified the following constraints in watershed planning:

1. The concept of management of inter sectoral linkages for development was not clear to many sectoral officers.
2. People in watershed were not aware of the long term benefits from soil and water conservation activities and hence their participation at various stages was not forthcoming.
3. The role of local institutions was totally absent at planning and implementation of watershed activities and maintenance of community assets.

4. None of the district level officers received any special training in watershed management.
5. Sectoral officers were unaware of the rationale behind the integration of activities of watershed.

Joseph (1983) found that lack of office facilities, lack of supply of inputs, inadequate transport facilities, absence of touring facilities of staff in their working units and heavy work load were the most important problems experienced by the officials working in the T & V system.

Somasundaram (1983) reported the problems encountered by the agricultural officers in T & V system as:

1. Too many agricultural schemes to be operated by the agricultural officers.
2. The schemes are mainly target oriented.
3. Hindrance to tour programmes due to frequent call from supervisors.
4. Fuel ceiling.
5. Too many demonstrations to be conducted by the agricultural officers.
6. Inadequate subsidy facilities for conducting demonstrations
7. Lack of promotional facilities for field level workers.
8. Lack of time to attend the urgent needs of farmers due to fixed programme of field level workers.
9. Lack of housing.
10. Non realization of benefits from additional work.

Cherian (1984) found that lack of office facilities and frequent transfer were the problems perceived by the VLWs whereas lack of conveyance facilities and heavy work load for the time bound projects were the important problems perceived by the officers.

Kalaichelvan (1984) in his study revealed that lack of housing and conveyance facilities, nonavailability of inputs in time, lack of subsidy facilities and high cost of inputs and labour were the important constraints in farm technology transfer through T & V system.

Balakrishnan (1987) reported the following administrative constraints as perceived by the officials of NARP regions in Kerala as:

1. Lack of sufficient fund for travelling expense of extension workers.
2. Lack of sufficient financial assistance to conduct demonstrations.
3. Development programmes other than T & V work will increase the work load on extension workers.
4. Insufficient promotional avenues of field level workers in T & V system.
5. Frequent transfer of extension workers.
6. Active workers are not appreciated.

He also identified the following constraints in the dissemination of messages in the NARP regions of Kerala as perceived by the officials:

1. Inadequate facilities for getting scientific publications and periodicals to extension workers.
2. Absence of contact farmers in their fields during VLW's visit.
3. Extensive jurisdiction allotted to VLWs.
4. Fortnightly training sections are more theoretical in nature rather than practical oriented.
5. Inadequate use of teaching aids for skill development.
6. Improper facilities to use teaching aids during VLW's field visits.
7. Lack of interest and response of contact farmers.
8. Poor ability of the contact farmers to receive and transmit technical information to fellow farmers.
9. Most of the contact farmers are not adopting recommended practices due to lack of infrastructural facilities.

Sreekumar and Pillai (1988) identified the following constraints affecting the effectiveness of soil conservation programmes:

1. Lack of effectiveness of engineering field staff of the S.C unit in different appropriate technologies of soil and water conservation (other than contour bunding).
2. The nature of implementation of soil conservation programme in the notified scheme areas as per the provisions of the Act does not normally permit the available staff to extend the activities outside the scheme areas.

3. Inadequate awareness and knowledge of functionaries in the new concept of watershed planning and watershed management.
4. Want of efforts to train the farmers in soil and water conservation.
5. Inadequate facilities for regular training to the field staff of the unit in soil conservation.
6. Inadequate research works conducted under Kerala conditions in the Soil Conservation Research Centre, Konni.
7. Want of suitable arrangements for monitoring and evaluation of soil and water conservation programmes.
8. Want of emphasis on the educational component in the soil conservation activities.
9. Lack of a unified and effective soil and water conservation extension service for Kerala.

The present research work on the awareness and training needs of the officers of the department of Agriculture in watershed planning has the limitation that sufficient literature on knowledge level, training need etc. in the area is not available. Since watershed planning and management is about to be introduced and given more thrust in the strategy for Agricultural development during the VIII Plan in Kerala, the topic has emerged very important.

Operationalization of variables

1. 1. Age

Age is operationalized as the number of completed years of a respondent at the time of interview.

2. Educational status.

Educational status is operationalized as the maximum qualification possessed by the JSCOs, JSSOs and AOs at the time of investigation.

3. Experience in the department.

Experience is operationalized as the completed years of service as JSCOs, JSSOs or AOs possessed by the respondents in the Soil Conservation Unit or the Department of Agriculture at the time of investigation.

4. Training undergone in agriculture.

Training undergone is operationalized as the number of trainings undergone by the respondents on any aspect of agriculture.

5. Information seeking behaviour.

Information seeking behaviour is operationalized as the extent to which the officers are seeking information regarding any aspect of watershed planning from different communication sources.

6. Job satisfaction.

It is operationalized as the satisfaction which the

officer respondent derives from effectively performing his work as a JSCO, JSSO or AO.

7. self confidence.

It is operationalized as the confidence of the JSCOs, JSSOs or AOs in their own abilities.

2. Awareness in watershed planning.

Awareness is operationalized as the first knowledge of JSCOs, JSSOs and AOs in watershed planning.

3. 1. Knowledge in watershed planning.

Knowledge in this study is operationalized as the extent of understanding of the officer respondents in watershed planning at the time of interview as evident from their responses to a set of questions prepared on important aspects of watershed planning.

2. Attitude towards watershed planning.

Attitude is operationalized as the officer respondent's degree of favourableness or unfavourableness towards watershed planning.

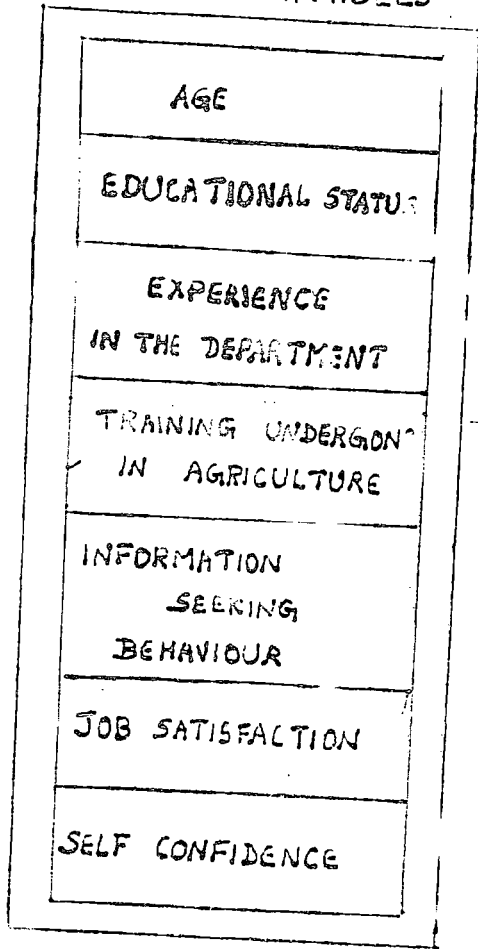
4. Training need in watershed planning

Training need is operationalized as the amount of training needed in various aspects of watershed planning as perceived by the JSCOs, JSSOs and AOs for efficient work

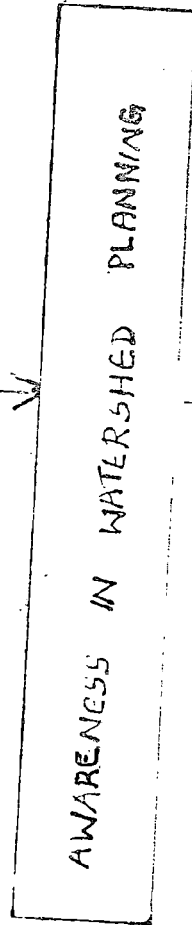
The conceptual frame work of the study is given in Figure 1.

FIGURE 1
CONCEPTUAL FRAME WORK OF THE STUDY

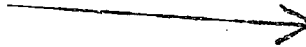
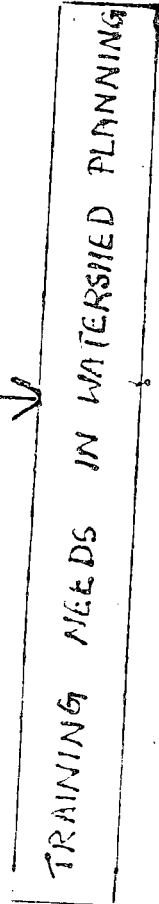
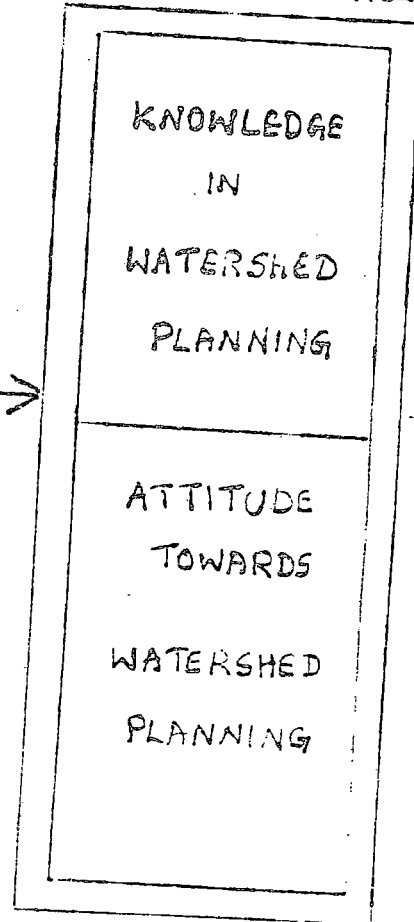
INDEPENDENT VARIABLES



INTERVENING VARIABLE



DEPENDENT VARIABLES



METHODOLOGY

CHAPTER III

METHODOLOGY

This chapter deals with the research methods and procedures used in the study which are presented under the following subheadings.

- A. Location of the study
- B. Selection of respondents
- C. Selection and measurement of variables
- D. Techniques of data collection
- E. Statistical methods used.

A. Location of the study

Kerala is a small state with an area of 38,863 m². The total population is 25,453,680 according to 1981 census. It is a land of rivers and back waters. There are 44 rivers with its tributaries and branches. But these rivers are comparatively small and being entirely monsoon-fed, practically turn into rivulets in summer, especially in the upper areas. Kerala state is divided into 14 revenue districts. It is divided into five agro-climatic zones under the National Agricultural Research Project which are very distinctive in climatic features and soil characteristics. They are the north zone, the high altitude zone, the central zone, the south zone and the problem zone. Since watershed planning is mainly based on the land and surface water hydrology of the watershed, the study was undertaken in these agro-climatic zones. For this

SELECTION OF RESPONDENTS FOR THE STUDY

Agro-Climatic zone	Sl. No.	Districts	No of officers			District selected for the study	No. of respondents in the sample			Total sample size
			JSCOs available at the time of investigation	JSSOs available at the time of investigation	AOs		JSCOs	JSSOs	AOs	
North zone	1	Kasargode	1	-	44	Calicut	3	4	12	19
	2	Cannanore	3	3	91					
	3	Wynad	3	-	28					
	4	Calicut	3	4	79					
	5	Malappuram	3	-	96					
High attitude zone	1	Wynad	1	-	28	Wynad	1	-	4	5
	2	Palghat	9	2	96					
	3	Ernakulam	3	2	96					
	4	Idukki	6	-	57					
Central zone	1	Malappuram	3	-	96	Palghat	9	2	14	25
	2	Palghat	9	2	96					
	3	Ernakulam	3	2	96					
	4	Idukki	6	-	57					
South zone	1	Idukki	6	-	57	Trivandrum	6	12	14	32
	2	Kottayam	3	2	79					
	3	Alleppey	3	2	81					
	4	Quilon	2	-	33					
	5	Trivandrum	6	12	96					
	6	Pathanamthitta	4	-	57					
Problem zone	1	Alleppey	3	2	81	Trichur	2	1	16	19
	2	Ernakulam	3	2	96					
	3	Trichur	2	1	110					
			51	28	1045	Total	21	19	60	100

purpose, five districts were randomly selected, one each from the five agro-climatic zones. [Distribution of the 14 districts of Kerala ^{among} these agro-climatic zones are given in Appendix I.] The districts selected were Calicut from the north zone, Wynad from the high altitude zone, Palghat from the central zone, Trivandrum from the south zone and Trichur from the problem zone.

B. Selection of respondents

Recently the Department of Agriculture has been re-organised into 1045 Krishibhavans under the Department of Agriculture, each under the charge of an Agricultural Officer/ Agricultural Assistant. In addition, there are 51 JSCOs and 28 JSSOs under the Soil Conservation Unit which has functional integration with the Department of Agriculture. Of these, the entire population of JSCOs and JSSOs in the selected districts at the time of investigation was taken ^{as the sample} for the study and sample from the AOs were selected from these five districts following stratified two stage random sampling. The sample consisted 21 JSCOs, 19 JSSOs and 60 AOs making a total sample of 100 (Table 1)

C. Selection and measurement of variables

Detailed review of literature, a pilot study in the area and discussion with the experts in the field were made use of in selecting the variables. The list of variables finally selected along with the instruments used to measure them is given below:

Variables

Measurement procedure

I. Independent variables

- | | | |
|--------------------------------------|---|---|
| 1. Age | : | Number of completed years at the time of interview |
| 2. Educational status | : | schedule developed for the study. |
| 3. Experience in the department | : | Number of actual years of completed service in the Dept. of Agriculture/soil conservation unit. |
| 4. Training undergone in agriculture | : | Schedule developed for the study. |
| 5. Information seeking behaviour | : | Procedure followed by Joseph (1983) with modifications in the scoring procedure. |
| 6. Job satisfaction | : | Procedure used by Joseph (1983) |
| 7. self confidence | : | Procedure developed by Pandyaraj (1978) with slight modifications in the scoring procedure. |

II. Intervening variable

- | | | |
|--------------|---|-----------------------------------|
| 8. Awareness | : | Schedule developed for the study. |
|--------------|---|-----------------------------------|

III. Dependent variables

- | | | |
|--------------|---|--|
| 9. Knowledge | : | Knowledge test developed for the study |
| 10. Attitude | : | Scale developed for the study. |

IV. Training needs : Procedure developed for the study.

Empirical measurement of variables

1. Educational status.

Nachiappan and Murthy (1976) used the socio-economic status scale of Trivedi (1963) to measure the educational status of small farmers.

Cherian (1984) measured educational level of farmers using the socio-economic status scale of Venkataramaih (1983) with slight modifications.

A schedule was developed in the study for measuring the educational status of the respondents. The scoring procedure was:

Sl. No.	Level of Education	Score
1	K.G.T.E. diploma	1
2	Diploma in Engineering	2
3	Degree in Agriculture	3
4	M.Sc.(Ag.) in Subjects other than Agronomy	4
5	M.Sc.(Ag.) in Agronomy	5
6	Ph.D. in Agriculture	6

2. Experience in the department

According to Chamber's Dictionary (1976) experience is the practical acquaintance with any matter gained by trial or

wisdom derived from the changes and trials of life.

Ernest (1970) measured experience in terms of number of years of service.

Ganesan (1978) measured length of service of gramasevaks as the total number of years of service as gramasevak at the time of investigation.

The actual years of completed service in the department of Agriculture/Soil Conservation Unit was taken as a respondent's experience in the study.

3. Training undergone in Agriculture.

Rajababu (1984) operationally defined training acquired as the number and type of trainings undergone by the respondents at the time of investigation excluding the T and V trainings.

Rajababu (1984) measured training acquired by the respondent by assigning scores to each type of training undergone and multiplying the scores obtained by the number of trainings undergone.

A schedule was developed for the present study with respect to trainings undergone in any aspect of Agriculture, as follows:

Sl. No.	Category	Score
1	Pre-service training	1
2	Inservice training	
	a) Subject matter training	1
	b) Management training	1
	c) Extension training	1

The number of trainings undergone by the respondents was multiplied by the score for each type of training and the total score for training for each respondent was worked out.

Pandayaraj (1978) measured the information seeking behaviour of the JAOs by preparing a list of all the information sources and asking the respondents to indicate their preferences to all sources. The procedure was modified and used by Joseph (1983) in his study.

A schedule was developed for this study following the above method with modifications in the scoring pattern. The list of information sources was given to the respondents and they were asked to indicate the frequency of seeking information from these sources. The responses were rated in a four-point continuum of 'regularly', 'most often', 'one in a while' and 'seldom' with score of 4, 3, 2, and 1 respectively. Information seeking behaviour score for each respondent was worked out by adding up the scores corresponding to each response. Thus a maximum score of 60 or a minimum score of 15 could be obtained by a respondent.

6. Job satisfaction

Muthayya and Gnanakannan (1978) measured the job satisfaction of development personnel by items covering three aspects viz. personal aspects including feelings of inadequacy, insecurity, non-acceptance etc; the interpersonal aspects covering the interaction with superior people and non-officials and the job aspects including pay, work opportunities,

expectations etc. Rathors (1974) developed a job satisfaction scale to measure the level of job satisfaction of extension personnel. sinha et al., (1976) measured job satisfaction in terms of overall attitude of the respondent towards his job by asking direct questions such as whether he liked or disliked his job.

In this study, the procedure developed by Rathors (1974) which was modified and used by Joseph (1993) was used to measure the job satisfaction of the respondents. The items reflecting different aspects of job were selected. The items in the form of questions and answers were rated on a five-point continuum ranging from 'very much satisfied' to 'very much dissatisfied'. The scores assigned were as follows.

Very much satisfied	4
Satisfied	3
Undecided	2
Dissatisfied	1
Very much dissatisfied	0

The job satisfaction score for each respondent was computed by summing up the score corresponding to each answer. Thus a maximum score of 40 or minimum of zero can be obtained.

7. self confidence

In this study the variable self confidence was measured by using the procedure developed by Pandyaraj (1978) with modifications in the scoring procedure. A list of eight items

explaining initiative and ability to achieve goals were included in the scale. These items were rated on a different five point continuum ranging from 'always' to 'never'. The points in the continuum were 'always', 'most often', 'often', 'rarely' and 'never' giving a score of 4, 3, 2, 1 and 0 respectively. The maximum and minimum scores that could be obtained were 32 and 0 respectively.

II Intervening variable.

1. Awareness of the respondents in watershed planning.

According to the dictionary of behaviour sciences, awareness is 'being conscious of something as the state of ^{perceiving} ~~perceiving~~ and taking account of the event, occasion, experience or object'.

Gaikwad (1971) studied the awareness of participant farmers of Integrated Agriculture ^{Develop}ment Scheme, by asking a few questions to find out whether they were aware or not about the scheme. Awareness was measured by calculating the percentage of farmers aware ~~and percentage of farmers aware~~ and percentage of farmers unaware of the problem.

Salunke (1977) measured awareness of farmers by asking questions on different aspects of SFDA activities, viz. publicity about SFDA, methods of getting benefit, method of granting subsidy, supervision of loan, arranging services supply and technical guidance and giving a score of 'one' for each correct answer. Khan (1978) measured awareness by asking the respondents whether they were aware of certain measures.

of the government for improving the condition of the small farmers. Each respondent's total score was computed and converted into an awareness index by using the following formula:

$$\text{Awareness Index} = \frac{\text{Total score obtained}}{\text{Total score possible}} \times 100$$

Naik (1981) studied the awareness of respondents about T and V system by asking a number of questions on several aspects of T and V system. The scoring index developed for the purpose of the study was used as a guideline to score each response. By summing up these scores on individual items the total score on awareness was obtained.

Cherian (1984) measured awareness of AOs as follows:

The officials were given a few statements on the general principles and working of T and V system and were asked to indicate whether they agree or disagree with the statement and a score of one was given for 'agree' and zero for 'disagree' responses for positive statements. The scoring pattern was reversed in the case of negative statements. The scores for each of the respondents were added up and the total score on awareness was obtained. The means and standard deviations were worked out and on their basis the respondents were categorised into three.

In the present study the procedure suggested by Salunke (1977) was used. A range of 26 questions were first selected and sent to experts in the Department of Agriculture and Kerala Agricultural University, for rating. Based on their

judgement of relevancy 12 questions were selected. The responses were rated on a two-point continuum with Yes/No categories with respective scores of one and zero. Then each respondent's total awareness score was calculated.

Each category of respondents viz; JSCOs, JSSOs and AOs was divided into three groups viz. low, medium and high, based on the mean and standard error. Maximum score that could be obtained by an individual was 12 and the minimum score being zero.

III Dependent variables

1. Knowledge level of the respondents in watershed planning

Knowledge was defined as those behaviour and test indications which emphasised the remembering either by recognition or recall of ideas, material or phenomenon.

A standardised knowledge test was developed by following the procedure used by Lokhande (1973), Reddy (1976), Sadamate (1978), Pillai (1983), Viju (1985) and Kanagasabapathy (1988).

The steps followed in developing a knowledge test for the study are described below.

Collection of items

The content of a knowledge test is composed of questions called items. An ideal pool of questions was prepared by reviewing literature such as the reports of the CWRDM, Calicut, guidelines of the ICAR and the materials made available by the Soil Conservation unit, Kerala. The experts from the CWRDM,

the Kerala Agricultural University and Soil Conservation Unit of the Department of Agriculture were consulted while preparing the items.

The selection of items was done on the basis of the following criteria.

1. The items should promote thinking.
2. It should differentiate the well informed respondents from the poorly informed ones, and
3. It should have an item difficulty index.

Forty items which covered all aspects of watershed planning were selected to carry out item analysis for developing a standardised knowledge test.

All the 40 items collected for constructing the knowledge test were in the objective form. The questions were dichotomous with True/False type to have objective assessment.

Item analysis

The initially prepared 40 items were checked and modified on the basis of pre-testing and administered to 30 officials prior to the preparation of the final schedule. The respondents were randomly selected agricultural officers and soil conservation officers in the cadre of J800s from Alleppey district who were different from the sample selected for the main study and at the same time having identical conditions, job responsibilities and qualifications.

Item analysis gives two kinds of information viz. item difficulty and item discrimination. The index of item difficulty reveals how difficult an item is, whereas the index of discrimination indicates the extent to which an item discriminates the well informed individuals from the poorly informed ones. Scores of value one and zero were given to the correct and incorrect responses respectively. There was a possibility of respondents, scoring a maximum of 40 points for all the correct answers and a zero for all wrong answers.

The sum of scores obtained by the 30 respondents were arranged in the descending order, from the highest to the lowest and the respondents were divided into three equal groups. They were G1, G2 and G3 with 10 respondents in each group. For item analysis, the middle group namely G2 was eliminated, retaining only the terminal ones with high and low scores.

Calculation of item difficulty index

P is the index of item difficulty

$$P = \frac{\text{No of correct responses}}{\text{Total number of responses}}$$

The index of item difficulty as worked out in this study refers to the percentage of respondents answering an item correctly. The difficulty of an item varied for different individuals.

Calculation of Discrimination index

The other criterion for item selection was the discrimination index, indicated by $E_{1/3}$

$$E_{1/3} = \frac{(r_1) - (r_3)}{N/3}$$

Where r_1 and r_3 are the frequencies of correct answers in the group G_1 and G_3 respectively.

N = Total number of respondents in the sample.

The data pertaining to correct responses for all the items in respect of these two groups G_1 and G_3 were tabulated and the difficulty and discrimination index calculated (Appendix II).

Final selection of items

In this study, the items with P values ranging from 0.230 to 0.533 were considered for final selection of items in the knowledge test as the difficulty index ranges from 0.10 to 0.63. The selected items had high discrimination index values also. [Previous studies like Lokhande (1973), Pillai (1983) and Viju (1985) had put their units as 0.35 to 0.55, 0.35 to 0.50 and 0.30 to 0.90 respectively.] Thus 19 items were selected for the final format of the knowledge test.

Scoring

The summation of scores for the correct answers over all the items for a particular respondent indicated his level

of knowledge in watershed planning. The total knowledge score was worked out for individual respondents and taken for analysis. The maximum score that could be obtained by a respondent was 19 and the minimum score was zero.

Reliability

The test-retest method was used on the scale by administering it to a set of 30 respondents different from the sample, but having identical responsibilities. The test was used at an interval of 15 days and coefficient of correlation between two sets of knowledge scores was worked out ($r = 0.793$) which was significant at one level of ^{per cent} probability. The result indicated that the test was highly dependable for measuring the knowledge of the officers about watershed planning.

Validity

Care was taken to include items covering the entire universe of relevant aspects with respect to the knowledge about the different components of watershed planning. Items were collected through various sources such as experts from the Kerala Agricultural University and Soil Conservation Unit of the Department of Agriculture. So that it was assumed that the test would measure the knowledge of the respondents in watershed planning.

Based on the mean and standard error each category of respondents were grouped according to their level of knowledge.

2. Attitude towards watershed planning.

Thurstone (1946) defined attitude as the degree of positive or negative affect associated with some psychological object.

Development of Attitude scale.

The attitude of the respondents towards watershed planning was measured with the help of an attitude scale constructed for the purpose. The method adopted to develop the scale was the equal appearing interval as described by Thurstone and Chave (1929) and likerts summated rating method as described by Edwards (1969) with slight modification. The steps followed in constructing the scale were:

a. Collection of statements.

Forty statements were collected after a detailed review of the literature on watershed planning and discussions with the specialists in the Department of Agriculture and Kerala Agricultural University. The 40 statements collected were edited for the removal of ambiguous and overlapping statements, using the criteria described by Edwards (1969) and the number of statements finally selected for judges rating was reduced to 20.

b. Judges rating of attitude statements.

