CHAPTER 1

INTRODUCTION

1.1 SOILS AND WATER CONSERVATION THROUGH WATERSHED APPROACH

Watershed as a whole:

Watershed refers to a natural drainage system and its size can vary from small plots of a farmer to large river basins. In the drought prone areas, from practical point of view of proper utilization of land and water resources, watersheds of 200 to 5000 ha. Size has been suggested as units of operation. A watershed is claimed to be the most scientific unit for efficient management of land and water resources as it is basically an Agro-climatic unit with relatively more homogeneity of land and other resources when compared with the revenue district. Under watershed approach, a suitable size of watershed is selected for making concentrated efforts and for easy management. A land capability survey is undertaken to prepare a soil use map. Other basic information is also collected through hydrological, vegetation, agronomic, socio-economic and site-specific surveys to fully ascertain the status of the land and water resources of the watershed and the human and live stock pressures on them. Based on the survey findings, suitable measures like Afforestation, pasture development and crop farming are undertaken in the areas identified as suitable. Suitable soil and moisture conservation measures and water harvesting techniques are also

employed for production of crops, pasture and forest. The activities are undertaken in a compact block (the watershed) and are located contiguous to each other in order to promote the synergetic effect. As these activities are complementary and supplementary in nature, the total impact of these sectoral activities when undertaken to gather in a compact area, is much more than the sum total of the impact of individual sectoral activity (Jaiswal, 1982).

Swaminathan (1998) said rainfed agriculture to be productive, should be based on a watershed as the unit of development. Watershed is not technology but a concept, which integrates conservation, management and budgeting of rainwater through simple but discrete hydrological units. Simultaneously, a watershed supports a holistic framework which means a combined application of technologies on soil and water conservation with improved crop varieties, farming systems and agronomic management, taking into account both arable and non-farm land.

The idea of integrated treatment of all lands on a watershed was adopted and implemented by Damodar Valley corporation as early as in 1949. The watershed is a continuous area whose runoff water drains to a common point, so it facilitates water harvesting and moisture concentration. Integrated watershed management focuses on combining improved farming practices with soil and water conservation and appropriate land use. Watershed approach refers to both the types of farming i.e. irrigated and Rainfed (dry land) and widely differs in their approach but the concept remains more or less the same. It also includes both arable and non-arable land and, therefore,

needs equal emphasis in terms of improvement for maintaining ecological balance and sustainable development. Also, the concept of integrated treatment of all lands on a watershed basis to improve the moisture retention capacity of soil and to minimize the soil erosions by effectively checking the flow of excess runoff rain water is important specially in dryland/rainfed areas. The specific objectives of the watershed programme include promotion of soil and water conservation, optimal use of land and water resources (Singh, 1993).

According to Singh (1990) watershed constitutes a basic unit of development of rainfed areas. It is a holistic approach encompassing a process of economic planing to obviate the twin problems of rainfed agriculture - low productivity and instability through an integrated approach. Unlike the earlier isolated efforts through soil conservation or crop production or use of any other agro-technique in a disjointed manner, the watershed approach aims at optimizing the use of land, water and vegetation in an area in an integrated way and thus help alleviate drought, moderate floods, prevent soil erosion, improve water availability, increase fuel, fodder and agricultural production on a sustained basis.

Watershed is a hydrological unit. It covers the total catchment land area, starting from the highest point (ridgeline) to the lowest point of the area through which water flows into the outlet of a natural stream.

In physical terms, a watershed refers to the area lying above a given drainage point. In functional terms,

the watershed programme tends to become synonymous with the area development; in the present context, the central theme begins the improvement of dry lands.

The main thrust of watershed development is to rationalize conservation and utilization of natural resources and other inputs to optimize productivity, stability and prosperity of the area. The main components which should be integrated in watershed development programmes are as follows:

i) Conservation, management and development of soil resources
ii) Conservation, management and development of water resources
iii) Efficient crop management and improved cropping intensity
iv) Alternate land use systems according to land capability

Why Watershed Management?

Singh et al. (1990) stated that by and large, most of the arid and semi-arid regions have been overlooked by the development planners and researchers. It is only in recent years; little attention has been paid about the problems of these areas. These regions have concentrations of eroded and degraded natural resources. Loss of vegetative cover followed by soil degradation through various forms of erosion has resulted in lands which are thirsty in terms of water as well as hungry in terms of soil nutrients. All these regions have predominantly livestock-centered farming systems; less

biomass for animals not only reduces animal productivity but subsequent intense grazing pressures on already eroded lands further exacerbate the problem and deteriorate the ecological balance. Growing population pressure, higher demand for food and fodder coupled with impact of rapidly changing Socio-economic conditions has added fuel to the fire. The piecemeal approaches such as contour bunding or terracing on individual holdings or a group of farms only marginally benefit as they are done ignoring to what happens to other areas, which are influencing the hydrologic characteristics. Such sporadic actions generally fail to attract farmers, as they do not yield benefits commensurating with the efforts and investments made. Thus, for maximizing the advantages, all developmental activities should be undertaken in a comprehensive way on watershed basis. The main principles of watershed management are:

i) Utilizing the land according to its capability.
ii) Putting adequate vegetal cover on the soil during the rainy season.
iii) Conserving as much rain water as possible at the place where it falls.
iv) Draining out excess water with a safe velocity and diverting it to storage ponds and store it for future use.
v) Avoiding gully formation and putting checks at suitable intervals to control soil erosion and recharge ground water.
vi) Maximizing productivity per unit area, per unit time and per unit of water.
vii) Increasing cropping intensity and land equivalent ratio through intercropping and sequence cropping.