The experts in the department of Agronomy, Agricultural Engineering, Agricultural Extension and Horticulture in Kerala Agricultural University comprised the team of judges. Out of 50 judges 45 responded. Five were eliminated on the criteria

of Thurstone and Chave (1929) for careless judging. The responses of 40 judges were retained for the final selection of statements for the attitude scale.

c. Final selection of statements.

The scale and Q values for all the 20 statements that had been judged by the 40 judges were found (Appendix III) to obtain a small number of statements rather evenly placed on the continuum and where there is good agreement between the judges in judging the degree of favourableness or unfavourableness of a statement. The following criteria were adopted to select the final statements:

- i) The statements selected should have comparatively small Q values.
- ii) The scale values of the statements should have almost equal appearing intervals.
- iii) A set of more or less equal number of statements with favourable and unfavourable attitudes should be in the scale.

Following these criteria 12 statements were finally selected of which six were indicators of favourable attitude and the remaining were indicators of unfavourable attitude. The maximum score that could be attained by a respondent was 48 and the minimum score was zero.

Scoring

The statements selected were arranged randomly in the schedule for data collection in order to avoid bias. Against the 12 statements, a five-point continuum was given. The points of the continuum were: strongly agree, agree, undecided, disagree and strongly disagree with scores 4, 3, 2, 1 and 0 respectively for the positive statements. The scoring pattern was reversed for the negative statements. The respondents were asked to respond to each statement in terms of their own agreement or disagreement. The attitude score of a respondent towards watershed planning was the sum of scores secured by him for all the 12 statements of the final format of the scale.

Reliability

Reliability of the scale was measured by using the split-half method. The 12 statements were divided into two equal halves with six odd numbered statements in one half and six even numbered statements in another. These two forms of statements were administered separately to 30 respondents other than from the sample, but officers of the same cadre. The coefficient of correlation between the two sets of scores obtained was computed and found to be significant ($r = 0.811$) at one per cent level of probability. Kuder-Richardson formula was also used as described by Guilford (1971) to find out the reliability for the full length of the scale. The results indicated that the scale was highly dependable.

Validity

The contents of the attitude scale were obtained by discussions with experts in the related fields and through review of literature. The statements represented a broad universe of opinion collected from various experts and other sources and it was assumed that the scale possessed content validity.

Based on the mean score and standard error, each category of respondents ^{was} were grouped according to their attitude scores into three groups.

IV Training need of the respondents on watershed planning.

Bhatnagar (1987) defined training need as the discrepancy between the actual estimated job requirements and the estimated or measured attributes of the employees incorporated judiciously in the training objectives.

To measure training need, a training need quotient (TNQ) was developed by Sharma and Singh (1976). It is a ratio scale. The formula for calculation of TNQ was as follows:

$$TNQ = \frac{os_{ij}}{ms_{ij}} \times 100$$

Where os_{ij} is the sum of observed scores of ^{jth} individual for the i th item.

ms_{ij} is the maximum score attributable to the i th item rated by the j th individual.

Ganesan (1976) measured the training needs of Gramasevaks as follows.

The respondents were asked to rate their training needs on a three-point continuum with points, 'much needed', 'somewhat needed' and 'not needed' carrying respective scores of 2, 1 and 0. Then the overall mean score for each of the specific areas was individually worked out and ranking was done.

Sharma and Singh (1984) measured the training need of development personnel on a three-point continuum and a simple numerical procedure was used. Each item was provided with three alternative responses: 'most needed' (3), 'needed' (2) and 'not needed' (1). The score for each item was worked out by multiplying the number of respondents selecting the response type, the value assigned to the response and then summing up the scores of all the three categories of response. The total training need score and the mean scores were calculated. Rank order was determined for each item based on mean scores.

Varma and Varma (1985) measured training needs of rural women. The trainees preferences were recorded under need and interest categories and to 'most' (needed/interested), 'somewhat' (needed/interested) and 'least' (needed/interested) categories with 3, 2, 1 scores assigned respectively. The Spearman's rank order correlation test was applied to find out the different preferential choices of progressive and non-progressive farm women.

For the present study the following procedure was developed to measure the training need:

Important areas of training in watershed planning were listed after discussion with experts in the Department of Agriculture and Soil Conservation unit. The respondents were asked to indicate their perception of training need in a threepoint continuum with points 'most needed', 'somewhat needed' and 'not needed' with respective scores 3, 2 and 1 in the knowledge and skill aspects separately. Then the total training need score for each individual was worked out by adding up the scores for different areas. Then the total training need score for the three categories of respondents was calculated separately.

Each category of respondents was divided into three groups with low, medium and high training needs based on the mean training need score and standard error. Maximum and minimum scores that could be obtained by a respondent was 174 and 58 respectively.

The method of training preferred by the respondents was found^{out} using the procedure described below.

Four types of training commonly followed in the department were listed. The respondent's preferences on each method of training they need were rated on a three-point continuum with points 'most preferred', 'somewhat preferred' and 'least preferred' with respective scores 3, 2 and 1.

Then the overall mean score for each of the choices was worked out from the pooled sample and ranking was done.

Similarly the duration of training, venue of training and frequency of training preferred by the respondents were rated.

V. Constraints in watershed, planning.

Fifteen important constraints in watershed planning were listed after a thorough review of the literature and discussion with experts in the Department of Agriculture and Soil Conservation Unit. The respondents were asked to indicate their perception of the importance of each constraint on a threepoint continuum viz. 'most important', 'somewhat important' and 'less important' with respective points 3, 2 and 1. Then the overall mean score for each constraint was worked out for the three categories of respondents separately and ranking was done.

D. Techniques of data collection

Prior to collection of data, discussion were conducted with the Soil Conservation Officers and officers of the Department of Agriculture on watershed planning and management. An identified micro watershed in Trivandrum District was also visited to have more idea about a watershed. After getting a clear idea about the concept and a thorough review of literature, an interview schedule was prepared in English for administering to the officer respondents.

The interview schedule was pre-tested and necessary modifications were made. (Finalised schedule is given in Appendix IV). The data collection was carried out during December 1988 and January 1989. The respondents were individually contacted by the researcher.

E. Statistical methods used :

The statistical tools used were :

i. Percentage analysis :

Percentage analysis was done to make simple comparisons whenever necessary.

ii. Correlation analysis:

Simple correlation coefficients were computed to find out the relationship between the dependent variables and each of the independent variables.

iii. Path analysis :

Path analysis developed by Wright (1934) was done to find out the direct and indirect effects of the independent variables on the dependent variables.

iv. Multiple regression

Multiple regression analysis was done to find out the contribution of each independent variable on the knowledge and attitude of the respondents in watershed planning.

v. t - test.

The t - test for unequal samples which do not follow normal distribution was carried out for finding out the significant difference in awareness, knowledge, attitude and training needs of the three categories of respondents with respect to watershed planning.

Analysis of the data was done in the department of statistics, College of Agriculture, Vellayani using the Versa IWS Computer.

RESULTS AND DISCUSSION

CHAPTER IV

RESULTS AND DISCUSSION

The results of the study are mentioned and discussed in this chapter under the following sub headings:

1. Awareness of the JSCOs, JSSOs and AOs in Watershed Planning.
2. Knowledge of the respondents in Watershed Planning.
3. Attitude of the respondents towards Watershed Planning.
4. Association of the Characteristics of the respondents with their knowledge in Watershed Planning.
5. Association of the characteristics of the respondents with their attitude towards Watershed Planning.
6. Direct and Indirect effects of the independent variables on the knowledge of the respondents in Watershed Planning.
7. Direct and indirect effects of the independent variables on the attitude of the respondents towards Watershed Planning.
8. Contribution of the independent variables in predicting the knowledge of the respondents in Watershed Planning.
9. Contribution of the independent variables in predicting the attitude of the respondents towards Watershed Planning.
10. Training needs of the respondents in Watershed Planning.
11. Method, duration, venue and frequency of training preferred by the JSCOs, JSSOs and AOs in Watershed Planning.

12. Comparison of the awareness, knowledge, attitude and training needs in Watershed Planning between the three categories of respondents.

13. Constraints in Watershed Planning as perceived by the JSCOs, JSSOs and AOs.

1. Awareness of the JSCOs, JSSOs and AOs Watershed Planning.

The respondents were divided into three categories viz; JSCOs, JSSOs and AOs. Each category of respondents was divided into three groups based on mean and standard error, with low, medium and high levels of awareness in Watershed Planning.

Table 2

Level of awareness of the JSCOs, JSSOs, and AOs in Watershed Planning. (n=100)

Category	Sl.No.	Level of awareness	Awareness Score range	Frequency	Percentage
JSCO n= 21	1	Low	0 to 7	9	42.86
	2	Medium	7 to 9	2	9.52
	3	High	Above 9	10	47.62
	Total			21	100.00
JSSO n= 19	1	Low	0 to 6	12	63.16
	2	Medium	6 to 7	4	21.05
	3	High	Above 7	3	15.79
	Total			19	100.00
AO n= 60	1	Low	0 to 3	38	63.33
	2	Medium	3 to 4	14	23.33
	3	High	Above 4	8	13.34
	Total			60	100.00
Total 100		Total		60	100.00

a. Level of awareness of the JSCOs in Watershed Planning.

As seen from Table 2, 42.86 per cent of the respondents were in the low group who had only low level of awareness in Watershed Planning. 47.62 per cent of the respondents had high level of awareness, whereas 9.52 per cent of the respondents belonged to the medium group.

b. Level of awareness of the JSSOs in Watershed Planning.

Majority (63.16 per cent) of JSSOs were in the low awareness group. Only 15.79 per cent of the respondents were in the high awareness group and 21.05 per cent were in the medium group.

c. Level of awareness of the AOs in Watershed Planning.

Majority (63.33 per cent) of the AOs had only low level of awareness. Only 13.34 per cent were in the high group, whereas 23.33 per cent of the AOs came under the medium group of awareness.

Watershed concept is by and large new to the change agents of Kerala. Of late, the State Government has initiated attempts to popularise the watershed technology and the Department of Agriculture, particularly the Soil Conservation Unit has been assigned the responsibility of formulating development programmes on watershed basis. The soil conservation schemes in Kerala were being implemented on watershed basis since many years. This has provided some exposure to the

JSCOs on the concept of watershed planning. The recent attempts of the soil conservation unit in instructing all the JSCOs to concentrate on watershed planning and management have resulted in the creation of more awareness among the JSCOs in this area. Naturally, the study revealed that more than 47 per cent of the JSCOs possessed high level of awareness in Watershed Planning. On the contrary, the distribution of JSSOs and AOs in the high level of awareness was rather low. (15.79 per cent and 13.34 per cent respectively).

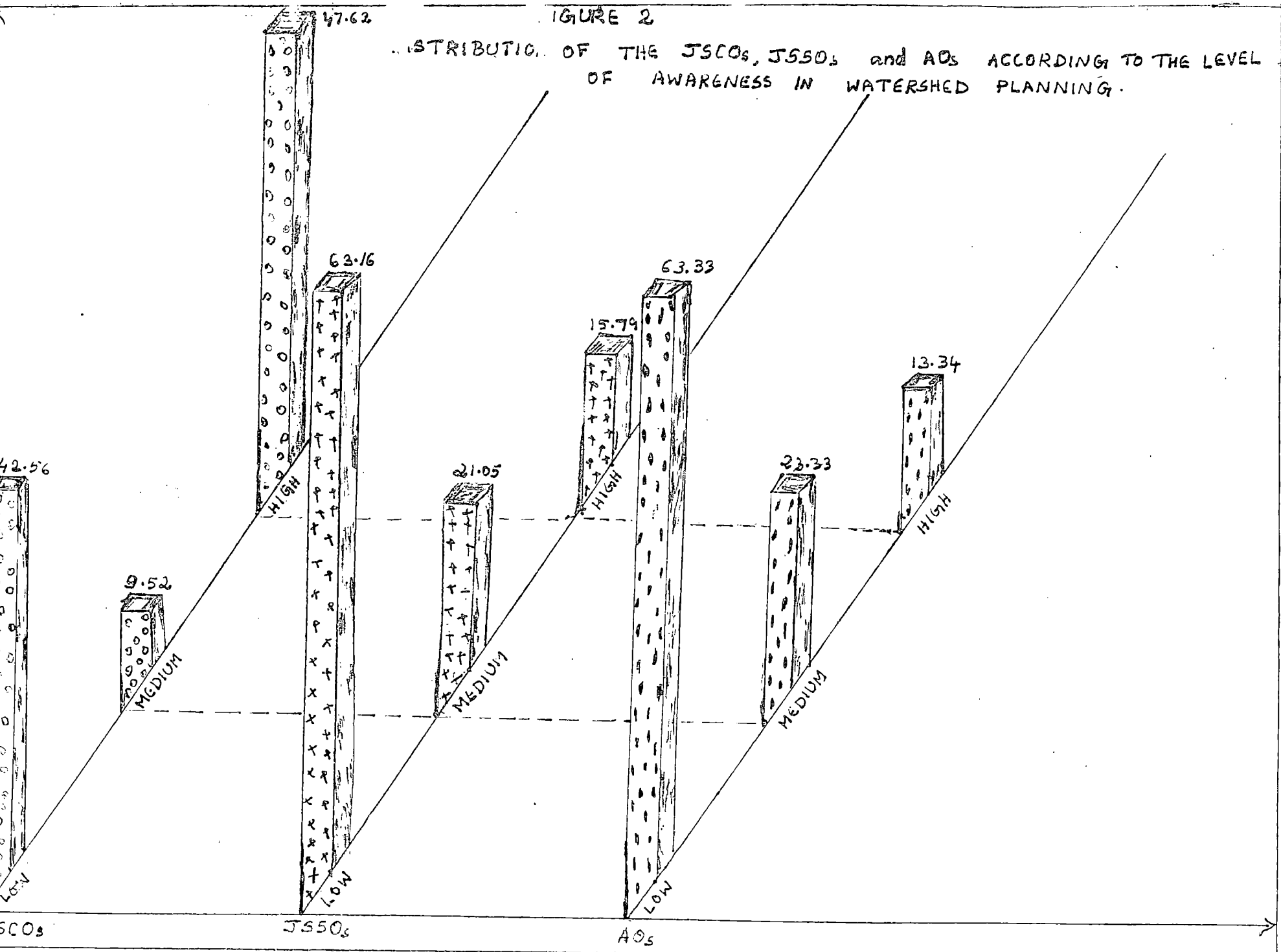
Majority of the respondents among the JSSOs and AOs possessed only low level of awareness in watershed planning because they were not directly involved in watershed development programmes so far. Obviously their level of awareness would be poor. This can be explained in terms of the felt needs of the officers in fulfilling their job responsibilities.

The results are diagrammatically presented in Figure 2.

~~2. Knowledge of respondents in Watershed Planning.~~

FIGURE 2

DISTRIBUTION OF THE JSCOs, JS50s and AOs ACCORDING TO THE LEVEL OF AWARENESS IN WATERSHED PLANNING.



2. Knowledge of the respondents in watershed planning.

Table 3

Level of knowledge of the JSCOs, JSSOs and AOs in
Watershed Planning. (n = 100)

Category	Sl.No.	Level of knowledge	Knowledge score range	Frequency	Percentage
JSCOs n= 21	1	Low	0 to 12	7	33.33
	2	Medium	12 to 15	6	28.57
	3	High	Above 15	8	38.10
Total				21	100.00
JSCOs n=19	1	Low	0 to 11	8	42.11
	2	Medium	11 to 14	7	36.84
	3	High	Above 14	4	21.05
Total				19	100.00
AOs n= 21	1	Low	0 to 8	26	43.33
	2	Medium	8 to 10	14	23.34
	3	High	Above 10	20	33.33
Total-100	Total			60	100.00

a. Level of Knowledge of the JSCOs Watershed Planning.

A look at Table 3 reveals that there were 33.33 per cent of the JSCO respondents in the low level of knowledge, 28.57 per cent with medium level and 38.10 per cent with high level of knowledge in watershed planning.

b. Level of knowledge of the JSSOs in watershed planning.

Data in Table 3 indicate that 42.11 per cent, 36.84 per cent and 21.05 per cent of the JSSO respondents were in the low, medium and high categories of knowledge respectively.

c. Level of knowledge of the AOs in watershed planning.

It was seen from Table 3 that 43.33 per cent of the AO respondents were in the low group, 23.34 per cent in the medium group and 33.33 per cent in the high group of knowledge in watershed planning.

The results revealed that the JSCOs had more knowledge in watershed planning compared to the JSSOs and AOs. It is significant to note that 38 per cent of the JSCOs had high level of knowledge as compared to the JSSOs and AOs. The results reveal that the JSCOs have more exposure to watershed planning. The felt needs of the JSCOs to acquire more knowledge in watershed planning, the thrust of the activities of the Soil Conservation unit on watershed based programmes and recent circulars issued by the Additional Director of Soil Conservation Unit on Watershed based programmes at micro watershed level might have resulted in acquiring more knowledge by the JSCOs.

Probably, the JSSOs and AOs do not perceive that watershed planning is directly related to their job. As a matter of fact, the concept of watershed planning itself is quite new to them. When such is the case, it is obvious that

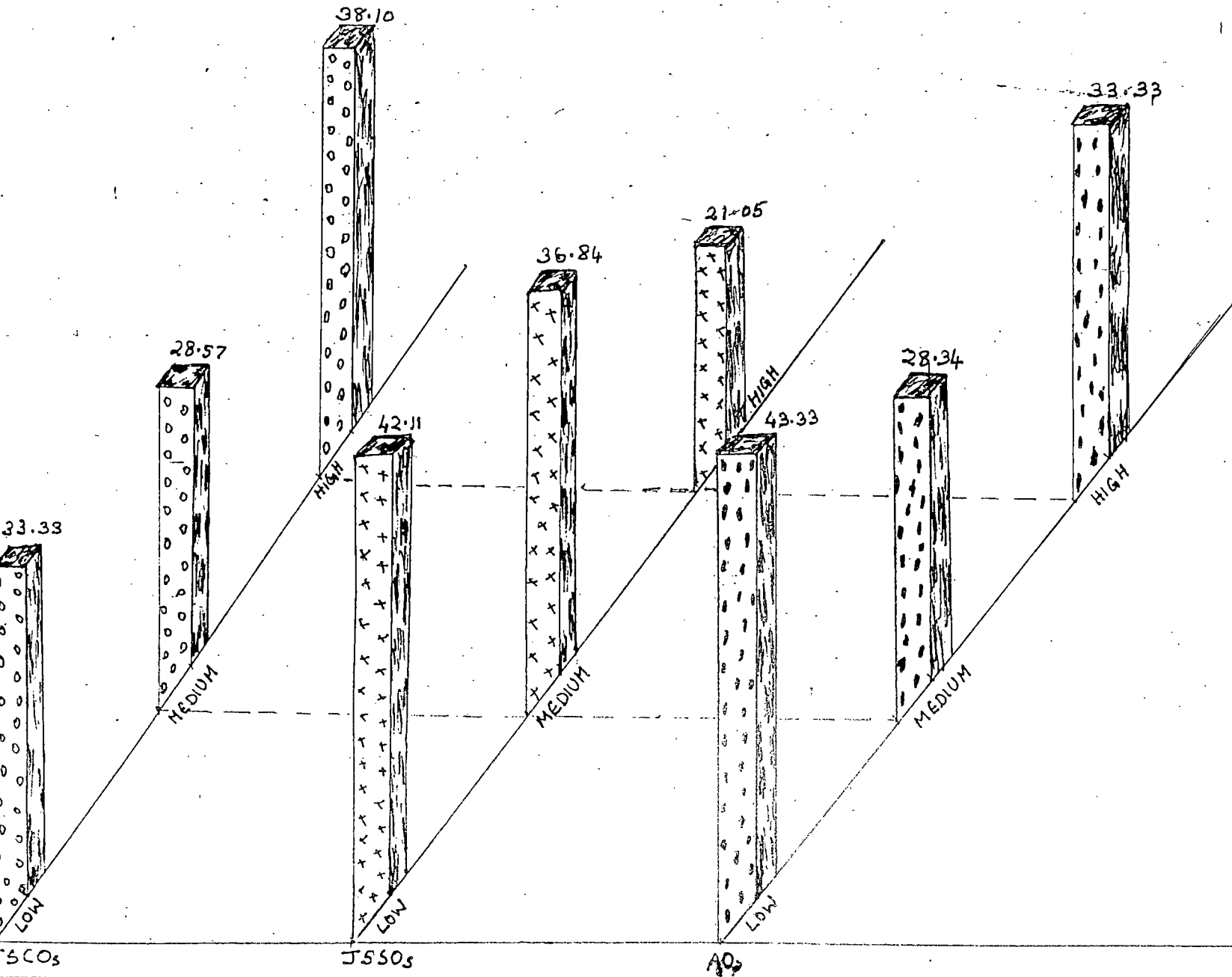
their level of knowledge would be low.

The results point out to the need of providing more knowledge to the JSSOs and AOs in watershed planning. This could be met by providing more literature on watershed planning and management and also by providing periodical training programmes in this area. Now that the concept of watershed planning is gaining momentum in every field of development, it is imperative that the level of knowledge of the JSSOs is also enhanced by exposing them to periodical training programmes for which the Department has to make concerted efforts.

The results are diagrammatically presented in Figure 3.

FIGURE 3

DISTRIBUTION OF THE JSCOs, JSSOs and AOs ACCORDING TO THE LEVEL OF KNOWLEDGE IN WATERSHED PLANNING



3. Attitude of the respondents towards watershed planning.

Table 4

Level of attitude of the JSCOs, JSSOs and AOs
towards watershed planning.

(n = 100)

Category	Sl. No.	Level of attitude	Attitude score Range	Frequency	Percentage
JSCOs n = 21	1	Low	0 to 35	8	38.10
	2	Medium	35 to 39	6	28.57
	3	High	above 39	7	33.33
Total				21	100.00
JSSOs n = 19	1	Low	0 to 32	6	31.58
	2	Medium	32 to 38	7	36.84
	3	High	Above 38	6	31.58
Total				19	100.00
AOs n = 60	1	Low	0 to 27	27	45.00
	2	Medium	27 to 30	18	30.00
	3	High	Above 30	15	25.00
Total				60	100.00

a. Attitude of the JSCOs towards watershed planning.

Table 4 revealed that 38.10 per cent of the JSCOs were in the low level of attitude category towards watershed planning, 33.33 per cent of the respondents in the high level group and 28.57 per cent were in the medium group.

b. Attitude of the JSSOs towards watershed planning.

The Table revealed that the distribution of JSSO respondents in the low, medium and high level groups were 31.58 per cent, 36.84 per cent and 31.58 per cent respectively.

c. Attitude of the AOs towards watershed planning.

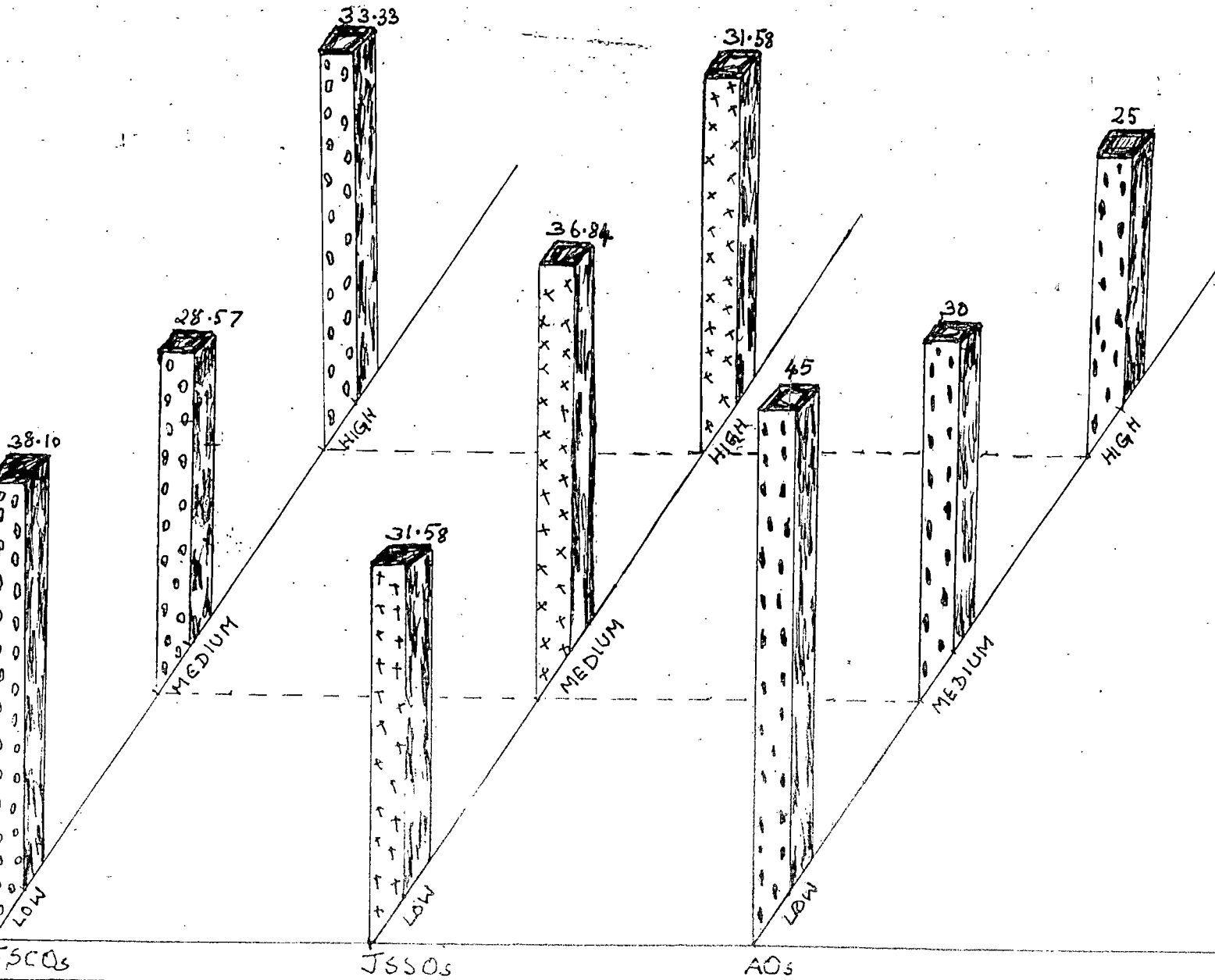
It is seen from the table that 45 per cent of the AO respondents fell in the low attitude score group. 30 per cent were in the medium group and 25 per cent in the high group.