viii) Safe utilization of marginal lands through alternate land use systems.

ix) Ensuring sustainability of the Eco-systems befitting the man-animal-plant-land-water-complex in the watershed.

x) Maximizing the combined income from the inter-related and dynamic crop-livestock-tree-labour complex over years.

xi) Stabilizing total income and cut down risks during aberrant weather situations.

xii) Improving infrastructure facilities with regard to storage, transportation and marketing.

Various soil and water conservation projects:

Watershed Development Projects have been taken up under different programmes launched by the Government of India. The Drought Prone Area Programme (DPAP) and the Desert Development Programme (DDP) adopted the watershed approach in 1987. The Integrated Wasteland Development Projects Scheme (IWDP) taken up by the National Wasteland Development Board in 1989 also aimed at developing wastelands on a watershed basis. This programme has now been brought under the administrative jurisdiction of the Department of Wastelands Development in the Ministry of Rural Development. The fourth major programme based on the watershed concept is the National Watershed Development Programme in Rainfed Areas (NWDPRA) under the Ministry of Agriculture (Anonymous,1994).

So far, these programmes have laid down their own separate guidelines, norms, funding patterns and technical components based on their respective and

specific aims. While the Desert Development Programme focussed on reforestation to arrest the growth of hot and cold deserts, the Drought Prone Areas Programme concentrated on non-arable lands and drainage lines for in-situ soil and moisture conservation, agro-forestry, pasture development, horticulture and alternate land uses. The Integrated Wasteland Development projects, on the other hand, made silvi pasture, soil and moisture conservation on wastelands under government or community or private control as their predominant activity. The NWDPRA combines the features of all these three programmes with the additional dimension of improving arable lands through better crop management technologies.

National Watershed Development Programme for Rainfed Agriculture (NWDPRA): A scheme of Government of India

National Watershed Development Programme for Rainfed Agricultural (NWDPRA) was initiated during 1986-87 and is being looked after by the Crops Division of the Department of Agricultural and Cooperation. Development of the rainfed dryland areas has been given a very high priority during the 7^{th} as well as for 8^{th} plan; and it forms item 2 of the 20 Point Programme - 1986 of the Govt. of India. The main objectives of the NWDPRA are to conserve and upgrade both crop lands and cultivable wastelands on watershed basis to stabilize and increase crop yields from rainfed farming, to augment the fruit, fodder and fuel resources through appropriate alternate land use systems, and to develop and disseminate technologies for proper soil and moisture conservation required under different conditions. The priority objective, however, is stabilization of agricultural

production in rainfed areas which constitute nearly 68% of the total area of the country comprising 33% in the low rainfall region (<750 mm) and 35% under medium rainfall region (750-1175 mm). The NWDPRA is being implemented in the unirrigated arable lands mostly falling in the rainfall range of 500 to 1125 mm. The districts having more than 30% area under irrigation are generally excluded from this programme (Singh, 1990).

The major components of the programme are as follows:

i) Land and moisture management including scientifically tuned cropping system, dryland horticulture, fodder production and farm forestry.
ii) Contingency seed and planting material stocking.
iii) Training, seminars study tours for staff and farmers within the state/region/national level.
iv) Adaptive research trials on different crops in small and marginal farmers' fields.
v) Procurement, fabrication and supply of survey equipment and prototype implements.
v) Preparation of field manuals and publicity materials.

Present status of soil and water conservation in India:

As a consequence of increasing pressure on land, the natural balance between the soil forming and soil conserving processes has been affected leading to serious problems of soil erosion. According to a rough estimate, out of the total geographical area of 329 m ha of our country, about 173 million hectare is subjected to varying degrees and forms of soil erosion. This includes

about 80 m ha of agricultural land, 20 m ha of degraded forest land, 13 m ha of permanent pastures and grazing lands, 29 m ha of barren and uncultivable land, etc. About 3.67 m ha are reported to be under ravines. Denudation of forest in various watersheds has resulted in floods and torrents. There are also the problems of landslides and silting of reservoirs and rivers. The erosion rates in some of the areas are indeed alarming. About 5334 million tones of soil (16.35 t/ha/year) is being eroded annually. About 29% of eroded material is permanently lost into sea. About 5.37 to 8.40 million tones of soil nutrients are lost through water erosion (Anonymous, 1998).

India was among first few countries to have taken timely cognizance of the enormity of the problem. Large scale soil and water conservation activity began in 1950's with the establishment of a chain of Soil Conservation Research, Demonstration and Training Centres by the Govt. of India in different problem areas, located at Dehradun, Kota, Bellary, Ootacamund, Vasad, Agra and Chandigarh. Besides these Centres, a centre was also established at Ibrahimpatnàm (Hyderabad) on 12.10.1962, which later became headquarters of All India Crop Research Project (AICRP) for dry land agriculture. Now, it is known as Central Research Institute for Dryland Agriculture (CRIDA) at Hyderabad.