The results revealed that in all the three categories of respondents the level of attitude towards watershed planning was not satisfactory. This may be due to the fact that the emergence of the concept of watershed planning and management is of recent origin. Moreover, there are no demonstration plots in the state to convince the officials about the advantages of watershed planning. Unless and until the officials have some experience in watershed planning and management, a definite attitude formation is not possible. In the course of the new thrust on watershed planning and management, it is expected that the officers will get opportunities for direct involvement in watershed planning and management.

The results are diagrammatically presented in Figure 4

FIGURE 4

DISTRIBUTION OF THE JSLOs, JSSOs and AOs ACCORDING TO THE LEVEL OF ATTITUDE TOWARDS WATERSHED PLANNING



The results are diagrammatically presented in Figure 4.

4. Association of the characteristics of the respondents with knowledge in Watershed Planning.

Table 5

Relationship of the independent variables with knowledge in watershed planning of the JSCOs, JSSOs and AOs.

Independent Variables	r Value		
	JSCOs (n=21)	JSSOs (n=19)	AOs (n=60)
Age	-0.6926 **	-0.4099 NS	-0.1789 NS
Educational status	0.7013 **	0.5493 *	0.5399 **
Experience in the department	-0.7856 **	-0.1119 NS	-0.1620 NS
Training undergone in Agriculture	0.4380 *	0.5934 **	0.5248 **
Information seeking behaviour	0.7941 **	0.7089 **	0.6801 **
Job satisfaction	0.2501 NS	0.1762 NS	-0.2591 NS
self confidence	0.7578 **	0.6436 **	0.7918 **

* significant at 0.05 level of probability
 ** significant at 0.01 level of probability
 NS Not significant

- a. Association of the independent variables with knowledge of the JSCOs in watershed planning.

Table 5 indicated that age, educational status, experience, information seeking behaviour and self confidence were correlated with knowledge in watershed planning of the JSCOs at one per cent level of probability.

Training undergone was correlated with knowledge in watershed planning of the JSCOs at five per cent level of probability. The variable job satisfaction was not significantly correlated with knowledge in watershed planning.

The results indicated that lower the age of the JSCO, more was his knowledge in Watershed Planning. More aged the person was, his knowledge in watershed planning was found to be less. As the young officers are naturally more inquisitive and not governed by the traditional practices, they may be more innovation prone. This is indicated by the negative association of age with knowledge in watershed planning.

It is quite natural that as the level of education of the respondents increased, his knowledge in watershed planning also increased.

It is strange that as the experience of the JSCO increased, there was a decrease in his knowledge in watershed planning as shown by the negative association. The experienced persons are more governed by the existing practices only in which they have more experience and confidence.

Watershed Planning is a new area in which their past experience has no consistency with it. Some experienced officers may find watershed planning a burden, which has no relation with their past experience. So more the experience, lesser their knowledge in watershed planning.

In some of the training programmes in Agriculture, Watershed Planning is also dealt with as a component. Many of the JSCOs are trained at Soil Conservation Research Station, Ooty, for six months in watershed planning as part of the course content. As such, it is quite natural that the trained persons had more knowledge in watershed planning.

Information seeking behaviour was found to result in more knowledge in watershed planning. As the higher officials and planning board officials stress on watershed planning and management, the information seeking behaviour of the JSCOs from such sources might have increased their knowledge in watershed planning.

Self confidence of the officer will lead to his increased communication abilities. A person with self confidence may interact with his fellow officials and higher ups so that he is likely to acquire more knowledge in watershed planning.

Watershed planning has now become a part of the official activity of the JSCOs. As such, whether they have job satisfaction or not, it may not make much impact on their

increase in knowledge. That is only job satisfaction was found to have no significant association with knowledge in watershed planning.

b. Association of the independent variables with knowledge of the JSSOs in Watershed Planning.

As seen from table 5, the variables: training undergone, information seeking behaviour and self confidence were positively correlated with knowledge in watershed planning of the JSSOs at one per cent level of probability. Educational status was positively correlated at five per cent level of probability. Age, experience in the department and job satisfaction were not seen correlated with knowledge in watershed planning of the JSSOs.

The JSSOs were all direct recruits with B.Sc.(Ag.) as the basic qualification. As all of them were young, age had not contributed to change in knowledge in watershed planning.

As in the case of JSCOs, as education increased, knowledge of the officers in watershed planning also increased.

As the JSSOs are all junior and young officers with only few years of experience, their experience in the department has not resulted in any significant change in their knowledge in watershed planning.

The nature of work of JSSOs in the department is conducting soil survey, land use capability classification and preparing soil survey reports, which are some of the components in watershed planning. As such, their practical, on the job training has led to their more knowledge in watershed planning.

As in the case of JSCOs, information seeking behaviour has led to the acquisition of more knowledge in watershed planning. Self confidence also might have increased their communication skills leading to possession of more knowledge in watershed planning.

As in the case of JSCOs, increased job satisfaction had not led to any significant increase in the knowledge in watershed planning.

c. Association of independent variables with knowledge of the AOs in watershed planning.

From Table 5, it is seen that educational status, training undergone, information seeking behaviour and self confidence were positively correlated with knowledge in watershed planning of the AOs. Age, experience and job satisfaction were not significantly related with knowledge in watershed planning.

As there was increase in educational status, training undergone, information seeking behaviour and self confidence, there was increase in knowledge in watershed planning.

This was similar to the result obtained with respect to these variables in the case of JSCOs and JSSOs.

The AOs have not so far been acquainted with watershed planning and management. Their total experience in the department has not contributed to any increase in knowledge in watershed planning. As watershed planning has not so far been considered as part of their job responsibilities, they might not have read the available literature in watershed planning. It is quite obvious that unless there is a felt need in direct field situations to take up the responsibility of watershed planning, they may not be interested to know more about the concept. Naturally, the variables: age, experience and job satisfaction of the AOs were not associated with their knowledge in watershed planning.

5. Association of the characteristics of the respondents with attitude towards watershed planning.

a. Association of the independent variables with attitude of the JSCOs towards watershed planning.

As indicated in Table 6, educational status, information seeking behaviour and self confidence were positively and significantly correlated with the attitude of the JSCOs towards watershed planning at one per cent level of probability. Training undergone was positively and significantly correlated with the attitude of JSCOs towards watershed planning at five per cent level of probability. Age and experience in the

Table 6

Relationship of the independent variables with the attitude of the JSCOs, JSSOs and AOs towards watershed planning. (n = 100)

Independent variables	r value		
	JSCOs (n=21)	JSSOs (n=19)	AOs (n=60)
Age	-0.4841*	-0.5198*	-0.2420 NS
Educational Status	0.7142**	0.4597*	0.5381**
Experience in the department	-0.5452*	-0.1402 NS	-0.2130 NS
Training undergone in agriculture	0.5404*	0.5783**	0.3901**
Information seeking behaviour	0.5409**	0.5663*	0.5761**
Job satisfaction	0.0161 NS	0.0803 NS	-0.0665 NS
Self confidence	0.7066**	0.7069**	0.5822**

* Significant at 0.05 level of probability

** Significant at 0.01 level of probability

NS Not significant

department were negatively and significantly correlated with the attitude of the JSCOs towards watershed planning at five per cent level of probability.

The results showed that lesser the age, more favourable will be the attitude possessed by the JSCO respondents towards watershed planning. As the younger officers are not exposed to the established traditional practices as much as their seniors, they may show more enthusiasm in new schemes and try to achieve more knowledge about improved technologies. This will result in more knowledge about the newer developments and consequently a favourable attitude will develop towards that scheme. Therefore the younger officers were having a more favourable attitude towards watershed planning.

A higher educational status will lead to gain in knowledge. This increased knowledge will naturally lead to a more favourable attitude towards the concerned programmes. Therefore, higher the educational status of the JSOs more favourable will be their attitude towards watershed planning.

An increase in the experience of the JSOs resulted in a less favourable attitude towards watershed planning. Higher experience will not be of any use, as watershed planning is a rather new concept. On the other hand, it may lead to a kind of attachment towards the traditionally followed practices. This may be the reason for a less favourable attitude of the JSOs with higher experience, towards watershed planning.

Training undergone by the JSOs had contributed to an increased knowledge and practical skill in performing



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soil conservation work, which is an essential component of watershed planning. This would have contributed towards a favourable attitude towards watershed planning.

Information seeking behaviour of the JSCOs had resulted in the increased knowledge and consequently favourable attitude towards watershed planning.

Job satisfaction had no direct impact on the attitude of the JSCOs towards watershed planning probably because it has now become a part of their regular work as in the case of other development programmes.

A self confident person may be able to take up challenges and can perform his work with more competency. Watershed planning being a new approach with wide scope in the existing situations, a JSCO with self confidence would be interested to take up the responsibility and make it a success. Therefore, it is no wonder that an increase in self confidence led to more favourable attitude towards watershed planning.

b. Association of the independent variables with attitude of the JSCOs towards watershed planning.

As seen from the table, training undergone and self confidence were positively and significantly correlated with the attitude towards watershed planning at one per cent level of probability. Educational status and information seeking behaviour were positively and significantly correlated with the attitude towards watershed planning at five per cent level

of probability. Age was negatively and significantly correlated at five per cent level of probability. Experience and job satisfaction were not found to have any association with attitude towards watershed planning.

As in the case of JSCOs, JSSOs' attitude towards watershed planning was becoming more favourable as age was less. This may be due to the inquisitive nature and physical fitness of the younger officers for the soil survey work which is an important aspect in watershed planning.

Higher educational status resulted in an increased knowledge and consequent favourable attitude towards watershed planning among the JSSOs.

Experience in the department was not found to have any impact on the attitude of the JSSOs towards watershed planning as all of them were directly recruited as JSSOs and were young.

The nature of work of the JSSOs has contributed to some sort of training and more of practical experience in conducting soil survey work. The technical nature of work of the JSSOs which involves some on the job training might have resulted in a favourable attitude towards watershed planning.

Information seeking behaviour of the JSSOs will increase their knowledge in watershed planning which may help develop a favourable attitude towards watershed planning. This is the reason why information seeking behaviour promoted their favourable attitude towards watershed planning.

Job satisfaction as seen in the earlier case had no effect in developing a favourable attitude towards watershed planning as it has now become a routine work of the JSSO.

Self confidence, as in the case of JSCOs, could make the attitude of the JSSO more favourable towards watershed planning due to the same reasons.

c. Association of the independent variables with the attitude of the AOs towards watershed planning.

As revealed in Table 6, educational status, training undergone, information seeking behaviour and self confidence had significant and positive relationship with the attitude of the AOs towards watershed planning at one per cent level of probability. Age, experience and job satisfaction had no association with the attitude towards watershed planning.

Higher educational status of the AOs as evident from the other cases had led to the increased knowledge in watershed planning and this increased knowledge had led to more conviction in the utility of the programme and consequent favourable attitude towards the same.

Periodical training undergone in agriculture had naturally increased the change agent's knowledge about the new technologies and approaches. This had facilitated a more favourable attitude among the trained AOs towards watershed planning.

Information seeking behaviour when increased had led to a higher level of knowledge and consequently more favourable attitude towards watershed planning in the case of the AOs due to the same reasons as in the case of JSCOs and JSSOs.

Higher self confidence had created increased interest in the latest technologies and a desire to meet challenges in the changed working situations. This had created a more favourable attitude towards watershed planning which is a new approach in development planning.

As watershed planning is rather new to the AOs, age, experience and job satisfaction had no impact on their attitude.

6. Direct and indirect effects of the independent variables on the knowledge of the respondents in watershed planning.

a. Direct and indirect effects of the independent variables on the knowledge of the JSCOs in watershed planning.

From the correlation table given in Table 5 it could be seen that out of the seven independent variables selected for the study, only six variables were correlated with knowledge of JSCOs in watershed planning. These six variables were considered for studying their direct and indirect effects on knowledge in watershed planning. Variables thus taken to study the direct and indirect effects on knowledge in watershed planning were: age (X_1), educational status (X_2),

experience in the department (X_3), training undergone in agriculture (X_4), information seeking behaviour (X_5) and self confidence (X_7).

Table 7 depicts the results of path analysis showing direct and indirect effects of the six independent variables on knowledge of JSCOs in watershed planning. The table revealed that highest direct effect towards knowledge in watershed planning was due to the variable self confidence (0.5257). This was followed by experience (-0.5159) and then educational status (0.4929).

The total indirect effect varied from 0.2174 (educational status) to -1.0140 (age).

The variable-wise discussion is presented below:-

1. X_1 Age:-

The direct effect of this variable was 0.3219. Its indirect effects on knowledge in watershed planning were routed mainly through experience (X_3), educational status (X_2) and self confidence (X_7). The total indirect effect being -1.0140 was higher than the direct effect.

2. X_2 Educational status.

The direct effect of this variable was 0.4929. The indirect effects on knowledge were routed mainly through experience (X_3), self confidence (X_7) and age (X_1).

The total indirect effect of this variable being 0.2174 was lower than the direct effect.

Table 7

Direct and indirect effects of the independent variables on the knowledge of the JSCOs in watershed planning.

(n = 21)

Variable No.	Characteristics	Direct Effect	Indirect Effect	'r' Value	Vital indirect effects		
					First	Second	Third
X ₁	Age	0.3219	-1.0140	-0.5926	-0.4743 (X ₃)	-0.3501 (X ₂)	-0.3079 (X ₇)
X ₂	Educational Status	0.4929	0.2174	0.7193	0.3622 (X ₃)	0.2524 (X ₇)	-0.2286 (X ₁)
X ₃	Experience in the department	-0.5159	-0.2697	-0.7856	-0.3461 (X ₂)	-0.3168 (X ₇)	0.2963 (X ₁)
X ₄	Training undergone in agriculture	-0.1559	0.5939	0.4380	0.3288 (X ₂)	0.2218 (X ₇)	0.1840 (X ₁)
X ₅	Information seeking behaviour	-0.0854	0.8795	0.3761	0.3761 (X ₇)	0.3726 (X ₂)	0.2497 (X ₃)
X ₇	Self confidence	0.5257	0.2325	0.7578	0.3109 (X ₃)	0.2367 (X ₂)	-0.1886 (X ₁)

Residua = 0.4631 Out of the 13 vital indirect effects, five were routed through X₇, five were routed through X₃, five were routed through X₂ and three were routed through X₁.

3. X_3 Experience in the Department

The direct effect of the variable on knowledge was -0.5159. The indirect effects were routed mainly through educational status (X_2), self confidence (X_7) and age (X_1). The total indirect effect being -0.2697 was less than the direct effect.

4. X_4 Training undergone in agriculture

The direct effect of this variable was -0.1559. The indirect effects were mainly routed through educational status (X_2), self confidence (X_7) and age (X_1). The total indirect effect being 0.5939 was higher than the direct effect.

5. X_5 Information seeking behaviour

The direct effect of this variable was low being -0.0854. The indirect effects were mainly routed through self confidence (X_7), educational status (X_2) and experience (X_3). The total indirect effect being 0.8795 was much higher than the direct effect.

6. X_7 self confidence

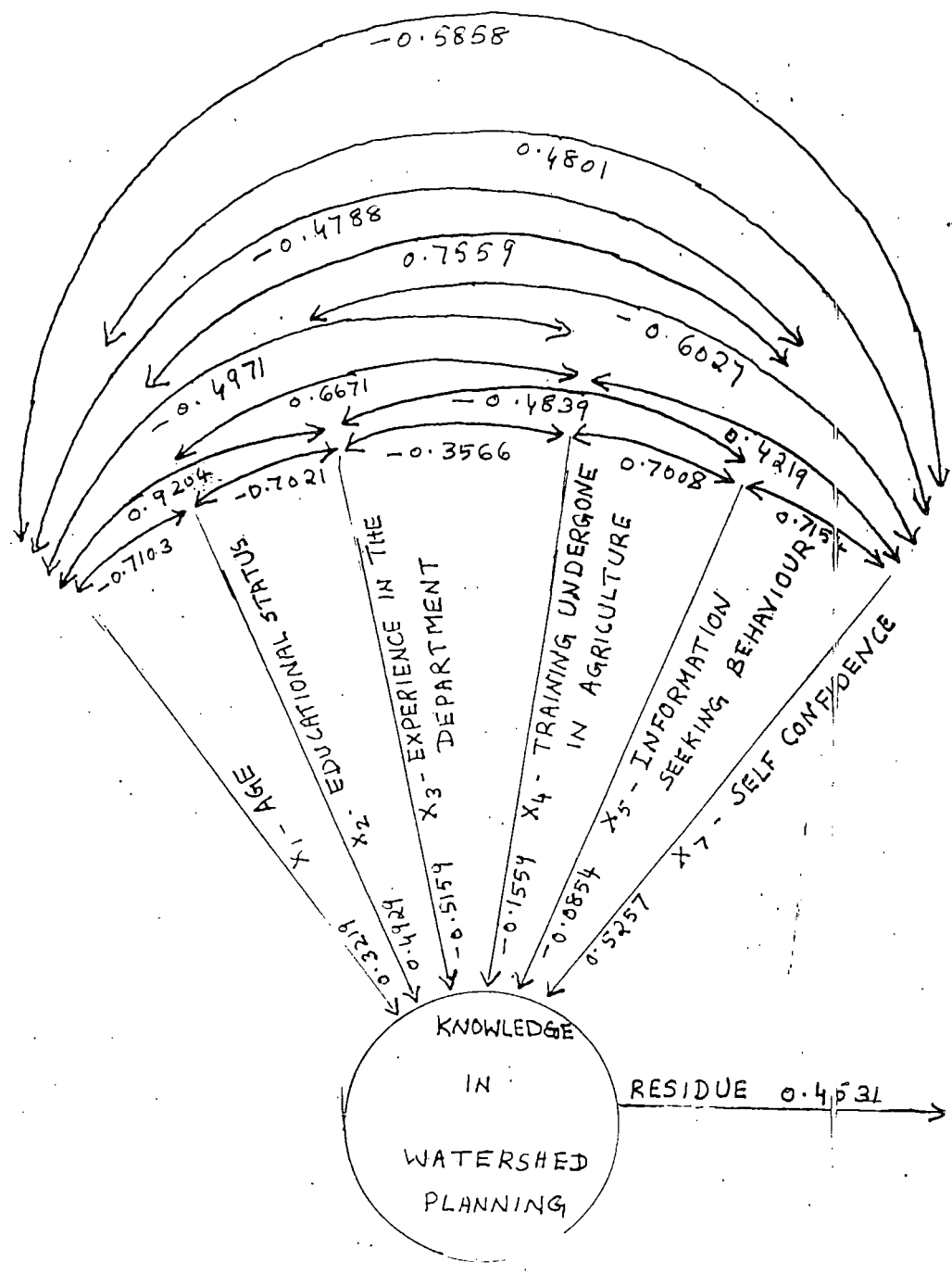
The direct effect of this variable was 0.52575. The indirect effects were routed through experience (X_3), educational status (X_2) and age (X_1). The total indirect effect being 0.2325 was lower than the direct effect.

It was revealed from the results that self confidence, experience in the department and educational status had

relatively high direct effect on knowledge in watershed planning. Age had very high indirect effect whereas its direct effect was low. Information seeking behaviour and training undergone also had relatively high indirect effects on knowledge in watershed planning. So it can be inferred that the variables self confidence, experience, educational status, age, information seeking behaviour and training undergone were important in determining the knowledge of the JSCOs in watershed planning.

The results are diagrammatically presented in Figure 5

FIGURE 5
 PATH DIAGRAM SHOWING THE EFFECTS OF SELECTED
 INDEPENDENT VARIABLES ON KNOWLEDGE IN
 WATERSHED PLANNING OF THE JSCOs



b. Direct and indirect effects of the independent variables on the knowledge of the JSSOs in watershed planning.

From Table 5, it could be seen that only four variables were correlated with the knowledge of the JSSOs in watershed planning. These four variables were considered for studying their direct and indirect effects on knowledge of the JSSOs in watershed planning. These variables thus selected were; educational status (X_2), Training undergone (X_4), information seeking behaviour (X_5), and self confidence (X_7).

Table 6 shows the results of the path analysis to show the direct and indirect effects of the four independent variables on knowledge of JSSOs in watershed planning. The table revealed that the highest direct effect towards knowledge in watershed planning was due to the variable information seeking behaviour (0.4387). It was followed by self confidence (0.2477) and educational status (0.1944).

The total indirect effects varied from 0.4900 (training undergone) to 0.2702 (information seeking behaviour). The variable-wise discussion is presented here.

1. X_2 Educational status

The direct effect of this variable was 0.1944. Its indirect effects on the knowledge in watershed planning of the JSSOs were mainly routed through information seeking behaviour (X_5) and self confidence (X_7). The total indirect effect (0.3549) was higher than the direct effect.

Table 8

Direct and indirect effects of the independent variables on the knowledge of the JSSOs in watershed planning.

Variable Number	Characteristics	Direct effect	Total indirect effects	r value	Vital indirect effects		
					First	Second	Third
X ₂	Educational status	0.1944	0.3549	0.5493	0.1711 (X ₅)	0.1535 (X ₇)	-
X ₄	Training undergone in agriculture	0.1034	0.4900	0.5934	0.2990 (X ₅)	0.1342 (X ₇)	0.0568 (X ₂)
X ₅	Information seeking behaviour	0.4387	0.2702	0.7089	0.1239 (X ₇)	0.0759 (X ₂)	0.0705 (X ₄)
X ₇	Self confidence	0.2477	0.3959	0.6436	0.2194 (X ₅)	0.1205 (X ₂)	0.0560 (X ₄)

Residue: 0.6012 Out of the 11 vital indirect effects, three were routed through X₇, three were routed through X₅, three were routed through X₂ and two were routed through X₄.

2. X_4 Training undergone

The direct effect of this variable was 0.1034. The indirect effects on knowledge were mainly routed through information seeking behaviour (X_5), self confidence (X_7) and educational status (X_2). The total indirect effect was very high (0.4900) compared to the direct effect.

3. X_5 Information seeking behaviour

The direct effect of this variable was 0.4387. Indirect effects on knowledge in watershed planning were mainly routed through self confidence (X_7), educational status (X_2) and training undergone (X_4). The total indirect effect (0.2702) was lower than the direct effect.

4. X_7 Self confidence

The direct effect of this variable was 0.2477. The indirect effects were routed through information seeking behaviour (X_5), educational status (X_2) and training undergone (X_4). The total indirect effect (0.3959) was higher than the direct effect.

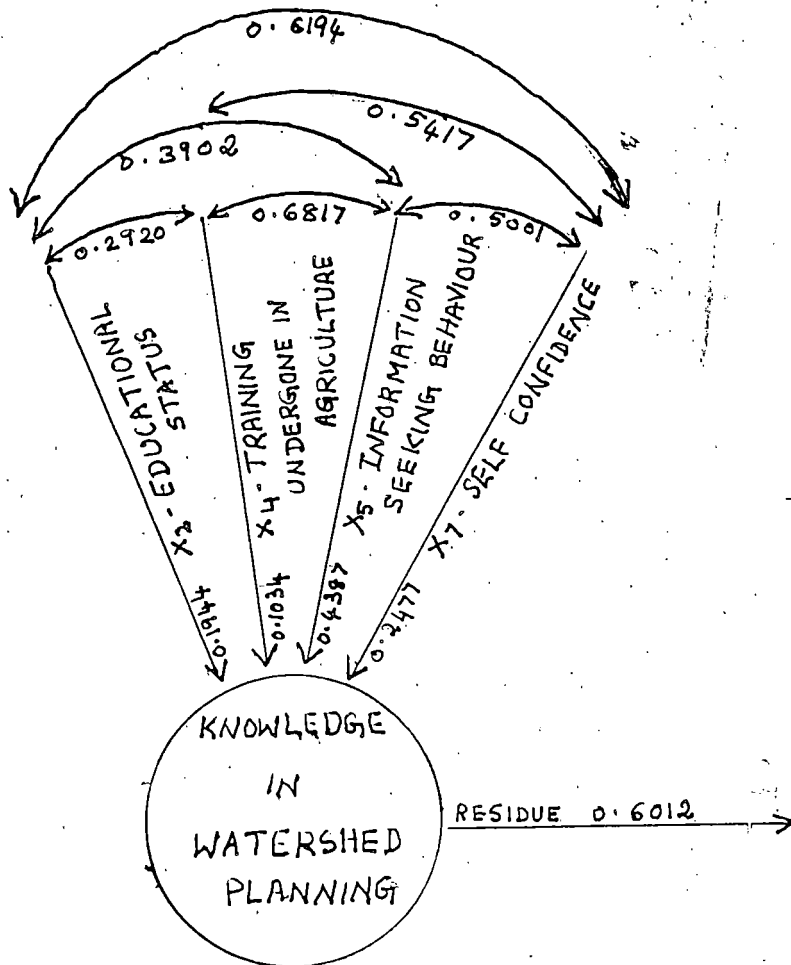
It was revealed that information seeking behaviour, self confidence and educational status had relatively high direct effects on the knowledge of the JS50s in watershed planning. Training undergone had high indirect effect, but its direct effect was low. Self confidence and educational status also had very high indirect effects on knowledge of

the JSSOs in watershed planning. So it can be concluded that the variables information seeking behaviour, self confidence, educational status and training undergone were important in determining the knowledge of the JSSOs in watershed planning.

Results are diagrammatically presented in Figure 6.

FIGURE 6

PATH DIAGRAM SHOWING THE EFFECTS OF SELECTED
INDEPENDENT VARIABLES ON KNOWLEDGE IN
WATERSHED PLANNING OF THE JSSOs.



c. Direct and indirect effects of the independent variables on the knowledge of the AOs in watershed planning.

From table 5, we can see that out of the seven independent variables only four were correlated with the knowledge of the AOs in watershed planning. These four variables were educational status (X_2), training undergone (X_4), information seeking behaviour (X_5) and self confidence (X_7). These are subjected to path analysis to study the direct and indirect effects on the knowledge of the AOs in watershed planning.

Table 9 shows the result of path analysis showing the direct and indirect effects of the four independent variables on knowledge of the AOs in watershed planning. The table revealed that the highest direct effect was due to self confidence (0.5522). Next in order was training undergone (0.2305), followed by information seeking behaviour (0.1577).

The total indirect effect varied from 0.5224 (information seeking behaviour) to 0.2366 (self confidence).

Variable-wise discussion is given below:-

1. X_2 Educational status

The direct effect of this variable was 0.1164. The indirect effects were routed through self confidence (X_7) and information seeking behaviour (X_5).

Table 9

Direct and indirect effects of the independent variables on the knowledge of the AOs in watershed planning. (n = 60)

Variable Number	Characteristics	Direct effect	Total indirect	'F' value	vital indirect effects		
					First	Second	Third
X ₂	Educational status	0.1164	0.4235	0.5399	0.2643 (X ₇)	0.1029 (X ₅)	-
X ₄	Training undergone in agriculture	0.2305	0.2943	0.5248	0.1984 (X ₇)	0.0776 (X ₅)	
X ₅	Information seeking behaviour	0.1577	0.5224	0.6801	0.3330 (X ₇)	0.1134 (X ₄)	0.0760 (X ₂)
X ₇	Self confidence	0.5552	0.2356	0.7918	0.0946 (X ₅)	0.0824 (X ₄)	0.0596 (X ₂)

Residue : 0.5189 Out of the 10 Vital indirect effects, three were routed through X₇, three were routed through X₅, five were routed through X₄ and two were routed through X₂.

The total indirect effect (0.4235) was higher than the direct effects.

2. X_4 Training undergone

The direct effect on knowledge was 0.2305. The indirect effects were routed through self confidence (X_7) and information seeking behaviour (X_5).

The total indirect effect (0.2543) was higher than the direct effect.

3. X_5 Information seeking behaviour

The direct effect was 0.1577. The indirect effects were routed through self confidence (X_7), training undergone (X_4) and educational status (X_2).

The total indirect effect (0.5224) was higher than the direct effect.

4. X_7 Self confidence

The direct effect of X_7 on knowledge of AOs was 0.5552. The indirect effects were routed through information seeking behaviour (X_5), training undergone (X_4) and educational status (X_2).

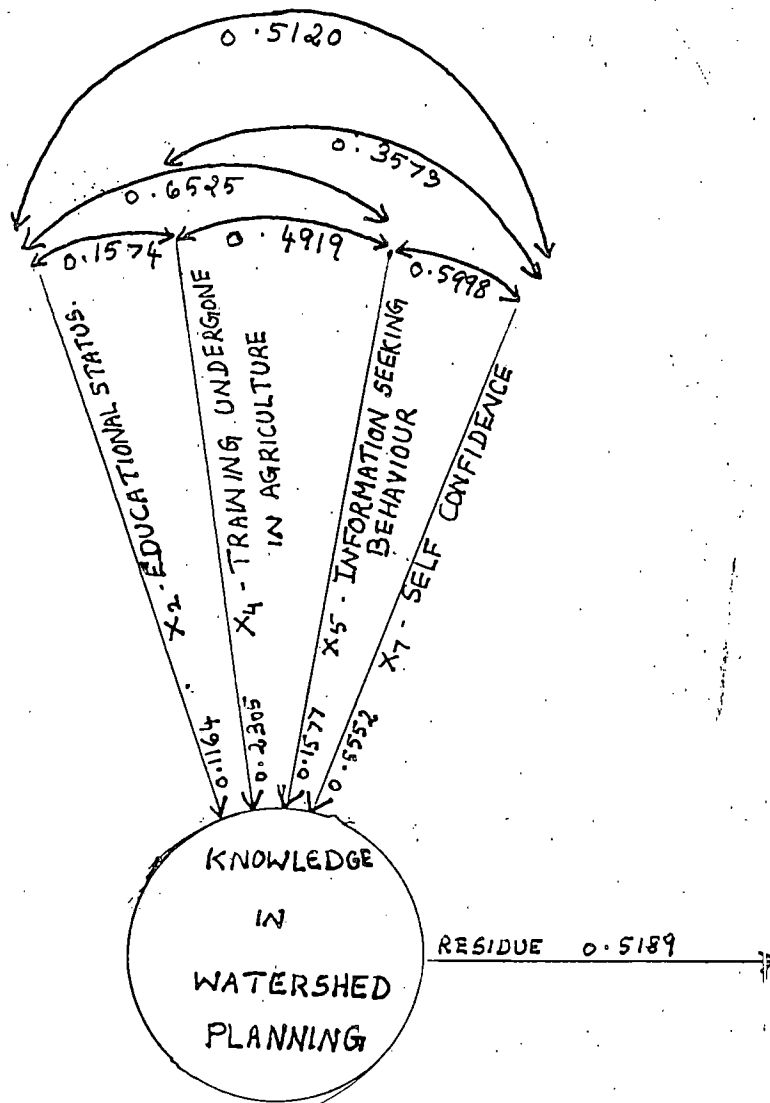
The total indirect effect (0.2366) was lower than the direct effect.

The results showed that self confidence (X_7), training undergone (X_4) and information seeking behaviour (X_5) had high direct effects on knowledge of the AOs in watershed planning. Information seeking behaviour had high indirect effect. Educational status (X_2) and training undergone (X_7) also had high indirect effects. So it can be concluded that educational status, training undergone, information seeking behaviour and self confidence had much importance in determining the knowledge of AOs in watershed planning.

Results are digramatically presented in Figure 7.

FIGURE 7

PATH DIAGRAM SHOWING THE EFFECTS OF SELECTED INDEPENDENT VARIABLES ON KNOWLEDGE IN WATERSHED PLANNING OF THE AOs.



7. Direct and indirect effects of the independent variables on the attitude of the respondents towards watershed planning.
7. a. Direct and indirect effects of the independent variables on the attitude of the JSCOs towards watershed planning.

Results of the path analysis showing direct and indirect effects of independent variables on the attitude of JSCOs towards watershed planning are presented in Table 10.

From Table 6 it could be observed that out of the seven independent variables selected for the study only six were significantly correlated with the attitude of the JSCOs towards watershed planning. These six variables viz age (X_1) educational status (X_2) experience (X_3) training undergone (X_4) information seeking behaviour (X_5) and self confidence (X_7) were subjected to path analysis to study the direct and indirect effects of the independent variables on the attitude of the JSCOs towards watershed planning.

Data in Table 10 bring to focus the direct and indirect effects of the independent variables on the attitude of the JSCOs towards watershed planning. The highest direct effect was due to information seeking behaviour (0.457) followed by age (0.3775) and educational status (0.3149).

Table 10

Direct and indirect effects of the independent variables on the attitude of the JSCOs
towards watershed planning

(n = 21)

Variable No.	Characteristics	Direct effect	Total indirect effect	'r' value	Vital indirect effects		
					First	Second	Third
X ₁	Age	0.3775	-0.8615	-0.4841	-0.2632 (X ₃)	-0.2236 (X ₂)	-0.2191 (X ₅)
X ₂	Educational status	0.3149	0.3993	0.7142	0.3459 (X ₅)	-0.2681 (X ₁)	0.2008 (X ₃)
X ₃	Experience	-0.2896	-0.2602	-0.5452	0.3475 (X ₁)	-0.2215 (X ₅)	-0.2211 (X ₂)
X ₄	Training undergone	-0.0261	0.5665	0.5404	0.3207 (X ₅)	0.2100 (X ₂)	-0.1877 (X ₁)
X ₅	Information seeking behaviour	0.4577	0.3832	0.8409	0.2380 (X ₂)	0.2059 (X ₇)	-0.1808 (X ₁)
X ₇	Self confidence	0.2878	0.4168	0.7066	0.3274 (X ₅)	-0.2211 (X ₁)	0.1724 (X ₃)

Residue 0.4773 Out of the 13 vital indirect effects five were routed through X₁, five were routed through X₅, four were routed through X₂, three were routed through X₃ and one was routed through X₇.

The indirect effects varied from -0.2602 (experience) status to -0.8616 (age).

The variable-wise discussion is hereunder.

1. X_1 Age.

The direct effect of age on the attitude of the JSCOs towards watershed planning was 0.3775. Indirect effects were mainly routed through experience (X_3), educational status (X_2) and information seeking behaviour (X_5).

The total indirect effect (-0.8616) was much higher than the direct effect.

2. X_2 Educational status.

The direct effect of the variable was 0.3149. The indirect effects were routed through information seeking behaviour (X_5), age (X_1) and experience (X_3).

The total indirect effect (0.3993) was higher than compared to the direct effect.

3. X_3 Experience.

The direct effect of experience on the attitude of the JSCOs towards watershed planning was -0.2860. The indirect effect were mainly routed through age (X_1), information seeking behaviour (X_5) and experience (X_3).

The total indirect effect (-0.2602) was lower than the direct effect.

4. X_4 Training undergone.

The direct effect was -0.0261 . The indirect effects were mainly routed through information seeking behaviour (X_5), educational status (X_2) and age (X_1).

The total indirect effect (0.5669) was much higher than the direct effect.

5. X_5 Information seeking behaviour.

The direct effect of this variable was 0.4577 . The indirect effects were routed through educational status (X_2), self confidence (X_7) and age (X_1).

The total indirect effect (0.3832) was lower than the direct effect.

6. X_3 Self confidence.

The direct effect was 0.2878 . The indirect effects were routed through information seeking behaviour (X_5), age (X_1) and experience (X_3).

The total indirect effect (0.4188) was higher compared to the direct effect.

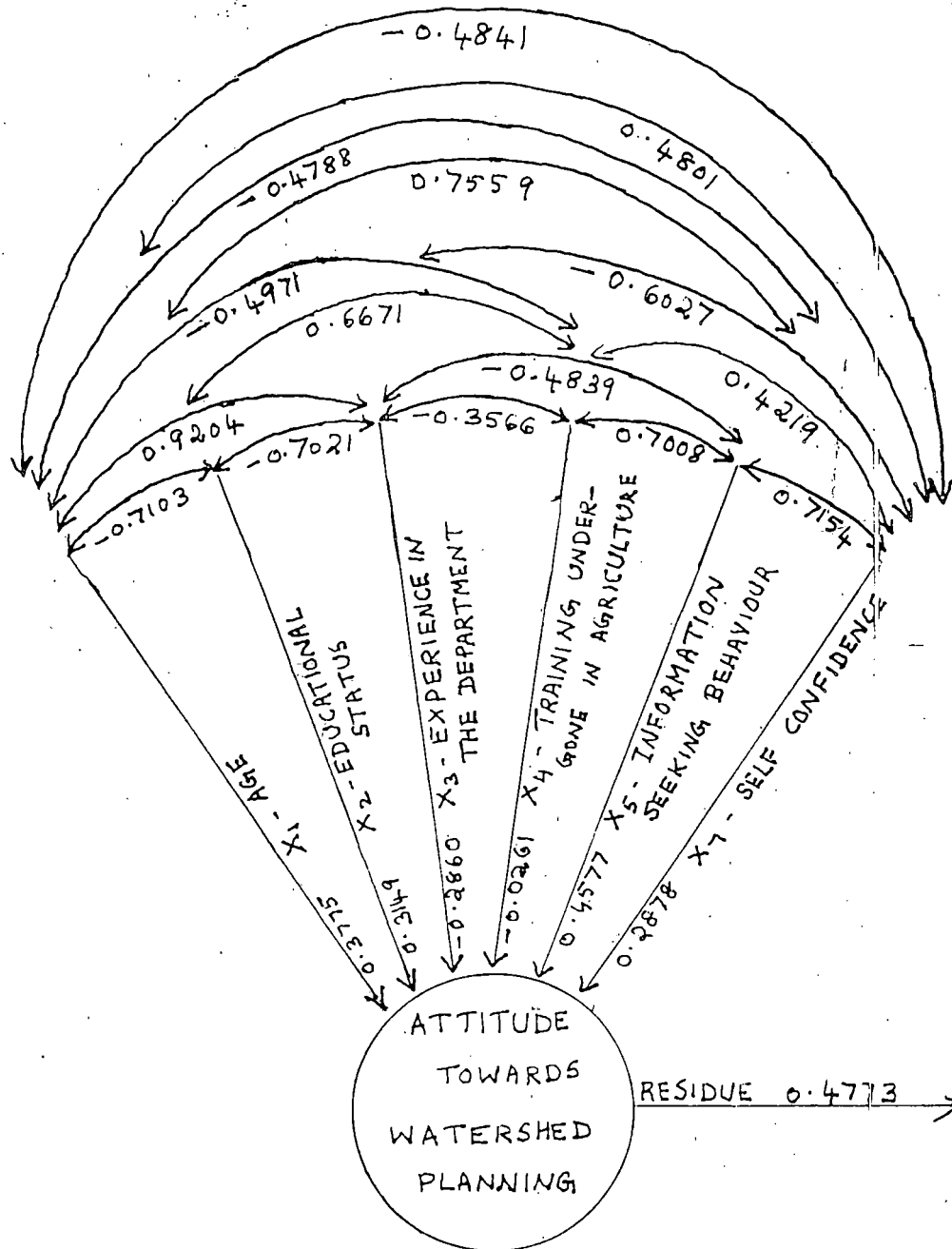
The results revealed that information seeking behaviour (X_5), age (X_1) and educational status (X_2) had the highest direct effects. Age (X_2) had the highest indirect effect followed by training undergone (X_4) and self confidence (X_7). Therefore it can be concluded that information seeking behaviour, age, educational status, training undergone and

self confidence were more crucial in determining the attitude of the JSCO respondents towards watershed planning.

Results are diagrammatically presented in Figure 8.

FIGURE 8

PATH DIAGRAM SHOWING THE EFFECTS OF SELECTED INDEPENDENT VARIABLES ON ATTITUDE TOWARDS WATERSHED PLANNING OF THE JSCOs.



b. Direct and indirect effects of the independent variables on the attitude of the JSSOs towards watershed planning.

From Table 6 it is evident that out of the seven variables, five were correlated with the attitude of the JSSOs towards watershed planning. These five variables namely age (X_1), educational status (X_2), training undergone (X_4), information seeking behaviour (X_5) and self confidence (X_7) were subjected to path analysis to show the direct and indirect effects of the independent variables on the attitude of the JSSOs towards watershed planning.

Table 11 gives the results of path analysis showing the direct and indirect effects of the independent variables on the attitude of the JSSOs. The highest direct effect was due to self confidence (0.4590) followed by information seeking behaviour (0.1894) and training undergone (0.1541).

The indirect effects varied from 0.4360 (educational status) to 0.2479 (self confidence). Variable-wise discussion is presented here.

1. X_1 Age

The direct effect of this variable was -0.0871. Indirect effects were routed through self confidence (X_7), information seeking behaviour (X_5) and training undergone (X_4). Total indirect effect was (-0.4327) much higher than the direct effect.

Table 11

Direct and indirect effects of the independent variables on the attitude of the JSSOs towards
in watershed planning.

(n = 19)

Variable Number	Characteristic	Direct effect	Total indirect effect	'r' value	vital indirect effect		
					First	second	Third
X ₁	Age	-0.0871	-0.4327	-0.5198	0.2859 (X ₇)	-0.0718 (X ₅)	-0.0698 (X ₄)
X ₂	Educational status	0.0237	0.4360	0.4597	0.2981 (X ₇)	0.0739 (X ₅)	-
X ₄	Training undergone in agriculture	0.1541	0.4242	0.5783	0.2487 (X ₇)	0.1291 (X ₅)	-
X ₅	Information seeking behaviour	0.1894	0.3769	0.5663	0.2296 (X ₇)	0.1051 (X ₄)	-
X ₇	Self confidence	0.4590	0.2479	0.7069	0.0947 (X ₅)	0.0835 (X ₄)	0.0543 (X ₁)

Residues : 0.65036 Out of the 12 vital indirect effects, four were routed through X₇, four were routed through X₅, three were routed through X₄ and one was routed through X₁.

2. X_2 Educational Status.

The direct effect was 0.0237. Indirect effects were routed through self confidence (X_7) and information seeking behaviour (X_5).

Total indirect effect was (0.4360) very high when compared to the direct effect.

3. X_4 Training undergone.

The direct effect was 0.1541. Indirect effects on attitude were routed through self confidence (X_7) and information seeking behaviour (X_5). Total indirect effect (0.4242) was higher than the direct effect.

4. X_3 Information seeking behaviour.

The direct effect of this variable was 0.1894. Indirect effects were routed through self confidence (X_7) and training undergone (X_4).

Total indirect effect (0.3769) was higher than the direct effect.

5. X_7 Self confidence.

Direct effect of self confidence was 0.4590. Indirect effects were routed through information seeking behaviour (X_5), training undergone (X_4) and age (X_1).

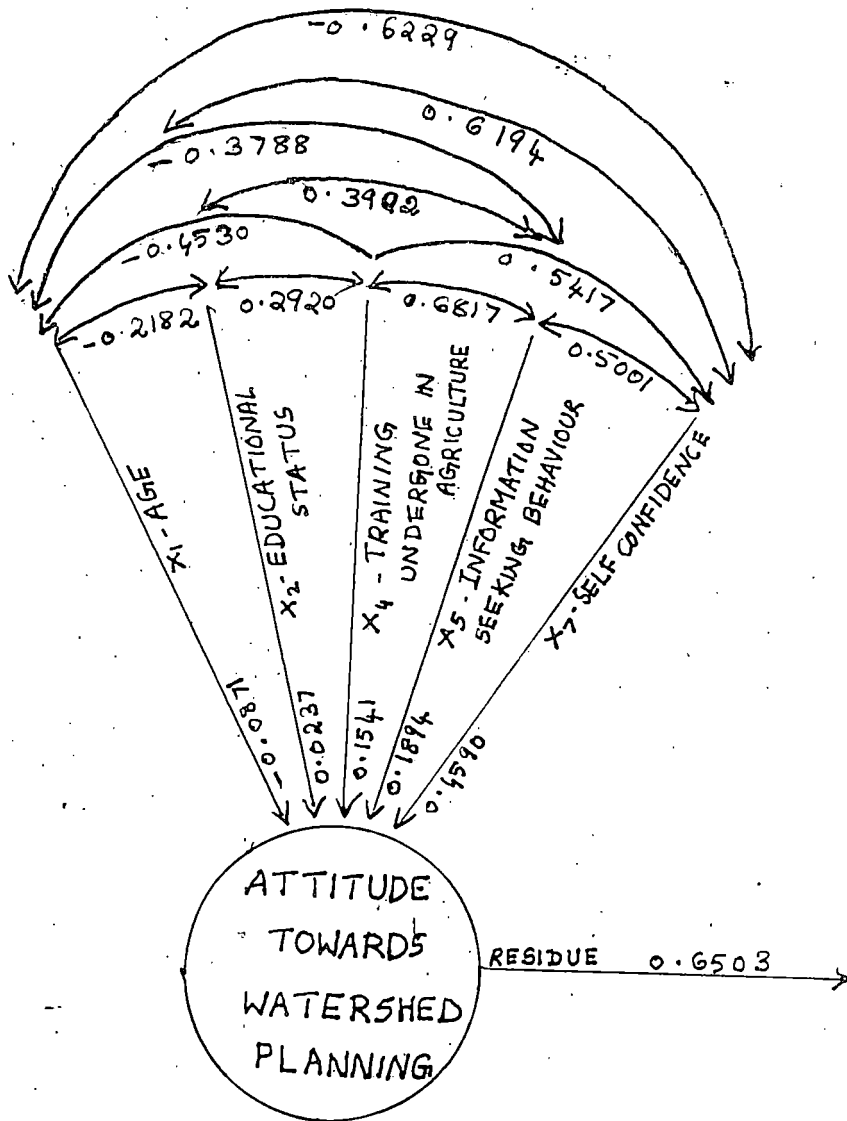
Total indirect effect (0.2479) was lower than the direct effect.

The results show that self confidence (X_7), information seeking behaviour (X_5) and training undergone (X_4) had relatively high direct effects. Educational status (X_2) had high indirect effect followed by age and training undergone effects. Therefore it can be concluded that self confidence, information seeking behaviour, training undergone, educational status and age were very important in deciding the attitude of the JSSOs towards watershed planning.

Results are diagrammatically presented in Figure 9.

FIGURE 9

PATH DIAGRAM SHOWING THE EFFECTS OF SELECTED INDEPENDENT VARIABLES ON ATTITUDE TOWARDS WATERSHED PLANNING OF THE JSSOs.



6. Direct and indirect effects of the independent variables on the attitude of the AOs towards watershed planning.

From Table 6 it is clear that out of the seven variables selected for the study, only four were correlated with the attitude of the AOs towards watershed planning. These three variables educational status (X_2), training undergone (X_4), information seeking behaviour (X_5) and self confidence (X_7) were subjected to path analysis to find out the direct and indirect effects of independent variables on the attitude of the AOs watershed planning.

From Table 12 the direct and indirect effects of these variables on the attitude of AOs can be found out. The highest direct effect was by self confidence (X_7). Then it was by educational status (X_2) and training undergone (X_4).

The indirect effects varied from 0.2206 (training undergone) to 0.4324 (information seeking behaviour).

The variable-wise discussion is as follows:-

1. X_2 Educational status.

The direct effect of educational status on the attitude of the AOs towards watershed planning ^{was} 0.2640. The indirect effects were mainly routed through self confidence (X_5) and information seeking behaviour (X_5).

Total indirect effect was 0.2742, slightly higher than the direct effect.

Table 12

Direct and indirect effect of the independent variables on attitude of the AOs towards watershed planning.

(n = 60)

Variable Number	Characteristics	Direct effect	Total indirect effect	'r' Value	Vital indirect effects		
					First	Second	Third
X ₂	Educational status	0.2639	0.2742	0.5381	0.1559 (X ₇)	0.0932 (X ₅)	-
X ₄	Training undergone in agriculture	0.1595	0.2206	0.3801	0.1088 (X ₇)	0.0703 (X ₅)	-
X ₅	Information seeking behaviour	0.1428	0.4333	0.5761	0.1826 (X ₇)	0.1722 (X ₂)	0.0785 (X ₄)
X ₇	Self confidence	0.3044	0.2778	0.5832	0.1351 (X ₂)	0.0857 (X ₅)	0.0570 (X ₄)

Residue = 0.7334 Out of 10 vital indirect effects, three were routed through X₇, three were routed through X₅, two were routed through X₂ and two were routed through X₄.

2. X_4 Training undergone.

The direct effect of this variable was 0.1595.

Indirect effects were mainly routed through self confidence (X_7) and information seeking behaviour (X_5).

The total indirect effect (0.2206) was higher when compared to the direct effect.

3. X_5 Information seeking behaviour.

Direct effect of this variable was 0.1428. The indirect effects were routed through self confidence (X_7) and educational status (X_2).

Total indirect effect (0.4333) was higher than the direct effect.

4. X_7 Self confidence.

Direct effect was 0.3044. The indirect effects were routed through educational status (X_2) and information seeking behaviour (X_5).

The total indirect effect (0.2778) was lower than the direct effect.