These Centres were transferred to the Indian Council of Agricultural Research (ICAR), New Delhi, on 1st October, 1967. The ICAR combined these Research Centres and established on 1st April, 1974, the Central Soil and Water Conservation Research and Training Institute

(CSWCRTI) with the headquarters at Dehradun. A new research Centre at Datia (M.P.) was established on 18.9.1986 to tackle the soil and water conservation problems of Bundelkhand region in Uttar Pradesh and Madhya Pradesh. Another new Research Centre at Koraput (Orissa) was established on 31.1.1992 to tackle the problem of shifting cultivation in the lateritic soils of Eastern Ghats and Kondhan Hills.

Research and development activities of the Central Soil and Water Conservation Research and Training Institute, Dehradun and Centres focussed on evolving strategies of soil and water conservation on watershed basis, tackling special problems such as ravines, landslides, minespoils and torrents demonstration of technology for popularization and imparting training. Reclamation technologies of torrent gullies, landslides, mine spoils, gravelly/boulders soils, sloping lands, watershed restoration, runoff harvesting alternate land uses, diversification, bio-diversity (ecological successions), bio-remediation, management common property resources and community participation were amply demonstrated with fairly good degrees of successes.

Experimental watersheds were set up in 1956 with monitoring devices for generating watersheds-based protection and production technologies. From 1974 onward, the Institute pioneered in operationalizing the watershed concepts through four famous Operational Research Projects at Sukhomajri (Haryana State). Nada (Chandigarh), Fakot (Tehri-Garhwal in UP), G.R. Halli (Chitradurga, Karnataka state). With the experience gained from the watershed, the ICAR launched 47 model

watershed programmes in sixteen states in collaboration with State Agricultural Universities and State Departments. Encouraged with the success of the model watersheds, the Ministry of Agriculture and Rural Development conceived of a massive development programme through 10,000 watersheds for soil and water conservation and sustainable development.

Paroda (2000) stated that India with an area of 329 million hectares is the 7th largest country in the world. And it share in land resources is only 2 per cent, but it sustains 18 per cent and 15 per cent of the global human and livestock population. The pressure on land is constantly on increase and our human population has already crossed 1 billion mark. As per the estimates of the National Bureau of Soil Survey and Land Use Planning (1994), about 57 per cent of the total geographical area of the country is suffering from various forms of degradation - water erosion, wind erosion, chemical and physical deterioration, besides, degradation on account of mining, quarrying, landslides, and urbanization, there are alarming trends in shift of prime agricultural land to non agricultural uses.

India has a net sown are of 142.5 million hectares, which is next only to the USA and more than that of China. Somehow, this has remained static since the beginning of the 90's. The per capita availability of agricultural land being 0.53 ha in 1950 has decreased to 0.14 ha at present, and is likely to decline further to 0.08 ha by 2020. This implies that there is practically no scope for horizontal expansion of agriculture. Thus, in future we will have to produce more food from less and

less of land and in an environmentally sustainable manner. The land falling in marginal to sub marginal class, which I better suited for pastures, forests and range lands have also been brought under cultivation of crop, a proposition that is neither economically viable nor environmentally sustainable. Although the net irrigated area has increased from 22.56 million hectares in 1950-51 to 55.14 million ha, which is the highest in the world, the cropping intensity has increased marginally from 111 per cent to 132.7 per cent in the corresponding period. Therefore, future production increases must come through vertical expansion, mainly through improved cultivars, judicious input use and increasing cropping intensity by 15-20 per cent with emphasis on legumes.

Our soils are more hungry now than even before, and they are low in organic matter content due to continuous cultivation and siphoning of soil nutrients. Current status indicates that the N deficiency is universal and nearly 49, 20 and 47 per cent soils are deficient in P, K and Zn, respectively. Similarly, Fe, Mn and B deficiencies have also surfaced in some pockets. In addition, more than 5.3 billion tonnes of top soil is lost every year due to erosion resulting in a net loss of around 8 million tonnes of plant nutrients and 3 million tonnes of foodgrains.

The green revolution technologies are the cornerstone of our agricultural growth, which often relied on intensive use of inputs, especially water and inorganic fertilizers. Though we had witnessed quantum jumps in foodgrains production, the continuous and

sometimes indiscriminate use of inputs had also adversely affected the health of our soil. Hence, a balanced and integrated water and nutrient management approach has to be put into place to ensure sustainability of our production systems.

The best means of improving sustainability of farming systems is to prevent any further degradation of land resources and adopting alternate agricultural practices/technologies related to soil conservation, crop rotation, conservation tillage, integrated nutrient management with improved input-use efficiencies etc.

Obviously, therefore, this is a strong case to go for scientific land-use planning commensurate with land capability class and its carrying capacity. In recognition of this, the ICAR is strengthening research on "Land Use Planning for the Resource Sustainability" under the National Agricultural Technology Project (NATP) in a Mission-Mode approach.