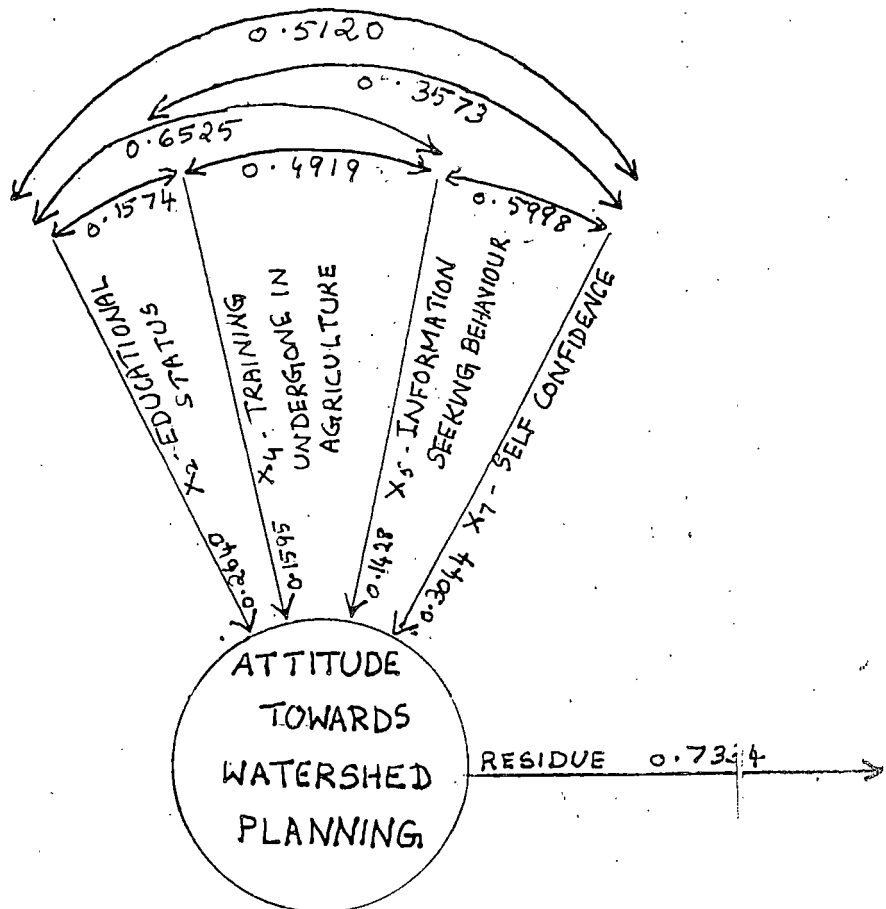
The results revealed that self confidence (X_7) had the highest direct effect followed by educational status (X_2) and training undergone (X_4). Information seeking behaviour (X_5) had the highest indirect effect followed by self confidence (X_7).

Therefore it is concluded that self confidence, educational status, training undergone and information seeking behaviour are important in determining the attitude of the AOs towards watershed planning.

The results are diagrammatically presented in Figure 10.

FIGURE 10

PATH DIAGRAM SHOWING THE EFFECTS OF SELECTED
INDEPENDENT VARIABLES ON ATTITUDE TOWARDS
WATERSHED PLANNING OF THE AOs.



8. Contribution of the independent variables in predicting the knowledge of the respondents in watershed planning.

- a. Contribution of the independent variables in predicting the knowledge of the JSCOs in watershed planning.

As evident from Table 13 the multiple regression test was significant at one per cent level probability with F Value 20.9306 and $R^2 = 0.9181$. Therefore from the multiple regression analysis it is seen that all the seven variables studied together contribute significant amount of variation to a proportion of about 91.81 per cent in the knowledge level of JSCOs in watershed planning.

The analysis revealed that 't' values for experience, information seeking behaviour and job satisfaction significantly determined their degree of interdependence and the regression equation fitted was

$$Y = -5.2483 + 0.1211 X_1^{NS} + 0.8405 X_2^{NS} - 0.2551^* X_3 - 0.1373 X_4^{NS} + 0.2221^* X_5 + 0.1816^* X_6 + 0.1357 X_7^{NS}$$

Table 13

Multiple regression analysis of knowledge of the JSCOs in watershed planning on seven independent variables.

(n = 21)

Sl. No.	Characteristics	Partial regression coefficient 'b'	S.E	(b) t value	R2	F
1.	Age	0.1211	0.1019	1.1892 NS		
2	Educational status	0.0405	1.0334	0.5134 NS		
3	Experience in the department	-0.2551	0.0964	-2.6470*		
4	Training undergone in agriculture	-0.1373	0.2220	-0.6183 NS	0.9181	20.8306**
5	Information seeking behaviour	0.2221	0.1030	2.1530*		
6	Job satisfaction	0.1816	0.0735	2.4722*		
7	Self confidence	0.1357	0.1497	0.9064 NS		

* Significant at 0.05 level of probability

** Significant at 0.01 level of probability

NS Not significant.

It could be understood from the prediction equation, that every five units increase in the experience will result in a unit decrease in the knowledge level of JSCOs, every five units increase in information seeking behaviour will result in a unit increase in the knowledge level of the officials and every six units increase in job satisfaction will result in a unit increase in the knowledge of JSCOs in watershed planning.

It is inferred that the above three variables were significantly contributing to the knowledge level of the JSCOs in watershed planning.

Therefore it can be concluded that experience was negatively contributing to the knowledge in watershed planning. More information seeking behaviour and more job ^{satisfaction} of official will contribute to an increase in knowledge of the JSCOs in watershed planning.

b. Contribution of the independent variables in predicting the knowledge of the JSCOs in watershed planning.

As shown by table 14, the multiple regression analysis was significant at five per cent level, with F value 3.9943 and R^2 0.7177. Therefore it is understood that all the seven variables studied together contribute considerable amount of variation, that is, about 71.77 per cent, in the knowledge level of JSCOs in watershed planning.

Table 14

Multiple regression analysis of knowledge of of the JSSOs in watershed planning on seven independent variables.

(n = 19)

Sl. No.	Characteristics	Partial regression Coefficient 'b'	S.E (b)	t value	R^2	F
1.	Age	-0.2246	0.2359	-0.9520 NS		
2.	Educational status	0.8255	1.0076	0.8192 NS		
3.	Experience in the department	0.2291	0.1950	1.1750 NS		
4.	Training undergone in agriculture	0.1619	0.2333	0.6943 NS	0.71626	3.99426*
5.	Information seeking behaviour	0.2905	0.1338	2.1709 ^a		
6.	Job satisfaction	0.0778	-0.0815	0.9543 NS		
7.	Self confidence	0.0261	0.2343	0.1114 NS		

* Significant at 0.05 level of probability

NS Not significant

The analysis revealed that among the 't' values of the seven variables only information seeking behaviour was significant at five per cent level of probability. The regression equation fitted was

$$\begin{aligned}
 Y = & 2.6947 - 2246 X_1^{NS} + 0.8255 X_1^{NS} \\
 & + 0.2291 X_2^{NS} + 0.1619^{NS} X_4 + 0.2905^* X_5 \\
 & + 0.0776^{NS} X_6 + 0.0261^{NS} X_7.
 \end{aligned}$$

It could be understood from the prediction equation that every four units increase in information seeking behaviour will contribute to a unit increase in the knowledge of the JSSOs in watershed planning.

Hence it is inferred that information seeking behaviour is significantly contributing to the knowledge level of the JSSOs in watershed planning.

Therefore it is concluded that as information seeking behaviour increases more will be the knowledge level of the JSSO in watershed planning.

c. Contribution of the independent variables in predicting the knowledge of the AOs in watershed planning.

As seen from table 15, the multiple regression analysis was significant at one per cent level of probability with F values 20.6042 and R^2 0.7350. About 73.5 per cent of the variation is explained by all the seven variables studied in the case of the knowledge level of AOs in watershed planning.

Table 15

Multiple regression of knowledge of the AOs in watershed planning ^{on} seven independent variables. (n = 60)

Sl. No.	Characteristics	Partial regression Coefficient (b ¹)	S.E. (b)	t value	R ²	F
1.	Age	-0.0597	0.0717	-0.8333 NS		
2.	Educational status	0.5552	0.5984	0.9279 NS		
3.	Experience in the department	0.0612	0.0681	0.8987 NS		
4.	Training undergone in agriculture	0.1156	0.0421	2.7442**	0.7350045	20.60424**
5.	Information seeking behaviour	0.0796	0.0621	1.2823 NS		
6.	Job Satisfaction	0.0021	0.0485	0.0434 NS		
7.	Self confidence	0.5191	0.0882	5.8557**		

* Significant at 0.01 level of probability

NS Not significant.

The analysis showed that the 't' values for training undergone and self confidence significantly determined their degree of interdependence and the regression equation fitted was.

$$Y = -7.5770 - 0.0597 X_1^{NS} + 0.5552 X_2^{NS} + 0.0612 X_3^{NS} \\ + 0.1156^{**} X_4 + 0.0796 X_5^{NS} + 0.0021 X_6^{NS} \\ + 0.5191 X_7^{**}$$

It could be understood from the regression equation that every 9 units increase in training undergone will result in a unit increase in the knowledge level of the AOs in watershed planning and every two units increase in self confidence will lead to a unit increase in the knowledge of the AOs in watershed planning.

Hence, it is inferred that the above mentioned two variables were significantly contributing to the knowledge level of the AOs in watershed planning.

Therefore, it could be concluded that more the training undergone more will be the knowledge of the AOs in watershed planning. An AO with higher self confidence will have a higher knowledge in watershed planning.

9. Contribution of the independent variables in predicting the attitude of the respondents towards watershed planning.

- a. Contribution of the independent variables in predicting the attitude of the JSCOs towards watershed planning.

Table 16

Multiple regression analysis of attitude of the JSCOs towards watershed planning seven ^{on} independent variables.

(n = 21)

Sl. No.	Characteristics	Partial regression Coefficient (b)	S.E. (b)	t value	R ²	F
1	Age	0.2741	0.2443	1.1221 NS		
2	Educational status	3.2083	2.4777	1.2949 NS		
3	Experience in the department of agriculture	-0.1620	0.2311	-0.7008 NS		
4.	Training undergone in agriculture	0.0506	0.5322	0.0950 NS	0.7823	6.6743 **
5	Information seeking behaviour	0.2402	0.2468	0.9734 NS		
6	Job satisfaction	0.1379	0.1761	0.7827 NS		
7	Self confidence	0.4695	0.3590	1.3079 NS		

** Significant at 0.01 level of probability.

NS Not significant.

From table 16 it can be sure that the multiple regression analysis was significant at one per cent level of probability with F value 6.6743 and R^2 0.7823. And it is clear that all the seven variables studied together contribute significant amount of variation to a proportion of about 78.23 per cent in the attitude of JSCOs towards watershed planning.

The analysis has shown that none of the seven variables was significant in determining their degree of interdependence

It is seen that the total contribution of the seven variables was significant, but none of them individually and significantly contributed to the attitude of the JSCOs towards watershed planning.

b. Contribution of the independent variables in predicting the attitude of the JSSOs towards watershed planning.

From table 17, it is seen that the multiple regression test was significant at five per cent level of probability with F value 3.1180 and $R^2 = 0.6649$. Therefore the multiple regression analysis shows that all the seven variables studied together contribute significant amount of variation to a proportion of 66.50 per cent in the attitude of the JSSO respondents in watershed planning.

The analysis has shown that none of the variables individually contributed to the variation in the attitude of the officers. This is similar to the case of JSCO respondents. This shows that an attitude formation at the

Table 17

Multiple regression analysis of attitude of the JSSOs towards watershed planning on seven independent variables.

(n = 19)

Sl. No.	Characteristics	Partial regression Coefficient 'b'	S.E. (b)	t value	R2	F
1	Age	-0.8204	0.5746	-1.4278 NS		
2	Educational status	1.1341	2.4548	0.4620 NS		
3.	Experience in the department	0.8024	0.4751	1.6888 NS		
4	Training undergone in agriculture	0.3680	0.5683	0.6476 NS	0.6647	3.1180*
5	Information seeking behaviour	0.1861	0.3251	0.5707 NS		
6	Job satisfaction	-0.0867	0.1986	-0.4368 NS		
7	Self confidence	0.5279	0.5709	1.0999 NS		

* Significant at 0.05 level of probability

NS Not significant.

present stage of the watershed development programme would not be meaningful.

c. Contribution of the independent variables in predicting the attitude of AOs toward watershed planning.

From table 16, it can be seen that the multiple regression test was significant at one per cent level of probability with F value 7.0767 and $R^2 = 0.4879$. Thus, from the multiple regression analysis it is seen that all the seven variables together contribute about 48.79 per cent of the total variation in the attitude which is significant.

Even though the seven variables significantly contributed to the variation in the attitude of the AOs, except self confidence none of the other variables had individual contribution. The regression equation fitted was

$$\begin{aligned}
 Y = & 0.8992 - 0.1043 X_1^{NS} + 2.2424 X_3^{NS} \\
 & + 0.1367 X_3^{NS} + 0.1590 X_4^{NS} + 0.1595 X_5^{NS} \\
 & + 0.1671 X_6^{NS} + 0.4976 X_7^*
 \end{aligned}$$

It can be seen that every two units increase in self confidence would contribute a unit increase in the attitude of the AOs.

Hence it is inferred that self confidence significantly contribute to the attitude of the AOs ^{towards} in watershed planning.

Therefore it can be concluded that when the self confidence is more, more favourable will be the attitude towards watershed planning.

Table 18

Multiple regression analysis of attitude of the AOs towards watershed planning on seven independent variables.

(n = 60)

Sl. No.	Characteristics	Partial regression Coefficient 'b'	S.E. (b)	t values	R ²	F
1	Age	-0.1043	0.1727	-0.6039 NS		
2	Educational status	2.2424	1.4408	1.5772 NS		
3	Experience in the department	0.1367	0.1639	0.8337 NS		
4	Training undergone in agriculture	0.1590	0.1014	1.5677 NS		
5	Information seeking behaviour	0.1595	0.1495	1.0673 NS	0.4879	7.0767**
6	Job satisfaction	0.1671	0.1167	1.4314 NS		
7	Self confidence	0.4976	0.2123	2.3429*		

* Significant at 0.05 level of probability

** Significant at 0.01 level of probability

NS Not significant.

10. Training needs of the respondents in watershed planning.

Table 19

Training needs of the JSCOs, JSSOs and AOs in
Watershed Planning.

(n = 100)

Category	Sl. No.	Level of Training need	Training need score	Frequency	Percentage
JSCOs (n= 21)	1	Low	0 to 137	5	23.80
	2	Medium	137 to 154	8	38.10
	3	High	Above 154	8	38.10
Total				21	100.00
JSSOs (n= 19)	1	Low	0 to 116	5	26.32
	2	Medium	116 to 142	5	26.32
	3	High	Above 142	9	47.36
Total				19	100.00
AOs (n= 60)	1	Low	0 to 95	32	53.34
	2	Medium	95 to 109	5	8.33
	3	High	Above 109	23	38.33
Total				60	100.00
Total n = 100				Total	100.00

Each category of respondents namely JSCOs, JSSOs and AOs was divided into three groups with low, medium and high levels of training needs in watershed planning as given in table 19.

a. Training needs of JSCOs in watershed planning

As seen from the table 23.80 per cent of the JSCO respondents perceived only low level of training need, 38.10 per cent of the officials perceived high level of training need, whereas the same percentage (38.10 per cent) of the JSCOs, came in the medium level.

b. Training needs of JSSOs in watershed planning.

It was revealed that 26.32 per cent of the JSSOs perceived only a low level of training need, whereas the same percentage of the respondents were in the medium level group and 47.36 per cent were those who perceived more training need.

c. Training needs of AOs in watershed planning.

It was seen that 53.34 per cent of the respondents perceived only a low need for training, whereas 8.33 per cent of the officers felt a medium level of training needs and 38.33 per cent of the AOs perceived a high level of training need.

From the results, it is clear that only less than one-fourth of the JSCOs perceived a low level of training need. The distribution of JSCOs in the medium and high level categories was similar, the total being more than 76 per cent, which indicates a high level of training need as perceived by the JSCOs.

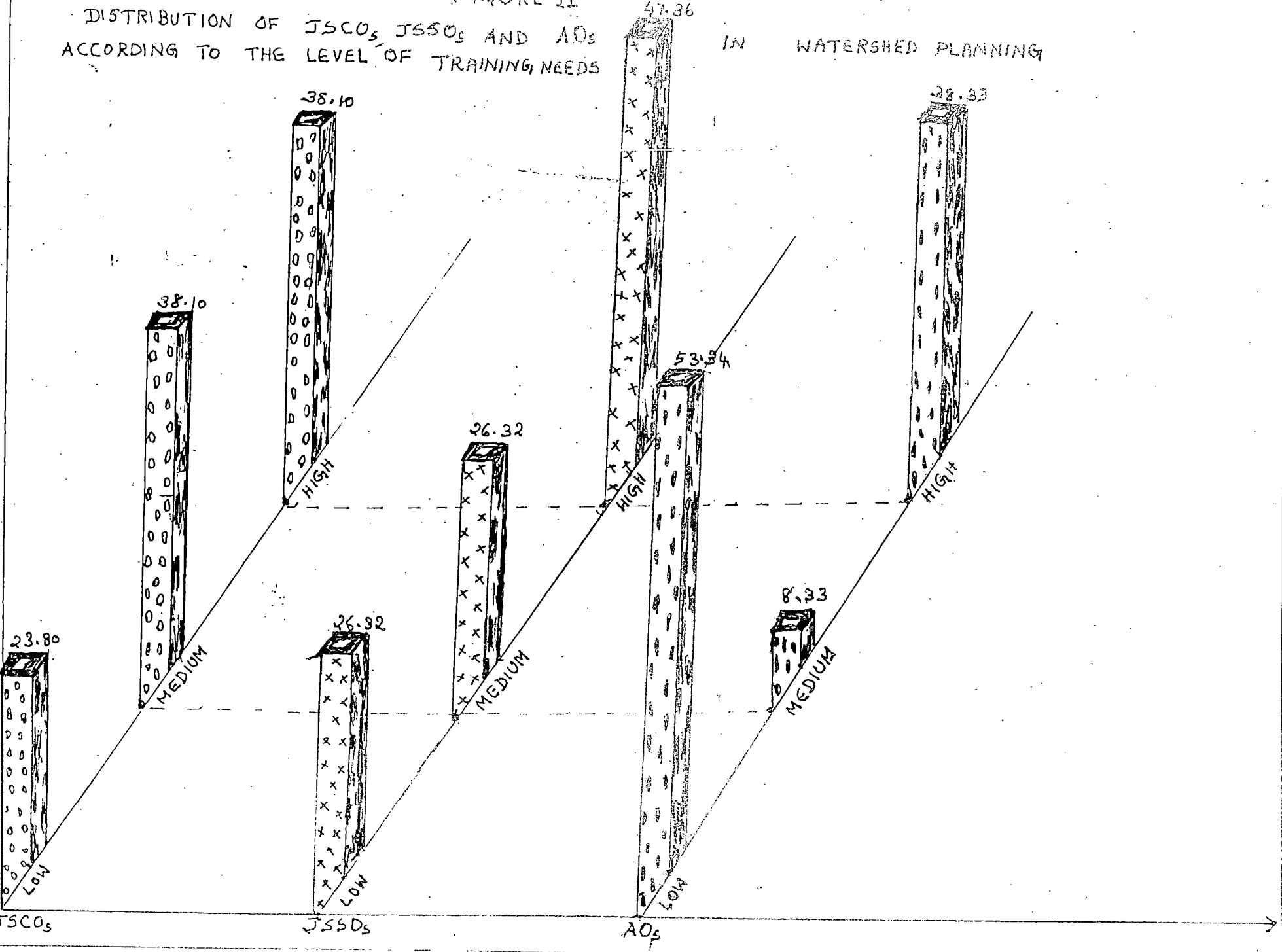
The JSSOs also perceived a high level of training need as the medium and high level categories belong to more than 73 per cent. Watershed planning and management is being now perceived as part of the activity of JSCOs and JSSOs so that this perception might have resulted in such a perception of the training need. The general level of knowledge and attitude of JSCOs and JSSOs were relatively higher than the knowledge and attitude of AOs. Some basic knowledge in the subject and favourable attitude towards watershed planning may motivate an official to have a training in the area. This is a possible result in that direction.

The AOs have not so far perceived watershed planning as one of their responsibilities so that the majority do not perceive the need for training. The study revealed that more than 61 per cent of the AOs were in the low and medium groups who perceived comparatively low level of training need in watershed planning.

The results are diagrammatically presented in Figure 11.

DISTRIBUTION OF JSCOs, JSSOs AND AOs
 ACCORDING TO THE LEVEL OF TRAINING NEEDS

IN WATERSHED PLANNING



11. Method of training, duration, venues and frequencies of training as preferred by the JSCOs, JSSOs and AOs.

- a. Preference of the method of training by the JSCOs, JSSOs and AOs (pooled sample).

Table 20

Preference of the Methods of training by the respondents in watershed planning.

(n = 100)

Sl. No.	Method of training	Total score	Overall mean score	Rank
1.	Lectures	134	1.34	10
2.	Group discussion	202	2.02	9
3	Lecture with field visits	239	2.39	4
4	Exhibitions	212	2.12	7
5	Field trips	258	2.58	2
6	Study tour	243	2.43	3
7	Campaigns	229	2.29	5
8	Film shows	217	2.17	6
9	Video cassettes	205	2.05	8
10	Demonstrations	259	2.59	
11	Others (specify)			

Table 20 revealed that demonstration was the most preferred (overall mean score 2.59) method of training as it was perceived by the respondents. This was followed by field trips (ONS, 2.58). Third in place was study tours (ONS 2.43)

and fourth came lecture with field visits (OMS 2.39).

Since watershed planning and management are new areas, it is quite natural that the change agents would like to see demonstrations and model plots where they get a chance to study the programmes.

b. Preference of the duration of training by the JSCOs, JSSOs and AOs (pooled sample).

Table 21

Preference of the duration of training by the respondents in watershed planning.

(n = 100)

Sl. No.	Duration of training	Total score	Overall mean score	Rank
1	One day	187	1.87	3
2	Two days	165	1.65	5
3	Five days	235	2.35	1
4	One week	159	1.59	6
5	Two weeks	190	1.90	2
6	One month	168	1.68	4
7	More than one month	155	1.55	7

The table reveals that five days' training programmes were preferred by more respondents (OMS 2.35). This was followed by two weeks (OMS 1.90). Next in preference was one day (OMS 1.87) and then one month (OMS 1.68).

c. Preference of the venues of training by the JSCOs, JSSOs and AOs (pooled sample).

Table 22

Preference of the venues of training by the respondents in watershed planning.

(n = 100)

Sl. No.	Venue of Training	Total score	Overall mean score	Rank
1	College of Agriculture, Vellayani	199	1.99	4
2	Central Training Institute, Mannuthi	253	2.53	1
3	CWRDM, Kozhikode	178	1.78	8
4	IMG, Trivandrum	229	2.29	3
5	Regional Training centre of the department of agriculture, Trivandrum	183	1.83	6
6	R.T.C. of other states	191	1.91	5
7	Soil conservation Research and training Centre, Konni	180	1.80	7
8	ICAR Stations	246	2.46	2
9	Others			

It is seen from Table 22 that Central Training Institute, Mannuthi was the most preferred venue of training (OMS 2.53). Second in preference was ICAR stations (OMS 2.46). Then came IMG, Trivandrum (OMS 2.29) and college of Agriculture, Vellayani (OMS 1.99).

- d. Preference of the frequencies of training by the JSCOs, JSSOs and AOs (pooled sample).

Table 23

Preference of the frequencies of training by the respondents watershed planning

(n = 100)

Sl. No.	Frequency of Training	Total score	Overall mean score	Rank
1	Once in a year	216	2.16	1
2	Once in 2 two years	207	2.07	2
3	Once in three years	196	1.96	3
4	Once in four years	178	1.78	4 a
5	Once in five years	171	1.71	5
6	Once in ten years	178	1.78	4 b
7	Once in a life time	148	1.48	6

From Table 23 it is seen that training programmes conducted once in a year are most preferred (OMS 2.16). Next preference was given to training once in two years. Third came training conducted once in three years.

12. Comparison of the levels of awareness, knowledge, attitude and training needs in watershed planning between the three categories of respondents: JSCOs, JSSOs and AOs.

- a. Comparison of the levels of awareness in watershed planning between the JSCOs, JSSOs and AOs.

Table 24

Comparison between the JSCOs, JSSOs and AOs with respect to awareness in watershed planning (n = 100)

Sl. No.	Comparison Between	Mean	Score	t Value
1.	JSCOs and JSSOs	8.0952	6.42	2.2603**
2	JSSOs and AOs	6.4200	3.20	8.0139*
3	JSCOs and AOs	8.0952	3.20	10.3016*

* Significant 0.05 level of probability

** Significant at 0.01 level of probability.

As revealed from table 24, the difference in awareness between the JSCOs and JSSOs was significant at 0.05 level of probability (t value 2.2603). The difference in awareness between the JSSOs and AOs was also significant (t value 8.0139) at one per cent level of probability. The difference in awareness between the JSCOs and AOs was significant at one per cent level of probability, the t value being 10.3016. So the three groups were significantly different in their awareness in watershed planning.

b. Comparison of the level of knowledge in watershed planning between the JSCOs, JSSOs and AOs.

Table 25

Comparison between the JSCOs, JSSOs and AOs with respect to knowledge in watershed planning

(n = 100)

Sl. No.	Comparison between	Mean	Score	t value
1	JSCOs and JSSOs	13.286	12.474	0.7847 NS
2	JSSOs and AOs	12.474	9.283	3.6754*
3	JSCOs and AOs	13.286	9.282	4.4506**

** Significant at 0.01 level of probability.

NS Not significant.

As evident from the table, the difference in knowledge between JSSOs and AOs was significant at one per cent level of probability (t value 3.6754). The difference in knowledge between the JSCOs and AOs was significant at one per cent level of probability, the t value being 4.4506. So there is significant difference in the knowledge in watershed planning between the JSSOs and AOs and also between JSCOs and AOs. There is no significant difference in the knowledge level between the JSCOs and JSSOs.

c. Comparison of the levels of attitude towards watershed planning between the JSCOs, JSSOs and AOs.

Table 26

Comparison between the JSCOs, JSSOs and AOs with respect to attitude towards watershed planning.

(n = 100)

Sl. No.	Comparison between	Mean	Scores	t Value
1	JSCOs and JSSOs	36.952	35.105	1.0005 NS
2	JSSOs and AOs	35.105	28.583	4.1260 **
3	JSCOs and AOs	36.952	28.563	5.6044 **

** Significant at 0.01 level of probability

NS Not significant.

It is seen from the table that there is no significant difference in attitude towards watershed planning between the first and second category^{ies} of respondents, ie between the JSCOs and JSSOs (t value being 1.0005). But there is significant difference between the JSSOs and AOs at one per cent level of probability (t value being 4.1260) Also there is significant difference between the JSCOs and AOs with respect to knowledge in watershed planning (t value is 5.6044) at one per cent level of probability.

d. Comparison of the levels of training needs in watershed planning between the JSCOs, JSSOs and AOs.

Table 27

Comparison between the JSCOs, JSSUs and AOs with respect to training needs in watershed planning

(n = 100)

Sl. No.	Comparison between	Mean	Score	t value
1.	JSCOs and JSSOs	145.143	128.950	2.0149 NS
2.	JSSOs and AOs	128.950	101.72	3.6826**
3.	JSCOs and AOs	145.143	101.72	6.6110**

** Significant at 0.01 level of probability

NS Not significant.

Table 27 shows that there is no significant difference between the JSCOs and JSSOs with respect to level of training need (t value 2.0149). There is significant difference between the levels of training needs of JSSOs and AOs. (t value 3.6826) at one per cent level of probability. The difference in the levels of training need in watershed planning between the JSCOs and AOs was significant at one per cent level of probability (t value 6.6110).

From the results we can conclude that there is significant difference between the JSCOs and JSSOs with respect to awareness only. The JSCOs and JSSOs are working under

more or less similar situations. The JSCOs, as they are conducting the soil conservation activities may have a good knowledge, favourable attitude and consequently higher training need in watershed planning. The JSSOs are performing the soil survey activities and also preparing soil survey reports and maps. This aspect is a vital activity in watershed planning. So they also possess some knowledge in watershed planning. Therefore, there is no significant difference between the JSCOs and JSSOs in the level of knowledge, attitude and training needs.

AOs possess a comparatively lower awareness, knowledge, attitude and training needs than the JSCOs. This is probably because the AOs do not perceive watershed planning as their responsibility. So they are not interested to gain more knowledge in that aspect and may not have a favourable attitude towards it.

13. Constraints in watershed planning as perceived by the JSCOs, JSSOs and AOs.

a. Constraints in watershed planning as perceived by the JSCOs.

Table 28 revealed that nonavailability of demonstration plots to see the benefits of watershed management was perceived as the most important constraint (OMS 2.77). Next in rank was anticipated protest from land owners to treat the watershed as a whole for development (OMS 2.72). Inadequate training of the officers in watershed planning and management was perceived to be next in importance (OMS 2.67). Inadequate

TABLE 26CONSTRAINTS IN WATERSHED PLANNING AS PERCEIVED BY THEJSCOs, JSSOs AND AOs

(n = 100)

Sl.	Name of constraint	Overall mean score			Rank		
		JSCOs n = 21	JSSOs n = 19	AOs n = 60	JSCOs n = 21	JSSOs n = 19	AOs n = 60
1	Lack of understanding of the concept of watershed Planning	2.05	2.42	2.60	11	5a	3
2.	Non-availability of model watershed plans for reference	2.43	2.11	2.28	6	8	9
3.	Non-availability of demonstration plots to see the benefits of watershed management.	2.77	2.58	2.63	1	3	2a
4.	Lack of awareness of the superior officers in watershed planning and management.	2.48	2.42	2.37	5a	5b	7
5.	Unawareness of the land owners about of the long term benefits from watershed management	2.15	2.47	2.45	9	4a	6
6.	Anticipated protest from the land owners to treat the watershed as a whole for development.	2.72	1.95	2.63	2	10	2b
7.	Inadequate linkage between various development departments responsible for watershed management	1.77	2.37	2.25	13	6	11
8.	Inadequate training of officers in watershed planning and management.	2.67	2.47	2.75	3a	4b	1
9.	Want of experienced persons to educate the Officers in watershed planning and management.	2.34	2.16	2.32	7	7a	8
10.	False notion of the Officers that contour the only						

Local institutions and voluntary agencies in watershed planning and management.

2.48 2.63 2.47 5b 2 5

Lack of awareness of the policy makers on the advantages of watershed planning and management.

2.58 2.84 2.53 4 1 4

Non-availability of any manual/literature on watershed planning and management.

2.10 2.00 2.08 10 9a 12

Negative attitude of field staff towards watershed planning and management.

2.19 1.89 1.85 8 11 13

Inadequate research support in watershed planning and management.

2.67 2.00 2.27 3b 9b 10

training of the officers in watershed planning and management was perceived to be next in importance (OMS 2.67). Inadequate research support in watershed planning and management was also perceived to be equally important (OMS 2.67). Lack of awareness of the policy makers on the advantages of watershed planning and management was perceived to be the next in importance (OMS 2.58).

The other constraints perceived in the rank order are:

- * Lack of awareness of the superior officers in watershed planning and management (OMS 2.48)
- * Low participation of local institutions and voluntary agencies in watershed planning and management (OMS 2.48)
- * Non availability of model watershed plans for reference (OMS 2.43)
- * Want of experienced persons to educate the officers in watershed planning and management (OMS 2.34)
- * Negative attitude of field staff towards watershed planning and management (OMS 2.19)
- * Unawareness of the land owners about the long term benefits from watershed management (OMS 2.15)
- * Non availability of any manual/literature on watershed planning and management (OMS 2.10)
- * Lack of understanding of the concept of watershed planning (OMS 2.05)

- * False notion of the officers that contour bunding is the only watershed management practice (OMS 1.86)
- * Inadequate linkage between various development departments responsible for watershed management practice (1.77).

b. Constraints in watershed planning as perceived by the JSOs.

Table 38 indicated that lack of awareness of the policy makers on the advantages of watershed planning and management was perceived to be the most important constraint by the JSOs (OMS 2.84) Low participation of local institutions and voluntary agencies in watershed planning and management was perceived to be the next in importance (OMS 2.63).

Nonavailability of demonstration plots to see the benefits of watershed management was perceived as the next important constraint (OMS 2.59). Unawareness of the land owners about the long term benefits from watershed management was the next in importance (OMS 2.47) Inadequate training of the officers in watershed planning and management was also an important constraint (OMS 2.47)

The other constraints perceived in the rank order are:

- * Lack of understanding of the concept of watershed planning (OMS 2.42)
- * Lack of awareness of the superior officers in watershed planning (OMS 2.42)
- * Inadequate linkage between various development departments responsible for watershed management (OMS 2.37)

- * Want of experienced persons to educate the officers in watershed planning and management (OMS 2.16)
- * False notion of the officers that contour bunding is the only watershed management practice (OMS 2.16)
- * Non availability of model watershed plans for reference (OMS 2.11)
- * Non availability of any manual/literature on watershed planning and management (OMS 2.09)
- * Inadequate research support in watershed planning and management (OMS 2.00)
- * Anticipated protest from the land owners to treat the watershed as a whole for development (OMS 1.95)
- * Negative attitude of the field staff towards watershed planning and management (OMS 1.69)

c. Constraints in watershed planning as perceived by the AOs.

From the table, it is seen that inadequate training of the officers in watershed planning and management was perceived as the most important constraint (OMS 2.75). Non-availability of demonstration plots to see the benefits of watershed management was perceived to be the next in importance (OMS 2.63). Anticipated protest from the land owners to treat the watershed as a whole for development was an equally important constraint (OMS 2.63). Next lack of understanding of the concept of watershed planning was perceived (OMS 2.60).

The next important constraint was the lack of awareness of the policy makers on the advantages of watershed planning and management (OMS 2.53).

The other constraints in the rank order are:

- * Low participation of local institutions and voluntary agencies in watershed planning and management (OMS 2.47)
- * Unawareness of the land owners about the long term benefits from watershed management (OMS 2.45)
- * Lack of awareness of the superior officers in watershed planning and management (OMS 2.37)
- * Want of experienced persons to educate the officers in watershed planning and management (OMS 2.32)
- * Non-availability of model watershed plans for reference (OMS 2.28)
- * Inadequate research support in watershed planning and management (OMS 2.27)
- * Inadequate linkage between the various development departments responsible for watershed management (OMS 2.25)
- * Non-availability of any manual/literature in watershed planning and management (OMS 2.09)
- * Negative attitude of field staff towards watershed planning and management (OMS 1.85)
- * False notion of the officers that contour bunding is the only watershed management practice (OMS 1.70).

The study of the constraints revealed that there was variation in the perception of the relative importance of constraints. Watershed planning being a new area for the JSCOs, JSSOs and AGs, they perceive lot of difficulties in watershed planning. Unless suitable demonstration plots are laid out for teaching such change agents, it may not be possible to create a confidence in them in watershed planning. This points out to the need of organising various training programmes in watershed planning and management for the different categories of officers in the department of agriculture. The perceived constraint that policy makers are not aware of the concept of watershed planning points out to the need of educating such people also on this concept. The JSCOs perceive the problem of anticipated protest from the land owners because they are not much experienced in the technique of group management. An effective communication strategy which needs detailed communication plan for popularising the watershed concept will be perhaps the need of the hour in this context.

SUMMARY

CHAPTER V

SUMMARY

The JSCOs, JSSOs and AOs are the officers of the department of Agriculture, mainly responsible for watershed planning and management in the state. Watershed planning is a new concept to the change agents of Kerala and as such, they may experience many difficulties in watershed planning and management. Watershed planning being a scientific way of planning for development, the change agents are to be trained in this concept. Before that, it is necessary to ascertain their present level of awareness, knowledge and attitude towards this new concept. Hence a study was undertaken with the following objectives.

1. To ascertain the awareness of the Junior Soil Conservation officers (JSCOs), Junior Soil Survey Officers (JSSOs) and Agricultural Officers (AOs) in watershed planning.
2. To determine the knowledge of JSCOs, JSSOs and AOs about watershed planning.
3. To measure the attitude of the officers towards watershed planning.
4. To study the relationship of the independent variables with knowledge and attitude of the officers.
5. To assess the training needs of the officers in watershed planning.
6. To study the constraints in watershed planning as perceived by the officers.

The study was carried out in Kerala. One district each was randomly selected from every agroclimatic zone of Kerala for the study, and five districts were thus selected. From the population of JSCOs, JSSOs and AOs from the selected five districts, stratified two-stage random sampling was done to select the respondents. Total sample size was 100.

A detailed review of literature was done and experts in the soil conservation unit of the department of Agriculture and experts in the university were consulted. Based on their suggestions, the variables for the research study were selected. Age, educational status, experience in the department, training undergone in agriculture, information seeking behaviour, job satisfaction and self confidence were the independent variables. Awareness in watershed planning was the intervening variable. Knowledge in watershed planning and attitude towards watershed planning were the dependent variables. Training needs in watershed planning was the derived variable.

Age was measured in number of completed years at the time of interview. Educational status was measured using the schedule developed for the study. Experience in the department was measured by the number of actual years of completed service in the department of Agriculture/Soil Conservation unit. Training undergone in Agriculture was measured by using the schedule developed for the study. Information seeking behaviour was measured using the procedure followed by Joseph (1983) with modifications in the scoring procedure. Jobsatisfaction was

measured using the procedure used by Joseph (1983). Self confidence was measured using the procedure developed by Pandyaraj (1978) with slight modifications in the scoring procedure.

To measure awareness in watershed planning, a range of 26 questions were first selected and sent to judges for rating. Based on their judgement, 12 questions were selected for the schedule. The responses were rated on two-point continuum with Yes/No categories.

To measure the level of knowledge of the officials in watershed planning, a knowledge test was constructed. The experts of the C.W.R.D.M., Kerala Agricultural University and soil conservation unit were consulted while preparing the items. Forty items were selected which covered all aspects of watershed planning. The items were in the objective form. The items were pre-tested and administered to 30 officials who were different from the sample selected for the main study. For item analysis, the respondents were divided into three equal groups according to the descending order of the total scores. The middle group was eliminated. Difficulty index and discrimination index were worked out and based on the criteria, 19 items were selected for the final format of the knowledge test. The reliability and validity of the test were found out.

To measure attitude towards watershed planning, a scale was constructed. Forty statements related to watershed planning

were collected after the review of literature and discussion with experts. The statements were edited based on the criteria described by Edwards (1969) and 20 statements were selected to be sent to judges rating. The scale and Q values for all the 20 statements judged by the judges were found out. The statements with comparatively small Q values and equal appearing scale values were selected for the final scale. Thus 12 statements were finally selected for the attitude scale. Their reliability and validity also were found out.

To measure the training needs, the important areas of training in watershed planning were listed after discussions with the experts. The respondents were asked to indicate their perception of training need in a three-point continuum with respect to knowledge and skill separately. Total training need score for each individual was worked out by adding the scores for different areas. The total training need scores for the three categories of the respondents were calculated separately. The perception of the officials with regard to their preferences in method, duration, venue and frequency of training also were assessed.

The constraints in watershed planning were also studied. Fifteen important constraints in watershed planning were listed and the respondents were asked to indicate their perceptions of the importance of each constraint in a three-point continuum.

Data were collected with the help of a well structured

and pretested interview schedule. Percentage analysis, simple correlation, path analysis multiple regression and t-test were used to derive the results.

Salient findings

1. Awareness of JSCOs, JSSOs and AOs in watershed planning

The study revealed that more than 47 percent of the JSCOs possessed high level of awareness in watershed planning. Majority of the respondents among JSSOs and AOs possessed only low level of awareness in watershed planning as only 15.79 per cent and 13.34 per cent respectively fell in the high awareness group.

2. Knowledge of the respondents in watershed planning

The study indicated that 33 per cent of the JSCOs were in the group with low level of knowledge, whereas 29 per cent were in the medium level and 38 per cent were in the high level group of knowledge in watershed planning. It was seen that 42 per cent, 37 per cent and 21 per cent of the JSSO respondents were in the low, medium and high level categories respectively in knowledge.

It was revealed that more than 43 per cent of the AO respondents were in the low group, more than 23 per cent in the medium group and around 33 per cent in the high group of knowledge level in watershed planning.

3. Attitude of the officers towards watershed planning.

It was revealed that 38 per cent of the JSCOs came under

low level of attitude category, whereas 33 per cent of the respondents were in the high group and 29 per cent in the medium group.

The distribution of JSSO respondent in the low, medium and high level group were 31.5 per cent, 37 per cent and 31.5 per cent respectively.

It was seen that 45 per cent of the AO respondents fell in the low level attitude score group, 30 per cent in the medium group and 25 per cent in the high group.

4. Association of the characteristics of the officers with their knowledge in watershed planning.

It was revealed that age, educational status, experience in the department, information seeking behaviour and self confidence were significantly associated with knowledge of the JSSOs in watershed planning at one per cent level of probability. Training undergone in Agriculture was correlated with their knowledge at five per cent level of probability. Job satisfaction was not significantly related with knowledge in watershed planning.

Training undergone in agriculture, information seeking behaviour and self confidence were associated with knowledge of JSSOs in watershed planning at one per cent level of probability. Educational status was correlated at five per cent level of probability. Age, experience in the department and job satisfaction were not seen associated with knowledge of the JSSOs in watershed planning.

It was seen that educational status, training undergone in Agriculture, information seeking behaviour and self confidence were positively correlated with knowledge of AOs in watershed planning at one percent level of probability. Age, experience in the department and job satisfaction were not significantly associated with knowledge of AOs in watershed planning.

5. Association of the characteristics of the officers with their attitude towards watershed planning.

It was revealed that age, educational status, information seeking behaviour and self confidence were positively associated with the attitude of JSCOs towards watershed planning at one percent level of probability. Training undergone was significantly and positively related with attitude at five per cent level of probability. Experience in the department was negatively associated with attitude at five per cent level of probability.

Training undergone and self confidence were positively and significantly associated with attitude of the JSSOs towards watershed planning at one percent level of probability.

Educational status and information seeking behaviour were positively ^{and} significantly correlated with attitude at five per cent level of probability. Age was negatively correlated with attitude at five per cent level of probability.

Attitude of the AOs towards watershed planning was related to educational status, training undergone, information

seeking behaviour and self confidence significantly and positively at one per cent level of probability.

6. Direct and indirect effects of the independent variables on the knowledge of the officers in watershed planning.

Self confidence, experience in the department and educational status had relatively high direct effects on the knowledge of the JSCOs in watershed planning. Age, information seeking behaviour and training undergone had high indirect effects on knowledge.

Information seeking behaviour, self confidence and educational status had higher direct effects on knowledge of the JSSOs. Highest indirect effects were those of training undergone in agriculture, self confidence and educational status.

Self confidence, training undergone and information seeking behaviour had high direct effects on knowledge of AOs. Higher indirect effects were that of information seeking behaviour, educational status and training undergone.

7. Direct and indirect effects of the independent variables on the attitude of the officers towards watershed planning.

Information seeking behaviour, age and educational status had the higher direct effects on the attitude of the JSCOs towards watershed planning. Age, training undergone ^{and} self confidence had higher indirect effects.

Self confidence, information seeking behaviour and training undergone had relatively higher direct effect on the

attitude of the JSSOs towards watershed planning. Educational status, age and training undergone had higher indirect affects.

Self confidence, educational status and training undergone and had high direct effects on the attitude of the AOs towards watershed planning. Higher indirect effects were due to information seeking behaviour and self confidence.

8. Contribution of the independent variables in predicting knowledge of the respondents in watershed planning.

The variable experience was found to be negatively and significantly contributing to the knowledge level of JSCOs. Information seeking behaviour and job satisfaction was found to have significant contribution towards knowledge of JSCOs in watershed planning towards positive direction.

Only information seeking behaviour was found to be significantly contributing to the knowledge of JSSOs in watershed planning.

Training undergone and self confidence was found to have significant contribution to the knowledge of AOs in watershed planning.

9. Contribution of the independent variables in predicting attitude of the respondents towards watershed planning.

Eventhough the total contribution of all the seven variables towards attitude of the JSCOs was significant,

None of the variables individually was having significant contribution towards attitude of the JSCOs towards watershed planning.

Even though the total contribution of all the variables to attitude of the JSSOs towards watershed planning was significant, none of the variables individually contributed significantly.

Self confidence was found to be significantly contributing to the attitude of the AOs towards watershed planning.

10. Training needs of the officers in watershed planning.

Thirty eight per cent of the JSCOs perceived high training needs in watershed planning. In the medium group, there were 36 per cent and 28.8 per cent were in the lower training need group.

Majority of the JSCOs ie 47 per cent perceived high training needs. About 26 per cent were in the medium group and 26 per cent perceived only low training needs.

Majority of the AOs (53 per cent) perceived low training need in watershed planning. Only 8 per cent were in the medium group and 38 per cent were in the high training need group.

11. Method of training, duration, venues and frequencies of training as preferred by the JSCOs, JSSOs and AOs (pooled sample).

a. Method of training.

Majority of the respondents preferred demonstrations as the method of training. Next in preferences were field trips and study tours.

b. Duration of training.

Five days' training programmes was the most preferred one. This was followed by two weeks duration and one day training.

c. Venues of training.

Central training institute, Mannathi was the most preferred venue of training. Next in preference were ICAR stations and IMG, Trivandrum.

d. Frequencies of training.

Most preferred was training once in a year. Next preference was given to training once in two years. Third preference was once in three years.

12. Comparison of the levels of awareness, knowledge, attitude and training needs among JSCOs, JSSOs and AOs.

There was significant difference between the JSCOs and JSSOs in awareness in watershed planning. But there was no significant difference in knowledge, attitude and training needs between the JSCOs and JSSOs.

There was significant difference between the JSSOs and AOs in the level of awareness, knowledge, attitude and training needs in watershed planning. Also there was significant difference in awareness, knowledge, attitude and training needs between the JSCOs and AOs with respect to watershed planning.

13. Constraints in watershed planning as perceived by the JSCOs, JSSOs and AOs.

JSCOs perceived non-availability of demonstration plots to see the benefits of watershed management as the most important constraint in watershed planning. Next in importance were anticipated protest from land owners to treat the watershed as a whole for development and inadequate training of the officers in watershed planning and management.

JSSOs perceived lack of awareness of the policy makers on the advantages of watershed planning and management as the most important constraint. Next important constraint was low participation of local institutions and voluntary agencies in watershed planning and management. The next important constraint was non availability of demonstration plots to the ^{see} benefits of watershed management.

AOs perceived inadequate training of the officers in watershed planning and management as the most important constraint. Next in rank was nonavailability of demonstration plots to see the benefits of watershed management followed by anticipated protest from the land owners to treat the watershed as a whole for development.

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REFERENCE

REFERENCES

- Ahamed, P. (1981) Effectiveness of the Training Programme for Farmers' Unpub. M.Sc(Ag.) Thesis, KAU, College of Agriculture, Vellayani.
- Allport, G.W. (1935) "A Hand Book of Social Psychology" Clark University Press, Worcester.
- Anantharaman, M. (1977) 'A study of Training needs of Small and Marginal Farmers' Un pub MSc (Ag) Thesis, TNAU, Coimbatore.
- Anastasi, A. (1979) "Fields of applied psychology" Mc. Graw Hill Book Company, New York:128 - 138.
- Arekoya, J.O. (1982) 'The diffusion and adoption of recommended agricultural practices among farmers in Northern State of Nigeria' Dissertation Abstract International A. 42 (12) : 499-510.
- Balakrishnan, N. (1987) 'Constraints Analysis of training and visit system in Kerala' Unpub. MSc (Ag) Thesis, Kerala Agricultural University, College of Agriculture, Vellayani.
- Basha, Javeed, M.W.Md, K. Radhakrishna Menon & K. Chandrakandan (1975) 'A study of the attitude of Deputy Agricultural Officers towards adaptive research programmes' The Madras. Agric. J 62 (10-12): 799 - 803.
- Bhatnagar, O.P. (1987) "Evaluation Methodology for training" Oxford and IBH publishing Co. New Delhi.
- Bhaskaran, K and Mahajan, B.S. (1968) 'Effectiveness of Extension methods in gaining knowledge about and acceptance of agrosan seed treatment to cotton' Ind. J. Extn. Edn. 4 : 28-33

- Central Soil & Water Conservation Training Institute (1978)
 'A Profile Note on Operational Project for land and water development in Siwaliks. Soil Conservation, Research Demonstration and Training Centre, Chandigarh.
- Chamber*
- Chandrasekaran, J. (1981) 'A study on the Training Needs of Small Tea Growers' Unpub MSc.(Ag) Thesis, TNAU, Coimbatore.
- Cherian, Betty, K. (1984) 'Awareness and Attitude of farmers Agricultural Extension Workers and Officials towards T & V system' Unpub. Msc (Ag) Thesis, KAU, College of Agriculture, Vellayani.
- Das, K.K. & D.R. Sarkar (1970) 'Economic Motivation and adoption of farming practices' Ind. J. Extn. Edn. 6(1&2): 103-107.
- Dhillon, G.S & T.C. Paul (1980) 'People's participation in watershed management-How essential and how to mobilize?' Seminar on strategy for mass mobilization and people's participation in the implementation of watershed management programme.' Central Board of Irrigation & Power, New Delhi, India, 35-55.
- Edwards, A.L. (1969) "Techniques of attitude scale construction" Appleton - Century Crofts, Inc., New York.
- * English, H.B & A.C. English (1958) "A Comprehensive Dictionary of psychological and psycho analytical terms" Logman Green and Company, New York.
- Ernest, R.S. (1970) 'A study on the time utilization of AEDs in coimbatore District' Unpub. MSc (Ag) Thesis, TNAU, Coimbatore.

- Gaikwad, V.R. (1971) 'Small farmers state policy and programme implementation' NIFCD, HYDERABAD.
- Ganesan, R. (1978) 'A study on the training needs of Gramasevaks with special reference to agriculture' Unpub MSc (Ag) Thesis, TRAU, Coimbatore.
- Ganesan, R., A.J. Knight & G. Perumal (1980) 'Subject matter training needs of Gramasevaks' Ind. J. Extn. Edn. 14(1 & 2):
- ← Ganguly, S.S. (1980) 'Watershed management a weapon to fight reservoir sedimentation' seminar on strategy for mass mobilization and people's participation in the implementation of watershed management programme. Central Board of Irrigation and power, New Delhi, India: 65-69.
- George, V.S. (1986) 'Watershed-Introduction' in Bibliography on Watershed Management. Library Documentation and Information Division, C.W.R.D.M. Calicut.
- Gill, L.S., A.S. Sandhu & R.K. Gupta (1977) 'some Co-ordination Problems in execution of Extension programmes at Block Level' Ind. J. Extn. Edn. 13 (182) 73-75.
- Gill, S.S. & A.S. Sandhu (1981) 'Training Needs of Prospective Poultry farmers of Punjab' Ind. J. Extn. Edn. 13 (1 & 2):
- Gosh, Hardhan & V.S. Reddy (1978) 'Attitude of farmers and agricultural extension workers towards intensive agricultural extension system in West Bengal' Research studies in Extension Education, Andhra Pradesh Agricultural University.
- Guilford, J.P. (1971) "Psychometric Methods" Tata Mc Graw Hill INC, New York.