We must strive for safeguarding our natural resources for posterity since they rightly belong to future generations and we must hand these over to them at least in a better state than what we inherited from our ancestors. Therefore, scientific land-use planning needs to be pursued.

Sustainable Agricultural Development:

The 25th FAO Conference, November, 1989, adopted the following definition of sustainable development. Sustainable development is the management and

conservation of the natural resource base, and the orientation of technological and institutional change in such a manner as to ensure the attainment and continued satisfaction of human needs for present and future generations. Such sustainable development (in the agriculture, forestry and fisheries sectors) conserves land, water, plant and animal genetic resources, and is environmentally non-degrading, technically appropriate, economically viable and socially acceptable (FAO, 1989).

The sustainable agriculture is that a cultivation practice, which over a long period of time enhances soil fertility, provides fuel, fodder and food to farmers. Sustainable agriculture should be environmentally suitable, economically viable and socially acceptable for upliftment of farmers and rural village society as a whole.

1.2 PEOPLE'S PARTICIPATION IN SOIL AND WATER CONSERVATION

The origin of participation:

Santhanam (1982) stated that although the concept of participation gained importance in recent times, its origin can be traced to Aristotle, the Greek Scholar. Aristotle was of the opinion that participating in the affairs of the state as a citizen was essential to the development and fulfillment of the human personality. He felt that exclusion from politics indicated that one did not develop fully the faculty of reason, a sense of responsibility for others welfare and a disposal towards prudent and balanced judgement. At societal level,

Aristotle found clear relationship between the extent of participation and the creation of good life. According to him, the best state was one where there was broad participation with no class dominating others. Aristotle's analysis showed some relationship between the participation and development. He mentioned that some conditions of development at the societal level were necessary for productive participation yet such participation was needed for development at the individual level. The relationship is complex because participation has economic, social and political dimensions.

In international development scenario, the concept of people's participation emerged through disenchantment with the growth-oriented, top-down dominant development paradigm. As assumptions under lying this dominant paradigm (such as that the benefits accruing from development programmes will trickle down from the upper strata of the society to the lower strata) failed to come true the concept of 'alternative development' also referred to as 'counter development', emerged in the 1970s. This thesis strongly advocated community participation as a pre-requisite for equitable development.

People's participation is, however, not a new idea in India. In fact, it emerged long ago in the vision and actions of Tagore and Gandhi. Rural masses as development actors were the central feature of their rural reconstruction programme. But the concept in the form we know it today is essentially a post-independence phenomenon. Right since the beginning of planned

development, people's participation was considered instrumental in realizing the goals of planning. The first Five Year Plan stated that, 'No plan can have any chance of success unless the millions of small farmers in the country accepts its objectives, share in its making, regard it as their own and are prepared to make sacrifices necessary for implementing it. Therefore, the nationwide Community Development Programme (CDP) launched to bring about socio-economic and cultural transformation of the country side, made professions for popular participation in planing and implementation of development programmes though Gram Panchayat, Block advisory Committees and District Boards.

It was soon realized, however, that the CDP, instead of being people's programme with government's support, was becoming more and more government's programme with varying degree of people's participation. People's participation was substituted by bureaucratic mobilization directed toward achieving set goals of development.

Poor performance of CDP prompted the policy makers to appoint a Study Team under the Chairmanship of Shri Balvantrai Mehta in 1957 to examine and assess the functioning of the programme. The Study Team remarked that in order to be self-sustaining and self-generating, development has to go hand-in-hand with participation. If found the ability to invoke popular participation as one of the least successful aspects of CDP. It therefore recommended a devolution of power and a decentralization of machinery controlled and directed by popular representatives of the local area'.

Based on these recommendations, people's participation was institutionalized with the launch of Panchayati Raj System in India on 2nd October, 1959. Since then the Panchayati Raj System has been experimented with in different States with all kinds of variations in it structure, implementation resource allocation, staffing pattern and the degree of autonomy allowed to different units.

The concept of people's participation:

Peabody (1965) opined that participation would consist of a specific action for a limited purpose.

Karl Deutsch (1969) considered participation as a technique for setting goals, choosing priorities and deciding on the kind of resources to commit to achieve goal attainment.

United Nations Social Development Division (1973) defined participation "as a process of activities comprising people's involvement in decision making, contributing to the development efforts shared equitably in the benefits derived there from".

In his paper on the psychological aspects of community development, Muthayya (1973) points out that the idea of participation emphasizes a process of social action in which the people of the community organize themselves for identifying their common needs and problems, plan a course of action with maximum reliance upon community resources and supplement the resources when necessary, with service and material from

governmental and non-governmental agencies outside the community. He further states that participation in the real sense should involve people in any programme based on mutual respect. It involves a capacity to identify oneself with others in the community without being conscious of any socio-economic barriers.