- Gupta, M.P. (1982) 'Training needs of farmers Himachal Pradesh' Ind. J. Extn. Edn. 13 (3 & 4) : 45
- Jaiswal, N.K., N.V. Kolte & H.P.S. Arya (1978) 'Management of Agricultural Extension study of T & V system in Rajasthan & Madhya Pradesh' Behavioural science and Rural development Journal. (1 & 2) 75-105.
- Jaiswal, N.K., A.V. Yadappanavar & A.P. Purandare (1982) 'Planning & Management of watersheds under Drought Prone Area Programme' Journal of Rural Development 4 (6) NIRD, Hyderabad.
- Jayakumar, M. (1987) 'Training programme for field staff of State Bank of India on water management' Central Training Institute, KAU, Trichur.
- Jha, P.N & H.N Jani (1977) 'Inservice training of VLWS in the new strategy of needs hierarchy agricultural production' Ind. J. Extn. Edn. (1 & 2): 57-60.
- Joseph, Jose (1983) 'A study on the factors related to the communication effectiveness of village level extension personnel in Trivandrum District' Unpub. MSc (Ag) Thesis, College of Agriculture, Vellayani.
- Kalaichelvan, K. (1984) 'Farm Technology Transfer through Training and Visit System Unpub. MSc (Ag) Thesis, TNAU, Coimbatore.
- Kaleel, F.M.H. (1978) 'A study on the impact of IPD Programme in Kerala' Unpub. MSc (Ag) Thesis, KAU, College of Agriculture, Vellayani.
- Karthikeyan, A. (1986) 'Training needs of Agricultural labourers in the cultivation of cotton crop' Unpub. MSc (Ag) Thesis, TNAU, Coimbatore.

- * Katzell, R.A. (1964) 'Personal values, job satisfaction and job behaviour' In Man in a world at work. H. Borrow(ed) Boston Massachusetts Houghton Mifflin company.
- Khan, M.A. (1978) sociological analysis of the working of SFDA, Indian Institute of advanced study, Rashtrapathi Nivas, Simla.
- Khare, A. (1976) "Innovation success and creative thinking" Babulu books company, Bangalore.
- Kretch, D & R.S. Krutch field (1948) "Theory and Problems of social psychology," Tata Mc Grawhill Publishing Co. Ltd., New Delhi.
- Kulhari, B.S. (1981) 'A study of reorganised agricultural extension (T & V) system and its impact in chambal comman area development project in Rajasthan.' Unpub. Ph.D. Thesis, Division of Agricultural Extension, IARI, New Delhi.
- Kulkarni, S.B., K. Patil & K.B. Kror (1980) 'Role of afforestation in watershed management' Seminar on strategy for mass mobilization & people's participation in the implementation of watershed management programme, Central Board of Irrigation and Power, New Delhi, India.
- Lionberger, H.F. (1960) "Adoption of New Ideas and Practices" IOWA University Press, America.
- Lokhande, M.R. (1973) 'Social Psychological factors associated with farm Credit Behaviour of Delhi Farmers.' Unpub. Ph.D. Thesis, IARI, New Delhi.
- Makkar, S.L. & T.S., Sohal, (1974) 'Association of Certain personal characteristics of farmers with their attitude towards soil testing' Ind. J. Extn. Edn. 10 (3 & 4): 50-51.
- Mac Donald, A.M. OBE, BA (Oxon) [Ed.] [1972] "Chambers Twentieth Century Dictionary" Allied Publishers Private Ltd, New Delhi.

- Mani, K.C. (1974) 'Inservice Training needs of Deputy Agricultural Officers in Tamilnadu' Unpub. MSc (Ag) Thesis, TNAU, Coimbatore.
- Mary, J.C. & Nancy, E.K. (1986) '4-H. Volunteer Training who needs it? Implications for planning volunteer training.' J. Extn. Fall 1986;18-23.
- Mathiyazhagan, T. (1978) 'A study of Training needs of banana growers in Trichi District of Tamil Nadu.' Unpub. MSc (Ag) Thesis. IARI, New Delhi.
- Menon, K.R. & R. ⁿⁿAmamalai (1975) 'An Analysis of the Training needs of VLWS.' Madras Agric. J. 62 (10 - 12):812-819.
- Menon, Madhava. T. (1970) 'Exploitation by non-tribal neighbours' paper presented in the training programme for Taluk Welfare Officers on Harijan Development administration.
- * Muttayya, R.C. & Gnanakannan, S. (1973) "Developmental Personnel- A Psycho-Social study across three states in India." National Institute of Community Development, Hyderabad.
- Nachiappan, P.R., Murthy, Srinivasa, J. (1976) 'The impact of SFDA on the knowledge of the participant small farmers of Tamilnadu' Ind. J. Extn. Edn. 13 (3 & 4):64-68.
- Naik, Balram, (1981) 'Awareness and attitude of farmers and extension workers towards Intensive Agricultural Research System (T & V system) in Andhra Pradesh' Unpub. MSc (Ag) Thesis, Department of Extension Education, S.V. Agricultural College, Thirupathi.
- Nayak (1986) 'Watershed Development programme for rainfed agriculture' General guideliness. Government of Karnataka.

- New Comb, Theodore, M. (1950) "Social psychology". The Dryden press, New York:291-517.
- Pandey, S.N. & M.B. Singh (1976) 'Training needs of small farmers and ways to meet their ^{needs} Review of studies conducted at Labour, Paper presented at national seminar on New Agricultural technology and extension strategy for small & marginal farmers held at Punjab Agricultural University.
- Pandey, S.N. (1980) 'A study of communication under Training and Visit system of agricultural extension in the Chambal command area development project of Rajasthan.' Unpub. Ph.D. Thesis, Division of Agricultural Extension, IARI, New Delhi.
- Pandeyaraj, S. (1978) 'A study of the communication behaviour of Agricultural Extension Personnel' Unpub. M.Sc.(Ag.) Thesis, KAU, College of Agriculture, Vellayani.
- Patil, S.D. & Kale, N. (1972) 'Vocational Training needs of farmers with special reference to the contents and Types of training,' Ind. J. of Extn. Edn. 3 (3 & 4): 18-34.
- Patel, V.S. & T. Somasundaram (1974) ' A study of the impact of upgraded training course of gramasevaks in state of Madhya Pradesh 'Research studies in Extension Education, E.E.I., APAU, Hyderabad: 399 - 402.
- Phillip, Sunny (1984) 'Study on the Agricultural information support provided through radio to farmers by KAU' Unpub. M.Sc.(Ag.) Thesis, College of Agriculture, Vellayani.
- Pillai, Balakrishna, G. (1983) 'An analytical study of the integrated Soil Conservation Practices in Kerala.' Unpub. Ph.D. Thesis, TNAU, Coimbatore.

- Planning Commission (1983) 'Western Ghats Development Programme. Approach to the seventh five year plan 1985-90'. Planning Commission New Delhi.
- Planning Commission (1987) 'Organising agricultural planning on the basis of Agro-climatic regions.' Planning Commission (Agricultural Division) New Delhi.
- Purushottan, J. (1980) 'Implementation of watershed management programme principles & general issues involved. Seminar conducted on strategy for mass mobilization and people's participation in the implementation of watershed management programme. Central Board of Irrigation & Power New Delhi India.
- Rahiman, G.A. & A.G.G. Menon (1980) 'Gain in Knowledge and attitude towards training of supervisors of Primary Land Mortgage Banks.' Agri. Res. J. Kerala 18 (1).
- Rajababu, M. (1984) 'Evaluation of the training programme under T & V system in Kerala.' Unpub. M.Sc. (Ag) Thesis, KAU, College of Agriculture, Vellayani.
- Rajendran, P. (1978) 'A study on the Constraints in the adoption of Improved practices in the cultivation of Rice in Kerala.' Unpub. MSc (Ag.) Thesis, KAU, College of Agriculture, Vellayani.
- Ramsey, C.H., R.A. Polson & G.H. Spenser (1959) 'Values to adoption of Practices' Rural Sociology (24).
- Ranganathan, H.N. & K.N.R. Sastry (1988) 'Why do we need watershed management?' Yojana 32(3) 1988:18-20.
- Rao, V.K. & V.S. Reddy (1979) 'An evaluation study on the Impact of Agricultural Extension System' (T & V system) in Andhra Pradesh' Research Studies in Extension Education. Andhra Pradesh Agricultural University.

- Rao, R.V. (1980) 'Role of watershed management for the rural development in India' Seminar on strategy for mass mobilization and people's participation of the implementation of watershed management Programme Central Board of Irrigation and Power, New Delhi : 121-126.
- Rathore, G.S. (1974) 'Job satisfaction scale'. In Hand book of Psychological and social instruments. Pareek, U. & Rao, P.V. (Ed) Samasti, Barodi.
- Ray, G.L. (1975) 'Contact of Extension officers with different sources of Agricultural information in West Bengal' J. Extn. 11 (3 & 4):65 - 67.
- Reddy, Byra, H.N. (1976) 'An analysis of patterns and procedures in communication of farm information by VLWs and factors associated with their communication behaviour' Unpub. Ph.D. Thesis, IARI, New Delhi.
- Reddy, H.H.N. & K.M. Singh (1977) 'Analysis of communication patterns and procedures used by VLWs in Karnataka State' Ind. J. Extn. Edn. 13 (3 & 4) : 78 - 79
- Rogers, E.M. & Shoemaker, F.P. (1971) "Communication of Innovations, - A Cross cultural Approach" The Free Press, New York.
- Ross, Stagner, (1961) "Psychology of Personality" Mc Graw Hill Book Company New York.
- Russel, E.W. (1981) 'Role of watershed management for arable land use in the tropics' Papers presented at a conference organised by the International Institute of Tropical Agriculture, Ibadan, Nigeria.
- Sabapathi, K.K. (1988) 'Training needs in Agriculture of Inulas of Attapadi' Unpub. M.Sc.(Ag) Thesis, KAU, College of Agriculture, Vellayani.

- Sadamate, V.V. (1978) 'A study of Tribal Farming System and Technological Gaps' Unpub Ph.D. Thesis, IARI, New Delhi.
- Salunke, V.G. (1977) 'A critical analysis of the functioning of SFDA' Unpub. Ph.D. Thesis, IARI, New Delhi.
- Sandhu, A.S. and K.S. Bilang (1977) 'Training needs of Agricultural Extension Officers in Punjab' Ind. J. Extn. Edn. 13 (3 & 4): 73-75.
- Sandhu, A.S. & T.S. Sohan (1965) 'An Appraisal of the Knowledge of Block Extension Staff about Extension Programme Planning' Ind. J. Extn. Edn. (3): 149 - 159.
- Sangha, G.S. & N.B. Sandhu (1980) 'Competencies of the Agri. Extension Officers regarding selection and use of extension methods' Ind. J. Extn. Edn. 16 (32): 43-45.
- Sanoria, Y.C. (1977) 'Correlates of communication efficiency of Agricultural Extension Personnel' Ind. J. Extn. Edn. 13 (3 & 4): 28-34.
- Sanoria, Y.C. & K.N. Singh (1976) 'Communication patterns of Extension personnel. A system analysis.' Ind. J. Extn. Edn. 10 (12): 39 - 45.
- Sarkar, A.S. & V.S. Reddy, (1980). 'A study on the impact of Intensive Agricultural Extension System (T & V system) in West Bengal.' Research studies in Extension Education Andhra Pradesh Agricultural University.
- Sarkar, D.R. & Pattnaik (1967) 'Study of selected factors on the job satisfaction of VLW.' Ind. J. Extn. Edn. 2 (1 & 2): 49-54.
- Satterlund, D.R. (1972) "Wild land Watershed Management"
The Ronald Press Company, New York: 314-337.

- Satyamurayana, T. (1980) 'Consultancy Services for Watershed Management as a people's programme' Seminars on strategy for mass mobilization and people's participation in the implementation of watershed programme, Central Board of Irrigation and Power, New Delhi.
- Savarimuth, G.V. (1981) 'Training needs of Farm Women' Unpub. Msc. (Ag) Thesis, INAU Coimbatore.
- Sharma, G.P (1972) 'Comparative study of scale of likert and Guttman - H technique for measuring attitude of extension personnel' In Singha, P.R.R. (Ed.) Studies in Extension Education, NICD, Hyderabad.
- Sharma, S.C. & R. Hojjs (1980) 'Watershed Management and People's participation' Kurukshetra 29 (8): 7-12.
- Sharma, S.H. & Y.P. Singh (1970) 'A study on the selected factors affecting the training needs of A.M. Extension Officers in Punjab' Ind. J. Extn. Edn. 6 (1 & 2): 24-33
- Sharma, Gyanendra & Singh, Y. P. (1984) 'Assessing Training needs of development personnel' Kurukshetra 32 (7): 25-27.
- Sharma, Davinder & A.N. ^hSukla (1986) 'Training needs of AEOs of Punjab' Ind. J. Extn. Edn. 22 (3 & 4) : 80.
- Singh, A.P. (1967) 'Some issues in training Extension Personnel' Ind. J. Soc. Work. 10 (3): 317.
- Singh, A.P. (1970) 'An analysis of Training needs of AEDs working in IADP block of Bihar.' Unpub. Ph.D. Thesis, IARI, New Delhi.

- Singh, B.K. (1971) 'A study of low level of agricultural progressiveness of small farmers and their socio-economic behaviour' Unpub. Ph.D. Thesis, IARI New Delhi.
- Singh, A.P. & S.S. Gill (1982) 'Relationship of Training need fulfilment with personnel characteristics of the farmers' Ind. J. Extn. Edn. 21 (3 & 4): 87-94.
- Singh, R. & H. Mohammed (1979) 'A study of the training needs of Extension workers belonging to Northern Iraq' Rural Extension Education and Training Abstract (1981) 4 (1):
- Singh, B.N. & A.P. Singh (1966) 'Inservice Training needs of AEDs' Ind. J. Extn. Edn. 2 (1 & 2): 17-21
- Singh, S.N. & E. N. Singh (1968) 'A multivariate analysis of adoption behaviour of farmers' Ind. J. Extn. Edn. 6 (3 & 4) : 39-44.
- Sinha, P.R. & S.S. Gill (1967) 'Training needs of village level workers with special reference to Agricultural Subjects' Ind. J. Extn. Edn. 3 (1 & 2): 82 - 90.
- Sinha, P.R.R., Kolte, H.V. and Arya H.P.S. (1976) 'Communication in Development Administration' National Institute of Community Development, Hyderabad.
- Sinha, P.R.R. & P.R.A. Sinha (1983) 'A study of the attitude of farmers of Chhotanagpur towards Soil Conservation Programme' Ind. J. Extn. Edn. 20 (3 & 4): 9-17.
- Schal, J.S. & Yanakai, D. (1970) 'Training programmes for young farmers' Kurukshetra 18 (5) : 6 - 8.
- Somasundaram (1983) 'Role perception of the Agricultural Officers in the past and present agricultural extension system' Unpublished MSc.(Ag) Thesis, INAU, Coimbatore.

- Sreekumar, C.P. & G.S. Pillai (1988) 'Project for organising soil and water conservation extension service in Kerala' Soil and Water Conservation Extension Service Kerala.
- Srivastava, K.N. (1987) 'Watershed - An ecological and management unit and ICRISAT Deep Vertisol technology' ICRISAT, Hyderabad.
- Subalakshmi, N. & Singh, R.P. (1974) 'Job satisfaction of Gramasevikas' Kurukshetra 22 (11): 12.
- Sunderam, K.V. (1985) 'Next phase in Planning for Western Ghats Development' Multi-level Planning Division, Planning Commission, New Delhi.
- Sundararajan, L. (1970) 'A study of certain aspects of inservice training programmes of ASUs in Coimbatore region-Tamilnadu' Unpublished M.Sc.(Ag) Thesis, TNAU, Coimbatore.
- Sundareswamy, S. & K.N. Duraiswamy (1971) 'Characteristics of farmers in relation to adoption of recommended practices of Lyoid sorghum' Madras Agric. J. 62 (10 & 12): 721-725.
- Supe, S.V. & Salode, M.S. (1975) 'Impact of National demonstration on knowledge and adoption level of farmer participants' Indian Journal Ext. Edn. 2 (1 & 2): 36 - 38.
- Surendran, K. (1982) 'Impact of Operational Research Projects, KAU in Agricultural Projection' Unpublished MSc.(Ag) Thesis, KAU College of Agriculture, Vellayani.
- Tejwanji, K.U. (1971) 'Watershed management as a basis for land development and management in India' Papers presented at a Conference organised by the International Institute of Tropical Agriculture, Ibadan, Nigeria.

- * Thurstone, L.L. (1946) 'Comment' Americ Jour of Sociology
52: 39-50.
- Thurstone, L.D. & E.J. Chave (1929) "The Management of attitude," Chicago University, Chicago Press.
- * ^{Thesis (unpub) IARI, New Delhi}
Trivedi, G (1963) 'Measurement analysis of Socio economic status of rural families' Ph.D.
Ullah Wasi, S.K. Gupta & S.S. Lal (1972) "Hydrological measurement for watershed Research" Jugal Kishore & Co. Dehradun, India:248-254.
- Varadan, K.V. (1987) 'Conservation Agronomy and Integrated Watershed Management' Training on water management for field staff of SBT, KAU, Trichur.
- Venkataramaih, P. (1983) 'Development of a socio-economic scale of a farm facilities in North Karnataka' Unpublished Ph.D. Thesis, College of Agriculture Dharvar.
- Verma, T. & S. Verma (1985) 'Training needs of Rural Women An Action Research' Ind. J. Extn. Edn. 21 (3 & 4): 104-107.
- Vijaya, K. (1982) 'An evaluation study on the impact of Intensive Agricultural Extension System (T & V) system in Thungabhadra Command area in Anantpur district of Andhra Pradesh'. Unpublished Msc.(Ag) Thesis, S.V. Agricultural College, Tirupathy.
- Viju, A. (1985) 'Adoption behaviour of Tribal farmers towards Improved Agricultural practices' Unpub. M.Sc.(Ag) Thesis, KAU, College of Agriculture, Vellayani.
- Viswanathan, H.P. (1982) 'Vegetation and Watershed Management in Thungabhadra Catchment'. Proceedings of the Seminars on watershed management in Tungabhadra river valley an appraisal. Thungabhadra Board, Thungabhadra dam, 583 225.

Williams, T.S.S. (1971) 'Training of Agricultural Extension Officers in Nigeria' Ind. J. Extn. Edn. 7 (1 & 2):42-49.

Wolman, B.S. (1973) 'Dictionary of Behaviour^{al} Science' Van Nostrand Reinhold Company, New York: 38.

Wright, (1974) 'The Method of Path Coefficients,' Ann Math Stat 5: 161-215.

* Originals not seen

APPENDICES

APPENDIX I

AGRO-CLIMATIC DISTRIBUTION OF THE DISTRICTS OF KERALA

Zone No.	Agro-climatic zone	Sl. No.	District
1.	North Zone	1	Kasargode ^a
		2	Channore ^a
		3	Wynad
		4	Calicut
		5	Malappuram
2.	High altitude Zone	1	Wynad
		2	Palghat
		3	Ernakulam
		4	Idukki
3.	Central Zone	1	Malappuram
		2	Palghat
		3	Ernakulam
		4	Idukki
4.	South Zone	1	Idukki
		2	Kottayam
		3	Alleppey
		4	Quilon
		5	Trivandrum
		6	Pattanamthitta
5.	Problem Zone	1	Alleppey
		2	Ernakulam
		3	Trichur

APPENDIX II

ITEMS COLLECTED FOR THE KNOWLEDGE TEST WITH THE DIFFICULTY AND DISCRIMINATION INDICES

Sl. No.	Item	Difficulty index	Discrimination index
1.	Watershed is an area from which water drain to a common out let	0.633	0.1
2.	Watershed is bounded by Panchayat boundaries	0.5*	0.3
3.	Watershed planning is for irrigation activities	0.565	0.1
4.	The smallest subdivision of a watershed is the mini watershed	0.167	0.1
5.	The operational size of a microwatershed is 10,000 ha	0.23*	0.3
6.	Kerala state can be divided into 960 micro watersheds	0.033	0.1
7.	In Karnataka, watershed development programme for rainfed agriculture was started as a project during 1980.	0.133	0.2
8.	The use of topo sheet in watershed planning is to identify the watersheds	0.2	0.2
9.	The use of code number for each category of watershed is for identification of the mini watersheds	0.3*	0.5
10.	The objective of contour survey is to gather useful information about soils and land.	0.433 ^{ab}	0.3
11.	Aerial photographs are used for identifying the climatic parameters affecting watershed planning	0.167	0.1

Sl. No	Items	Difficulty index	Discrimination index
12.	Soil survey activities are conducted in the selected watershed to prepare the resource inventory	0.133	0.2
13.	One important map to be prepared other than the location map while formulating the watershed project is the drainage map	0.2	0
14.	The important details you can gather from the contour map are different vertical intervals to be followed for contour bunding	0.367*	0.3
15.	The objective of preparing the resource inventory of a watershed is to prepare the watershed plan.	0	0
16.	The method to be adopted for preparing the resource inventory is the detailed bench mark survey.	0.267*	0.4
17.	The use of land capability classification is to study the slope of ranges only.	0.3*	0.5
18.	To prevent soil erosion in very steep slopes the recommended mechanical measure is to construct contour bunding.	0.433*	0.5
19.	For preventing soil erosion through gullies, contour bunds are constructed	0.23*	0.3
20.	A grass species found to be most suited for planting on contours to prevent soil and water loss is <u>Cynodon dactylon</u> .	0.433*	0.5
21.	Stone pitched contour bunds are also called bench terraces	0.267*	0.4
22.	Contour is an imaginary line joining points of same altitude	0.6	0.2

Sl. NO.	Items	Difficulty index	Discrimination index
23.	Soil erosion causes sedimentation in reservoirs and streams	0.6	0
24.	Loamy soils are less erodable than sandy soils	0.133	0
25.	Denudation of forests will decrease the hazards of soil erosion	0.63	0.1
26.	Annual stream flow is mainly dependent on the land area.	0.567	0.1
27.	Infiltration index can be worked out by using the formula total precipitation-annual stream flow	0	0
28.	Evapo-transpiration of watersheds can be calculated using the open pan evaporimeter	0	0
29.	One climatological parameter to be considered in watershed planning is the intensity of rainfall	0.5*	0.3
30.	It is necessary to collect data on socio-economic aspects of land owners in the watershed for watershed planning	0.433*	0.5
31.	It is not necessary to study the scope of new cropping patterns for the watershed	0.6	0.2
32.	Cultivation of topioca on hill slopes will decrease erosion hazards	0.433	0.5
33.	It is not wise to cover the top of bunds with grass	0.6	0.2
34.	One grass species you can use for planting on the top of bunds is congo-signal	0.467*	0.6

Sl.No.	Items	Difficulty index	Discrimination index
35.	The water harvesting structures constructed on appropriate locations of the watershed will lower the ground water level	0.4*	0.4
36.	Acacia is a suitable farm forestry species	0.133	0.2
37.	A Horticultural species used for reclamation of waste lands is Cashew	0.533*	0.4
38.	The system of irrigation suitable for drought prone areas is drip irrigation	0.167	0.1
39.	For minimising the havoc of floods and droughts in the state, watershed planning has to be substituted by Panchayat level planning	0.533*	0.6 ..
40.	The best extension approach for effective watershed development is individual contact only	0.3*	0.5

* Selected statements for the exam

APPENDIX III

ITEMS COLLECTED FOR THE ATTITUDE SCALE WITH SCALE AND Q VALUES

Sl.No	Statements	Scale value	Q Value
1.	I have no doubt that watershed planning is essential for our State.	6.804*	1.94
2.	Watershed planning is a must for fighting the havocs of droughts and floods	6.357*	1.874
3.	Watershed planning is not worth spending lot of time and energy	2.17*	1.39
4.	The use of watershed planning is not a fool-proof measure for mobilisation of resources	2.5	2.629
5.	Watershed is useful only for soil conservation	2.59	3.9
6.	For improving the agriculture and allied sectors, watershed planning is most useful	5.9*	1.53
7.	Watershed planning has long term positive impact on improving socio-economic aspects.	5.61*	1.947
8.	Watershed planning is useful only for dry farming areas	2.7*	2.29
9.	If the existing Panchayat level re-organization for Agriculture is continuing, there is no need for watershed planning	2.07	1.381
10.	In the long run, watershed planning may not be practical	2.132*	1.225
11.	Water harvesting structures in the watershed plans are only theoretical	2.423	2.846
12.	Watershed planning is an exercise in futility	2.6*	2.1
13.	Watershed planning is useful only for developed countries	2.3*	1.57

Sl. No.	Statements	Scale value	Q Value
14.	The basic units for planning must be the mini watersheds	4.63	1.37
15.	A totality development of the area is possible only by adopting watershed development plans	5.667	2.08
16.	Watershed planning is the most important item in agriculture	3.0	1.945
17.	For increasing production from our lands, it is to be treated on watershed basis	5.423*	1.489
18.	Watershed development project started in Karnataka state was a failure	3.0	1.945
19.	No co-ordination of developmental efforts will be possible through watershed planning.	2.05*	1.28
20.	Watershed planning will serve the farm community as a whole	6.38*	1.724.

* Selected statements

APPENDIX IV

AWARENESS AND TRAINING NEEDS OF THE OFFICERS OF THE DEPARTMENT OF AGRICULTURE IN WATERSHED PLANNING-INTERVIEW SCHEDULE.

District	1	Respondent
Name of		Number:
<u>Krishna Bhavan/</u>	<u>Soil Conservation Office/</u>	<u>Soil Survey Office</u>

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1. Name of the respondent :
2. Designation :
3. Age (completed number of years) :
4. Educational status :

Sl. No. Level of Education:

- (i) K.G.T.S. Diploma
- (ii) Diploma in Engineering
- (iii) Degree in Agriculture
- (iv) M.Sc.(Ag) in subjects other than Agronomy
- (v) M.Sc.(Ag) in Agronomy
- (vi) Ph.D. in Agriculture.