An overall review of the literature available on "participation" throws light on its varied aspects. If these aspects are classified into a specific pattern, the classification can be done as "person", "process" and "product". Although there is no consensus on the usage of the term participation, many definitions have emphasized mostly the "process" of participation starting from the 'decision-making' or 'setting up of goals', etc. The foregoing review indicates invariably the 'social change' as a "product", not adequately recognizing the importance of the 'person' which consists of the 'human factors' in participation and in bringing about the social change. Such human factors on which the processes of participation depends should also be given due importance lest effective participation may not be assured for achieving the set goal. The 'participation' or 'involvement' as same would prefer it, will be effective only when it is strongly and adequately reinforced by the awareness of the existing social situation, attitude towards it, felt-need or motivation to achieve the goal, viz. social change.

Any programme that aims at bringing about social change by an active participation of people themselves, should be prepared considering the human factors involved therein and also which will be further facilitated by

future reinforcement. Moreover, such participation will be enhanced by committed citizens when there will be no class consciousness or barriers in achieving the goals. This was well noted by Aristotle in defining a best state as the one where as broad participation occurs with no class dominating the others. Modernizing it, Muthayya (1973) makes participation as an involvement on the part of the individual without any socio-economic barriers to achieve the goal in a group situation. This aspect is considered here since importance is given to the individual, the socio-cultural and economic status as these have more impact on an individual and in shaping his behavioural pattern. Considering all those phenomena, one may well conceptualize 'participation' as "commitment on the part of the individual towards all forms of action through which he can 'take part' or 'play a role' in the operation without being conscious of any socio-economic barriers to achieve certain common goals in a group situation". This involvement or commitment would be influenced only if he is effectively appraised about the situation so as to enable him to form an attitude based on his own perception of the situation with this concept of participation in mind the present investigation is aimed to study some of the basic components of behavioural aspects which facilitate the effective participation.

Moulik (1978) is of the opinion that "participation in development process implies stimulating individuals to take the initiative and mobilizing people to work for overall societal development".

In spite of its importance, in most of the present rural development strategies, the element of people's participation is left a shade nebulous. There is confusion and vagueness regarding the understanding of the concept. According to Jagannadhan (1979), "involvement" may be a more appropriate term and a more acceptable concept than "participation". He elaborates stating that while participation implies sharing, involvement connotes a "sense of belongingness".

Sir Desmond Heap is also of the opinion that participation and involvement should be differentiated. He defines citizen participation as "the active participation in decision - making process" and citizen involvement as "awareness of policies through consultations". These writers interpret participation as meaning "sharing in decision - making" which, it presupposes knowledge, information, competence, acceptability, and a host of other qualities and capabilities which are generally rare among the people.

Some consider that financial assistance rendered under any programme by an individual or a group is a mode of participation. Some others felt that taking part in an activity by giving one's own labour, i.e. Shramdan is also participation; still others think that a person who can contribute neither financially nor by labour but can guide the group/activity by mobilizing resources is also said to be participating in the programme; in politics, casting vote is said to be participation and in the organizational set-up, membership and attending meetings actively or passively is taken as participation.

As there seems to be an overlapping in the meaning of the terms participation and involvement an attempt is made here to put forth the available definitions and/or descriptions of participation and evolve a suitable meaning to the concept for the purpose of the study.

Sharma (1979) viewed participation in two aspects: in the broadest sense, the term participation is used to refer to all those actions taken by people to take part in the process of social change. Participation is not regarded as having been committee to any social goals but is regarded as a technique of setting goals, choosing priorities and deciding to generate the resources to the achievement of the goal. In a restricted sense participation consists in a specific action by which the people participate for achievement of a limited goal. In this case, the citizen does not confine himself to expressing an opinion on specific measures but directly participates in the achievement of the objectives.

Cohen and Uphoff (1980) describe participation as "people's involvement in decision - making process about what would be done and how; their involvement in implementing programmes and decisions by contributing various resources or cooperate in specific organizations or activities, their sharing in the benefits of development programmes and/or their involvement in efforts to evaluate such programmes. Taken together, these four kinds of involvement appear to encompass most of what would generally be referred to as participation in development activities".

Further, they regard participation as "generally denoting the involvement of a significant number of persons in situations or actions which enhance their well-being, e.g. their income, security or self-esteem".

Hunter (1980) describes participation as that which "implies that farmers themselves have a major role say in the choice of the innovative programme, in deciding on the methods to be used and in organizing their own contribution of labour and management".

Verhagen (1980) is of the opinion that "participation is generally presented as the active involvement of target groups in the planning, implementation and control programmes and projects and not merely their passive acquiescence in performing predetermined tasks, not merely their exploitation in order to reduce the labour cost. Participation, it is argues, guarantees that the beneficiaries' own interests are taken into account. This enhances the likelihood that programmes and projects will prove effective in meeting felt development needs and that participants share equitably in all benefits".

According to Yadav (1980) people's participation means "involvement of the people in the development process voluntarily and willingly. Such participation cannot be coerced". He states that people's involvement has to be understood in terms of participation in decision - making, implementation of development programmes, monitoring and evaluation of such programmes and in sharing the benefits of development.

According to Banki (1981), "People's participation is a dynamic group process in which all members of a group contribute to the attainment of group objectives, share the benefits from group activities, exchange information and experience of common interest, and follow the rules, regulations and other decisions made by the group".

Mishra (1984) stated that in broadly speaking participation is understood as the "involvement of a significant number of persons in situations or actions, which enhance their well-being".

Jose (1994) has been defined participation as the process of taking part, having said, or being able to influence the design, implementation or the outcome of a development project.

Mishra (1994) stated that in practice, the term participation has three connotations. Participation means cooperating, taking part in something the more presence, even silent present of an individual or representative of an organization at different levels. Participation can be direct or indirect, active or passive. It can occur at any level from lower rung to higher hone from village level to the national level. It is one of the important techniques to achieve the desired goal.

Khatik (1997) defined people's participation as "concerted efforts by a group of local participants for achieving common goals and sharing benefits.

Benefits of people's participation:

The major benefits flowing from the participation of the people in development are: In the planning and programming stages and throughout the implementation of development programmes, rural people can provide valuable social-cultural, ecological, economic and technical indigenous knowledge ensuring consistency between objectives of development and community values and preferences; people can mobilize local resources in the form of cash, labour, materials, managerial talent and political support which are critical to programme success; Programmes involving people are more likely to sustain after outside financial and technical support is withdrawn; Participation by the poorer elements of the society may prevent the "hijacking" of programme benefits by wealthier members of the community; People accept more readily the programmes in which they or their recognized leaders have been involved. They feel that it is their programme; Involvement of local people in decision making generates commitment for implementation of the programme; it enhances people's ability to take responsibility and show competence in solving their own problems (Tyagi, 1998).

TYPES AND FORMS OF PEOPLE'S PARTICIPATION:

The types or forms of people's participation were suggested by different scientists in various ways but the most important classification which is suitable to watershed development is suggested as below:

According to Jose (1994) the people's participation is divided into four types:

(i) Participation as contribution:

Participation as contribution implies voluntary or other forms of contributions by beneficiaries to predetermined programmes and projects. The level of participation in management tends to be low. Beneficiary involvement in the programme implementation is limited to same contribution or to a limited extends of resource mobilization. The low involvement mainly arises from the lack of community capacity. Community capacity refers to the skill level within the beneficiaries to structure, analyse, generate and evaluate solutions to the problems facing the community.

(ii) Participation as organization:

The next higher level of participation involves changing/reorienting the administrative environment. This form of participation will take place when the beneficiaries are co-opted into the administering agency (beneficiary representatives on the board of the local authority). The advantage of such participation at its higher levels is that it lets the beneficiaries determine the nature and structure of the organization. This also affords the beneficiaries enhanced roles in the planning, selection and implementation stages of the programme. The process is essentially a bureaucratic re-orientation process. The administering authority now has to give up some of the powers of control enjoyed by it in the past. The lowest level examples of this are decentralization of

the central administering agency and the co-option of beneficiary representatives, which result in facilitating the creation of beneficiary organizations.

(iii) Participation as partnership:

Emphasis in this mode is on the development of skills and abilities that enable beneficiaries to manage their resource better (i.e. in sustainable and productive manner), and have a say in or negotiate with existing delivery systems (voice). At a higher level this occurs when the beneficiaries get together to form their own organizations (with the help of the development administration) such as farmers' cooperatives, irrigation committees etc.

Participation as partnership operates on the philosophy that given sufficient support and training people are capable of managing their own affairs. In recent times this has been the attitude of most developmental agencies to development in the rural sector. The beneficiaries have a substantial say in the selection and the administration of the developmental activity. Logically, it means that at the highest levels of participation in this mode the beneficiaries may select or reject a programme based on the criteria they may have set for themselves.

Two points need to be noted with regard to this mode. One, the development administrations role, in most cases, is limited to an advisory one and one of securing the necessary inputs and liaison with the external official machinery. Two, the development agency may

withdraw at a later stage without crippling the programme.

(iv) Participation as empowering:

Participation as empowerment is the process of enabling the beneficiaries to decide upon and to take actions, which they perceive as essential to their development. This is essentially a political process and the beneficiaries in this case would enjoy the maximum voice possible in any form of participation. Development of power to local administrative authorities is an example of this mode of participates management. Voluntary organizations very often resort to this process of participate management.

Psychology of participation:

The backbone of participation lies in the group dynamics and the behaviour of the individual in a group situation. Some factors operate in bringing people together to do a particular task. It is common experience that man does not live in isolation. He always wold like to be in groups and that he is known as a gregarious animal. The major part of the time of the that human beings is spent on doing things together in groups. Most of the people cluster into relatively small groups with members residing together in contiguous areas. Much of the work is carried out by people in close interdependence within relatively enduring associations. People derive pleasure and enjoy themselves in activities like recreation, sports, etc. Hence, it is important to understand what makes the people to come together and

live together and share together in any activity. This has a bearing on understanding the process of participation where the main interest is in brings people together for a development activity.

In general, 'group' refers to persons who are bound together by specific relationship. Usually they come together for work towards achieving certain common goals and a relationship is built among the members, which has great influence on the behaviour of these members. The groups emerge to provide security for their members, to carry on economic activities, to provide opportunities for social experience, and to achieve the objectives which the group has set for itself.

The groups are formed more or less spontaneously by the mutual agreement of the people who share a common goal. The groups, which are loosely organized, disintegrate quickly as soon as the need for which they have come together is fulfilled. But in other instances, the groups serve continuously to changing needs, expand in structure and functioning to meet the demand of the situation and take the shape of an established organization/institutions (Santhanam, 1984).