5. Experience in the department of Agriculture/Soil Conservant Unit (No. of completed years of service)

6. a. Have you undergone any training in Agriculture? If yes,

b. Training undergone in Agriculture (If it is in water shed Planning, please specify)

Sl. No.	Type of training undergone	No. of trainings undergone
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- (i) Pre-service training
- (ii) In-service training
 - a) subject matter training
 - b) Management training
 - c) Extension training

7. Information seeking behaviour

Indicate how frequently you are seeking information regarding any aspect of water shed planning from the following sources:

Sl. No.	Information Sources	Regularity (4)	Most often (3)	Once in a while (2)	in a Sel- dom (1)
1.	Radio broadcast				
2.	Newspaper reports				
3.	Text books				
4.	T.V. Programmes				
5.	Agricultural & Scientific journals				
6.	Farm magazines				
7.	Agricultural Seminars				
8.	Agricultural Workshops				
9.	Agricultural trainings/ Soil Conversation trainings				
10.	Agricultural Exhibitions				
11.	Discussions with Superiors Officers				
12.	Circular letters from Superior officers				
13.	Personnel of research stations				
14.	Discussion with colleagues				
15.	Any other (Specify)				
	1.				
	2.				

8. Job Satisfaction

Below are given a few questions regarding your job.

Please answer to questions as how much you are satisfied or dissatisfied with you job.

Sl.No.	Items	Very much satisfied (4)	Satisfied (3)	Un-decided (2)	Dissatisfied (1)	Very much dissatisfied (0)
1.	Are you satisfied that you are given enough authority to do your job?					
2.	Are you satisfied with the progress you are making towards the goals which you had set for yourself in your present position					
3.	How satisfied are you with your present position when you compare it with similar positions elsewhere ?					
4.	Are you satisfied that the people in the area give you proper recognition to your work as a specialist in your subject ?					
5.	How satisfied are you with your supervisors?					
6.	How satisfied are you with your salary ?					
7.	How satisfied are you with your professional and clerical staff in your department or in your department or in your area ?					
8.	How satisfied are you with your present position in the light of your career expectations?					
9.	How satisfied are you with your present position when you consider expectations at the time you took the position?					
10.	How satisfied are you with the assessment of time and energy you are devoting to your present position and the satisfaction you derive from your position?					

9. Self Confidence

Sl.No.	Items	Always (4)	Most often (3)	Often (2)	Rarely (1)	Never (0)
1.	I feel no obstacle can stop me from achieving my final goals					
2.	I am generally confident of my own ability					
3.	I am bothered by the feeling that I cannot complete with others					
4.	I am not interested to do things at my own initiative					
5.	I usually work out things for myself rather than get some one to show me					
6.	I get discouraged easily					
7.	Life is a strain for me much of the time.					
8.	I find myself worrying about something or other					

10. Awareness of the Officer on watershed Planning

Sl. No.	Items	Yes	No
1.	Are you aware that watershed planning is not only for soil conservation aspects, but for totality development of the area ?		
2.	Have you heard about the advantages of watershed planning over the Panchayat level planning?		
3.	Have you heard about the classification of different watersheds ?		
4.	Are you aware of the use of aerial photographs in watershed identification ?		
5.	Are you aware of the water management principles in a Mini water shed?		
6.	Have you heard about the low cost technology in water shed management ?		
7.	Are you aware of the need of soil survey report in preparing a watershed plan ?		

Sl.No.	Items	Yes	No
8.	Are you aware of the recommended cropping patterns on different slope ranges of watershed?		
9.	Are you aware of the importance of resource inventory collection while preparing a plan for watershed development ?		
10.	Are you aware of the procedure of contour survey and preparation of contour maps for a watershed plan ?		
11.	Are you aware of the different maps to be attached with a watershed Plan ?		
12.	Have you heard about the group management approach in watershed Management ?		

11. Knowledge level of the Officers on Watershed Planning.
Use a tick mark (✓) against each statement in the concerned column.

Say True or False

Sl. No.	Items	True	False
1.	Watershed is bounded by Panchayat boundaries		
2.	The operational size of a microwatershed is 10000 ha.		
3.	The use of code number for each category of watershed is for identification of the Mini watersheds.		
4.	The objective of contour survey is to gather useful information about soils and land.		
5.	The important details you can gather from the contour map are different vertical intervals to be followed for contour bunding.		
6.	The method to be adopted for preparing the resource inventory is the detailed bench mark survey.		
7.	The use of land capability classification is to study the slope of ranges only.		

Sl.No	Items	True	False
8.	To prevent soil erosion in very steep slopes, the recommended mechanical measure is to construct contour bunding.		
9.	For preventing soil erosion through gullies contour bunds are constructed.		
10.	A grass species found to be most suited for planting on contours to prevent soil and water loss is <u>Cynodon dactylon</u> .		
11.	Stone pitched contour bunds are also called bench terraces.		
12.	One climatological parameter to be considered in watershed planning is the intensity of rainfall.		
13.	It is necessary to collect data on socioeconomic aspects of land owners in the watershed for watershed planning.		
14.	Cultivation of tapioca on hill slopes will decrease erosion hazards.		
15.	One grass species you can use for planting on the top of bunds is congo-signal.		
16.	The water harvesting structures constructed on appropriate locations of the watershed will lower the ground water level.		
17.	A Horticultural species used for reclamation of waste lands is cashew.		
18.	For minimising the havocs of floods and droughts in the State, watershed planning has to be substituted by Panchayat level planning.		
19.	The best extension approach for effective watershed development is individual contact only.		

12. Attitude of the Officers towards Watershed Planning:

Following are some statements indicating the attitude towards watershed Planning. Please tick (✓) in the appropriate column to indicate your favourableness or unfavourableness towards the statement.

Sl. No.	Statement	Strong-ly agree (4)	Agree (3)	Unde-cided (2)	Dis-afree (1)	Strong-ly dis-agree (0)
1.	I have no doubt that watershed planning is essential for our state					
2.	Watershed Planning is a must for fighting the havocs of floods and droughts.					
3.	Watershed Planning is useful only for dry farming areas					
4.	Watershed Planning has long term impact on improving the Socio-economic aspects.					
5.	Watershed planning is an exercise in futility					
6.	In the long run, watershed planning may not be practical					
7.	Watershed planning will serve the farm community as a whole					
8.	No co-ordination of development efforts will be possible through watershed planning.					

Sl.No.	Statement	Strongly agree (4)	Un- Agree de- cided (3)	Dis- agree (2)	Strong- ly dis- agree (1)
8.	No co-ordination of development efforts will be possible through watershed planning.				
9.	For improving agriculture and allied sectors watershed planning is most useful				
10.	Watershed planning is not worth spending lot of time and energy				
11.	Watershed planning is useful only for developed countries				
12.	For increasing production from our land it is to be treated on watershed basis				

13. Training needs of the Officers in Watershed Planning

a. Method of Training

Please indicate your choice for the following training methods to be followed in watershed planning

Sl.No	Method of Training	Most preferred (3)	Pre- Somewhat preferred (2)	Least preferred (1)
1.	Lectures	(3)	(2)	(1)
2.	Group discussion			
3.	Lecture with field visits			
4.	Exhibitions			
5.	Field trips			

Sl. No.	Method of Training	Most Preferred	Somewhat Preferred	Least Preferred
6.	Study tour	(3)	(2)	(1)
7.	Campaigns			
8.	Film shows			
9.	Video Cassettes			
10.	Demonstrations			
11.	Others (specify)			

b. Duration of training you prefer

Sl. No.	Duration	Most Preferred	Somewhat Preferred	Least Preferred
1.	One day	(3)	(2)	(1)
2.	Two days			
3.	Five days			
4.	One week			
5.	Two weeks			
6.	One month			
7.	More than one month			

c. Venues of training

Please indicate your choice for following venues for your training.

Sl. No.	Venue	Most Preferred	Somewhat Preferred	Least Preferred
1.	College of Agriculture, Vellayani	(3)	(2)	(1)
2.	Central Training Institute, Mannutti			
3.	CWRDM, Kozhikode			
4.	IMG, Trivandrum			

Sl. No.	Venue	Most Preferred	Somewhat preferred	Least Preferred
		(3)	(2)	(1)
5.	Regional Training Institute, Mannutti.			
6.	RTC of other States			
7.	Soil Conservation Research & Training Centre, Konni			
8.	ICAR Stations			
9.	Others (Specify)			

d. Frequency of Training

Please indicate the frequency training that you desire.

Sl. No	Frequency	Most Preferred	Somewhat Preferred	Least Preferred
		(5)	(2)	(1)
1.	Once in a year			
2.	Once in two years			
3.	Once in three years			
4.	Once in four years			
5.	Once in five years			
6.	Once in ten years			
7.	Once in a life time			

e) Training needs of the Officers in Watershed Planning.

Please indicate the perception of your training need in the following subjects matter areas listed below relating to the watershed planning & Management

Sl. No.	Major areas	Knowledge Training needs			Skill	
		Much need- ed	Some- what need- ed	Not Much Need. ed	Some- what need- ed	Not at Need- ed
		(3)	(2)	(1)	(3)	(2)
					(2)	(1)

1. Concept of watershed planning
2. Concept of watershed management
3. Characteristic features of a watershed; classification of watersheds
4. Identification, delineation and codification of micro & mini watersheds
5. Preparation of resource inventory/Basic data collection from the watershed
6. Areal Photography & remote sensing. Its use in watershed planning.

Sl. No.	Major areas	Training needs					
		Knowledge			Skill		
		Much need- ed (3)	Some what need- ed (2)	Not need- ed (1)	Much need- ed (5)	S.W. need- ded (2)	Not need- ed (1)
7.	Principles and practices in Watershed Planning						
8.	Soil survey activities and use of soil survey report for watershed planning						
9.	Soil and Moisture conservation practices in watersheds						
10.	Low cost technologies in soil and water conservation						
11.	Development of water resources surface & ground water management						
12.	Water harvesting structures-design and location of check dams and other experimental structures.						
13.	Hydrology of Watersheds						
14.	Climatic parameters in watershed planning						
15.	Nutrient management in Watersheds						
16.	Crop planning and cropping systems in watershed						
17.	Rainfed farming and water use efficiency						
18.	Homestead farming in Watersheds						
19.	Lift irrigation, Drip irrigation and selection of pump sets for irrigation						
20.	Exploiting underground water-techniques.						
21.	Drainage in Watersheds						

Sl. No.	Areas	Training needs				
		Knowledge			Skill	
		Much need- ed (3)	Some what need- ed (2)	Not need- ed (1)	Must need- ed (3)	Some what need- ed (2)
22.	Fodder crops and their Management in Watersheds					
23.	Livestock development aspects in Watersheds					
24.	social Forestry aspects in Watersheds					
25.	Fisheries development aspects in Watersheds					
26.	Socio-economic aspects in Watershed Planning					
27.	Group Management in Watershed Planning					
28.	Monitoring and evaluation of watershed development programmes					
29.	Practices in identification of Mini/Micro watersheds, preparation of Plan for Watershed Management (Project formulation.)					

14. Constraints in Watershed Planning.

Please indicate your perception of the constraints in watershed planning listed below.

Sl. No.	Constraints in Watershed Planning	Most Important	Important	Less Important
		(3)	(2)	(1)
1.	Lack of our understanding of the concept of watershed planning			
2.	Non availability of model watershed plans for reference			
3.	Non availability of demonstration plots to see the benefits of watershed management			
4.	Lack of awareness of the superior officers in watershed planning and management			
5.	Unawareness of the land owners about the long-term benefits from watershed management.			
6.	Anticipated protest from land owners to treat the watershed as a whole for development.			
7.	Inadequate linkage from various development departments responsible for watershed management.			

Sl. No.	Constraints in Watershed Planning	Most Important (3)	Important (2)	Less Important (1)
8.	Inadequate training of Officers in watershed planning and Management			
9.	Want of experienced persons to educate the Officers in Watershed Planning and Management			
10.	False notion of Officers that contour bunding is the only watershed management practice.			
11.	Low participation of local institutions and voluntary agencies in watershed planning & management.			
12.	Lack of awareness of the Policy makers on the advantages of Watershed Planning & Management			
13.	Non-availability of any manual/literature on watershed planning			
14.	Negative attitude of field staff towards watershed Planning & Management			
15.	Inadequate research support on watershed Planning & Management			
16.	Others			

**AWARENESS AND TRAINING NEEDS OF OFFICERS OF
THE DEPARTMENT OF
AGRICULTURE IN WATERSHED PLANNING**

BY
SHEELA L. B.Sc.(Ag.)

Abstract of the Thesis
Submitted in partial fulfilment of the requirement
for the Degree
MASTER OF SCIENCE IN AGRICULTURE
Faculty of Agriculture
Kerala Agricultural University

DEPARTMENT OF AGRICULTURAL EXTENSION
COLLEGE OF AGRICULTURE
VELLAYANI, TRIVANDRUM

1989

ABSTRACT

A study was undertaken to assess the awareness and

training needs of officers of the department of Agriculture in
watershed planning.

The study was conducted in five districts of Kerala.

The respondents were the Junior Soil Conservation Officers

(JSCOs), Junior Soil Survey Officers (JSSOs) of the Soil

Conservation Unit and Agricultural Officers (AOs) of the

Department of Agriculture. Total sample size was 100 of which

21 were JSCOs, 19 were JSSOs and 60 were AOs. A knowledge test

and attitude scale were constructed for the study. Data were

collected with the help of a well constructed interview schedule

which was pretested. The data thus collected were subjected

to derive the results.

The study revealed that more than 47 per cent of the

JSCOs possessed high level of awareness in watershed planning.

Majority of the respondents among the JSSOs and AOs possessed

only low level of awareness in watershed planning.

Majority of the JSCOs had high level of knowledge in

watershed planning. Only 21 per cent of the JSSOs had high

level of knowledge in watershed planning. Same was the case

with AOs. Only 33 per cent of AOs possessed high level of

knowledge in watershed planning.

Only 33 per cent of the JSCOs were having a high

attitude score regarding watershed planning. About 22 percent

of the JSSOs were in the high attitude group and the same number of respondents were in the low attitude group. Majority of the AOs were having low attitude score regarding watershed planning.

Educational status, information seeking behaviour, training undergone and self confidence were positively and significantly related to the knowledge of the officials in watershed planning. Age and experience was found to have negative and significant relationship with the knowledge of the JSCOs only.

Educational status, information seeking behaviour, training undergone and self confidence were found to have positive and significant relationship with the attitude of the officers towards watershed planning. Age was found to have negative and significant relationship with the attitude of the JSCOs and JSSOs towards watershed planning. Experience was found to have negative and significant relationship with the attitude of the JSCOs towards watershed planning.

Self confidence had the highest direct effect on knowledge of the JSCOs in watershed planning and age had the highest indirect effect. Information seeking behaviour had the highest direct effect on knowledge of the JSSOs and training undergone had the highest indirect effect. Self confidence had the highest direct effect on knowledge of the AOs in watershed planning and information seeking behaviour had the highest indirect effect.

Information seeking behaviour had the highest direct effect on the attitude of the JSCOs towards watershed planning. Highest indirect effect was that of age. Self confidence had the highest direct effect on the attitude of the JSSOs towards watershed planning and educational status had the highest indirect effect. Self confidence had the highest direct effect and information seeking behaviour had the highest indirect effect on the attitude of the AOs towards watershed planning.

Variables experience, information seeking behaviour and job satisfaction had significant contribution to the knowledge of the JSCOs in watershed planning. Independently, only information seeking behaviour had significant contribution towards knowledge of JSSOs. Training undergone and self confidence had significant contribution to the knowledge of the AOs in watershed planning.

None of the independent variables had significant contribution to the attitude of the JSCOs and JSSOs towards watershed planning. Only self confidence had significant contribution to the attitude of AOs towards watershed planning.

Majority of the JSCOs perceived training need in watershed planning. A considerable number of JSSOs also perceived high training needs in watershed planning. But majority of the AOs perceived only a low training need in watershed planning.

No significant difference in knowledge, attitude and training needs was observed between the JSCOs, but for awareness there was significant difference between these two groups. There was significant difference in awareness, knowledge attitude and training needs between the JSSOs and AOs and also between the JSCOs and AOs.

Non-availability of demonstration plots for seeing the benefits of watershed management was the most important constraint in watershed planning as perceived by the JSCOs. But according to the JSSOs lack of awareness of the policy makers on the advantages of watershed planning and management was the most important constraint, whereas the AOs perceived inadequate training of the officers in watershed planning and management as the most important constraint.

FINAL REPORT OF THE STUDY

1. Name of the Research Centre : Department of Agricultural Extension,
College of Agriculture,
Vellayani.
2. Project number and Title : AWARENESS AND TRAINING NEEDS OF
OFFICERS OF THE DEPARTMENT OF
AGRICULTURE IN WATERSHED PLANNING
3. Objectives of the project :
 1. To ascertain the awareness of the Junior Soil Conservation Officers (JSCOs), Junior Survey Officers (JSOs) and Agricultural Officers (AOs) in Watershed Planning.
 2. To determine the knowledge of the JSCOs, JSOs and AOs about Watershed Planning.
 3. To measure the attitude of the officers towards watershed planning.
 4. To study the relationship between selected characteristics of the officers and their knowledge about and attitude towards watershed planning.
 5. To assess the training needs of the officers in watershed planning.
 6. To study the constraints in watershed planning as perceived by the officers.
4. Name of the project leader and : Sheela L.,
associated 86-11-31
Department of Agricultural Extension

Dr.G.Balakrishna Pillai,
Associate Professor,
Department of Agricultural Extension
Chairman, Advisory Committee.
5. Date of starting : 22-6-1987
6. Date of completion : 15-4-1989

7. Technical Programme:

Kerala is a state, where there is abundance of natural resources. The problem is that we are not able to make economic and effective use of it. By adopting watershed as the basic unit of planning and development, we can make a balanced use of the natural resources. For this the change agents should have a clear idea of the concept & technology of watershed planning and development. Hence a study was made, to assess the awareness and training needs of these change agents in watershed planning. The change agents were in three categories - JSCOs, JSSOs and AOs. For the study, stratified two stage random sampling was used. One district each from five agroclimatic zones of Kerala was selected and from ~~it~~ each selected district, the entire number of JSCOs and JSSOs were included in the sample for study. Sample of AOs was selected proportionate to the total number of AOs in each district by random sampling. Altogether the sample consisted of 21 JSCOs, 19 JSSOs and 60 AOs making the total sample size 100.

The variables were measured as follows:-

Age was measured as the number of completed years at the time of interview. Educational status was measured using the schedule developed for the study. Experience in the department was measured as the number of actual years of completed service in the department of Agriculture/Soil Conservation unit. Training undergone in agriculture was measured using the schedule developed for the study. Information seeking behaviour was measured using the procedure followed by Joseph^e (1983) with slight modifications in the scoring procedure. Job satisfaction was measured using the procedure ~~developed~~ used by Joseph^e (1983). Self confidence was measured using the procedure developed by Pandeyaraj (1978) with slight modifications in the scoring procedure. Awareness was measured using the schedule developed for the study. Knowledge was measured using the knowledge test developed for the study. ~~Training~~ Attitude was measured using the scale developed for the study. Training need was measured using the procedure developed for the study.

Constraints in watershed planning was measured using the procedure developed for the study.

Data were collected using pre-tested interview schedule developed for the study.

Percentage analysis, correlation analysis, path analysis multiple regression and T-test were the statistical techniques used for the study.

8. Deviation from the original study : Nil

9. Results

1. The JSCOs had a higher awareness in watershed planning than the JSSOs and AOs.
2. The JSCOs were having a higher knowledge in watershed planning compared to the JSSOs & AOs. JSSOs had higher knowledge in this aspect than the AOs.
3. The JSCOs had a more favourable attitude towards watershed planning than the JSSOs & AOs. AOs were having a less favourable attitude than the AOs, JSSOs.
4. Age and experience of the JSCOs had negative and significant relationship with their knowledge in watershed planning. Educational status, training undergone in agriculture, information seeking behaviour and self confidence were having positive and significant relationship with knowledge in watershed planning of the JSCOs and also in the case of JSSOs and AOs.
5. In the case of JSCOs and also in the case of JSSOs, age was having negative and significant relationship with the attitude towards watershed planning. Experience was found to have negative and significant relationship with the attitude towards watershed planning of the JSCOs only. Educational status, training undergone, information seeking behaviour and self confidence had significant and positive relationship with the attitude of the JSCOs, JSSOs and AOs towards watershed planning.

6. Self confidence had the highest direct effect on the knowledge of the JSCOs and AOs in watershed planning. In the case of JSCOs highest indirect effect was due to age. In the case of AOs the highest indirect effect was due to information seeking behaviour. In the case of JSSOs information seeking behaviour had the highest direct effect on the knowledge in watershed planning and training undergone had the highest indirect effect.
7. Information seeking behaviour had the highest direct effect on the attitude of the JSCOs towards watershed planning. Highest indirect effect was that of age. Self confidence had the highest direct effect in the case of JSSOs and educational status had the highest indirect effect on the attitude towards watershed planning. In the case of AOs self confidence had the highest direct effect and information seeking behaviour had the highest indirect effect on the attitude towards watershed planning.
8. Variables experience, information seeking behaviour and job satisfaction had significant contribution to the knowledge of the JSCOs in watershed planning. Independently, only information seeking behaviour had significant contribution towards knowledge of JSSOs. Training undergone and self confidence had significant contribution to the knowledge of the AOs in watershed planning.
9. None of the independent variables had significant contribution to the attitude of the JSCOs and JSSOs towards watershed planning. Only self confidence had significant contribution to the attitude of the AOs towards watershed planning.
10. Majority of the JSCOs perceived training need in watershed planning. A considerable number of JSCOs also perceived high training needs in watershed planning. But majority of the AOs perceived only a low training need in watershed planning.
11. No significant difference in knowledge, attitude and training needs was observed between the JSCOs and JSSOs, but for awareness there was significant difference between these two groups. There was significant difference in awareness, knowledge, attitude and training needs between the JSSOs and AOs and also between the JSCOs and AOs.

12. Non-availability of demonstration plots for seeing the benefits of watershed management was the most important constraint in watershed planning as perceived by the JSCOs. But according to the JSSOs lack of awareness of the policy makers or the advantages of watershed planning and management was the most important constraint whereas the AOs perceived inadequate training of the officers in watershed planning and management as the most important constraint.

10. Summary

A study was conducted in Kerala to assess the awareness and training needs of the officers of the Department of Agriculture in watershed planning.

1. The study revealed that the JSCOs were having a better awareness, knowledge, and training needs in watershed planning and also a more favourable attitude towards watershed planning and management compared to the JSSOs and AOs.
2. Variables educational status, training undergone, information seeking behaviour and self confidence had significant and positive relationship with the knowledge in watershed planning and also with the attitude towards watershed planning and management in the case of all the three categories of respondents. Age and experience had ~~having~~ significant and negative relationship with knowledge about and attitude towards watershed planning of the JSCOs. Age was having significant and negative relationship with the attitude towards watershed planning of the JSSOs also.
3. Self confidence had the highest direct effect on the knowledge of the JSCOs and AOs in watershed planning. In the case of JSCOs highest indirect effect was due to age. In the case of AOs, highest indirect effect was due to information seeking behaviour. In the case of JSSOs information seeking behaviour had the highest direct effect on the knowledge in watershed planning and training undergone had the highest indirect effect.

4. Information seeking behaviour had the highest direct effect on the attitude of the JSCOs towards watershed planning. Highest indirect effect was that of age. Self confidence had the highest direct effect on the attitude of the JSSOs and AOs towards watershed planning. Educational status had the highest indirect effect on the attitude of the JSSOs and information seeking behaviour had the highest indirect effect on the attitude of the AOs towards watershed planning.
5. Variables experience, information seeking behaviour and job satisfaction had significant contribution to the knowledge of JSCOs in watershed planning. Independently, only information seeking behaviour had significant contribution towards knowledge of the JSSOs. Training undergone and self confidence had significant contribution to the knowledge of the AOs in watershed planning.
6. None of the independent variables had significant contribution to the attitude of the JSCOs and JSSOs towards watershed planning. Only self confidence had significant contribution to the attitude of the AOs towards watershed planning.
7. No significant difference in knowledge, attitude and training needs was observed between the JSCOs and JSSOs but, for awareness there was significant difference between these two groups. There was significant difference in awareness, knowledge, attitude and training needs between the JSSOs and AOs and also between JSCOs and AOs.
8. Non-availability of demonstration plots to see the benefits of watershed management was the most important constraint in watershed planning as perceived by the JSCOs. But according to the JSCOs, lack of awareness of the policy makers on the advantages of watershed planning and management was the most important constraint whereas the AOs perceived inadequate training of the officers in watershed planning and management as the most important constraint.

Now that the watershed planning approach gains momentum in the planning strategy of the country, this study may be useful in designing a training strategy for ^{change} agents working in this field.

11. Future lines of work

1. The study was conducted among the lower level officials of the department of Agriculture or Soil Conservation unit. If a study is conducted among the higher level officials (Assistant Directors and Deputy Directors) ~~it~~ would be more helpful in carrying out the watershed development activities.
2. The study was conducted to assess the awareness, knowledge, attitude and training needs of the JSCOs, JSSOs and AOs in watershed planning. If a training strategy is prepared based on these findings it would be helpful in improving their awareness, knowledge and attitude towards watershed planning.
3. Now a days training programmes are being conducted in watershed planning. If a study is undertaken to study the effectiveness of these training programmes it would be helpful in overcoming the drawbacks in the present approach.

12. All the research materials have been deposited with the departments of Agricultural Extension, College of Agriculture, Vellayani.

The results of this study is getting ready for publication.



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