1.3 STATEMENT OF THE PROBLEM

People's participation in natural resources conservation programme like watershed management is utmost important at different stages viz.; programme planning, implementation, maintenance and evaluation. It is a collective and cooperative effort by the local people for sharing common benefits.

People's participation at the time of preparing a watershed development programme is very much needed to take decisions because the programme should be according to the basic needs of local people. The programme should meet the basic needs of the majority of the local people like supply of drinking water, fodder for cattle and fuel for kitchen. The local people are the ultimate beneficiary of any programme. Therefore, the programme should be for the people, by the people and of the people.

The watershed development programmes are made for local people, hence the local people should take interest and participate in implementation of programme by contributing labour and money in construction of soil and water conservation structures on their field and common land. Participation in maintenance is required because without protection and care by the local people the programme will not be successful. The involvement of local people in evaluation of programme is also necessary, so that it may provide points to be considered for improvement in future programme planning.

Therefore, the concept of soil and water conservation through watershed area basis was taken to reduce the soil degradation. The natural resources such as soil and water should be managed properly for sustainable agricultural production. There should be optimum use of soil and water for optimum production through the concept of watershed. The watershed is not a technology of soil and water conservation. Whereas, watershed is a concept according to that the soil and

water conservation technologies should be adopted within the contour lines of catchment area of watershed. Recently, the soil and water conservation programmes on the basis of watershed were developed by the rural farmers, for the rural farmers and of the rural farmers. The participation of local rural farmers is imperative for implementation and maintenance of Soil and Water Conservation programmes. Hence, the present study was carried out to know whether, the rural farmers actively participate in soil and water conservation programme on watershed basis during planning, implementation, maintenance stages or not at all concerned with natural resources conservation.

Therefore, the present research study is framed to assess the extent of people's participation in Soil and Water Conservation for sustainable agricultural production in watershed. The study is also focusing to assess the knowledge level of farmer's regarding soil and water conservation practices. The attitude of farmers towards Soil and Water Conservation technologies and extent of adoption of SWC technologies were also be studied. It is also emphasized to analysis the different problems faced by the farmers and farm women during Soil and Water Conservation programme.

Thus, it was decided to undertake a study on **"PEOPLE'S PARTICIPATION IN SOIL AND WATER CONSERVATION FOR SUSTAINABLE AGRICULTURAL PRODUCTION IN THE ANTISAR WATERSHED OF GUJARAT".**

1.4 JUSTIFICATION OF THE STUDY

Land degradation is a continuous process caused by soil erosion due to rain water and wind. According to the present scenario, a considerable amount of soil i.e. about 5334 million tones is eroded every year. The land degradation to day threatens the livelihoods of rural poor farmers. The agricultural production is going to be decreased year after year under the erosion affected lands and poor farmers becomes poorer. The situation is more dangerous in arid areas, where only rainfed crops are cultivated. The poor farmers are unable to grow crops even as much as needed to feed his own family members through out the year. Particularly, in Gujarat State a very extensive degradation of land has occurred along the banks of the rivers; Banas, Sabarmati, Vatrak, Mahi, Tapi and Naramda. This continuous extensive degradation of soil has developed big gullies on the land, which is known as ravines and also popularly known as "Kotar" in gujarati.

It seems from the present situation of the country that the environment, problem has increased due to deforestation in rural areas. The rural people cut down the forests tremendously for their own consumption. By cutting down the forests the environmental imbalance is created and the water level of the area also decreases. This leads to the agricultural land converted in barren land due to lack of water and environmental hazards. Therefore, to increase the agricultural production the soil and water conservation is at most required. Therefore, the local people in the rural areas should participate in conserving the natural resources such as

soil and water conservation for re-converting the barren land into the agricultural land. Soil and water are the natural resources essential for survival of people on earth. People should realize the importance of conserving the soil and water. There should be judicial utilization of soil and water for sustainable agricultural production. This requires participation of people at all levels of soil and water conservation programme.

This study will help to find out factors responsible for people's participation in soil and water conservation programme. It will also analyse the constraints faced by the rural farmers during soil and water conservation programme and draw out the suggestions to over come these constraints by adopting a participatory approach.

Hence, it is very much important to measure and assess the level of people's participation in soil and water conservation programmes.

1.5 SIGNIFICANCE OF THE STUDY

Improved soil and water conservation technologies are very essential for conserving the natural resources. The concept of watershed management is in vogue for soil and water conservation for sustainable agricultural production in rural areas. Keeping in view the importance of watershed development programme in rainfed areas, it is utmost realized by the project implementing agencies that the local people or ultimate beneficiaries of watershed programme should participate in the soil and water conservation programme. Therefore, it is realized to measure the extent of people's participation in soil

and water conservation programme as well as extent of participation in different stages of soil and water conservation programme.

The study will describe and analyze the extent of people's participation in the particular programme of Integrated Wasteland Development Programme, Antisar watershed (Kapadvanj taluka). The most important significance of the study would be that based on the findings to suggest an appropriate participatory approach by local people in watershed management for sustainable agricultural production. It is hoped that the findings of the study will be very useful to planners, administrators, and extension functionaries to restructure and reframe the watershed development programme in future in right direction in the benefit of rural farmers.

Significance of the study in the Home Science Extension and Communication:

The department of Home Science Extension and Communication is very much concerned with the present investigation on people's participation in soil and water conservation for sustainable agricultural production in Antisar watershed of Gujarat state. It is due to the fact that women play a vital role in agricultural cultivation activities on farm. The agriculture is the backbone of Indian economy and the woman is the backbone of Indian agriculture in rural areas. The findings of the present study would be helpful to the department of Home Science Extension and Communication to organize a small training programme for rural farm women regarding participation in

soil and water conservation programme on watershed basis. The department of Home Science Extension and Communication can provide genuine information regarding natural resources conservation to make benefited to rural farmers.

The environmental education is a part of today's Home Science Extension and Communication programmes. The soil and water conservation can be an important constituent of environmental education to conserve natural resources and improve environmental imbalance in rural areas. Based on the present study the Home Science Extension and Communication department may also conduct awareness camps, farm visits, informal discussions etc. to educate farmers regarding natural resources conservation and encourage them to participate in environmental development programmes.

The contents and findings of the study could be incorporated in different extension activities carried out by the department of Home Science Extension and Communication to educate the rural farmers about importance of natural resources conservation. The department may also conduct research on people's participation in soil and water conservation programme and study it's relationship with the quality of the farmer's family life.

JUSTIFICATION OF THE SAMPLE:

The village rural farmers and farm women are directly or indirectly dependent on soil and water in the catchment area of a watershed. A sufficient care needs to

be taken on the orientation, skill upgradation and motivation of the rural farmers towards soil and water conservation programme. The knowledge of rural farmers should be improved regarding adoption of soil and water conservation practices. The soil and water conservation programme on watershed management basis is developed by the rural farmers, for the rural farmers and of the rural farmers.

It was felt that without people's participation no soil and water conservation programme would be successful. There is a considerable role of local rural farmers to take decisions at the time of planning of SWC programme. To make the soil and water conservation programme successful, the local farmers should take care and protect the soil and water conservation structures in adverse situations. Therefore, the present study was planned to take the rural farmers and farm women of Antisar watershed as a sample of the study. All the farmers residing in the Antisar watershed or farmers having land in the Antisar watershed are taken as a sample of the present study. The sample of farmers for this study is very much justified because these farmers will be very much affected with the soil and water conservation programme for sustainable agricultural development through adopting watershed management practices. The farmers are the ultimate beneficiaries of the SWC programme.

The study was planned to be conducted in the Antisar watershed area purposively. Because the Antisar watershed development programme was sanctioned by Ministry of Rural Area Employment to the Central Soil & Water Conservation

Research & Training Institute, Research Centre, Vasad and the investigator also employed in the Research Centre, Vasad. Antisar watershed area comes under Kapadvanj Taluka of Kheda district in Gujarat. The watershed is about 12 km from Kapadvanj.

1.6 JUSTIFICATION OF THE VARIABLES

1.6.1 Gender

Men and women both are having different capabilities to carry out different household and agricultural works efficiency. The women have more capabilities by nature to do some cultivation works more efficiently than the men and vice-versa. For example in agricultural enterprise the most of the business work such as buying inputs and selling of products are carried out by men only. Women are mostly doing the on farm activities such as seedbed preparation, interculture, weeding, harvesting of crops etc. The gender is an important variable, which affect the different activities in agriculture. Most of the decisions in planning of agricultural cultivation operations are taken by men. The women are to follow the decisions taken by the men in the rural areas. Therefore, gender variable is justified for the present study to find out whether the majority of decisions in planning of SWC programme is taken by men or not and also the extent of active participation by men as well as women in implementation and maintenance of soil and water conservation structure on their farm.

Varma and Sinha (1992) conducted a study on involvement of women and men in cultivation of crops.

The findings of the study indicated that involvement of men and women in various operations of Bajra cultivation showed that mean score of women's work load was higher than men's work load in high, medium, low Socio-economic strata as well as in the pooled data. There was significant inter sex variation in high, low socio-economic strata and among the pooled data.

1.6.2 Age

Age is also a variable, which may be associated with adoption of soil and water conservation practices. The farmers who are younger, may have less knowledge regarding Soil and Water Conservation practices, where as old age farmers may have more experience and more knowledge level regarding SWC practices. As the age increases the practical knowledge and experiences regarding adoption of SWC practices also increases. The younger group of farmers may participate more in the soil and water conservation programme by contributing more labour work than the older one. The younger group of farmers may have good physical strength to do hard work during construction of soil and water conservation structures than the older farmers.

1.6.3 Socio Economic Status (overall)

Many investigators stated that the socio economic status of farmers directly or indirectly is correlated with the development of agriculture. The Socio economic status includes size of land holding, education, house, occupation, caste, farm power, material possession and

family income. The socio economic status variable was selected to know the effectiveness of socio economic power possessed by the farmers on participation in soil and water conservation programme. The socio economic status directly represents the physical infrastructure facilities and farm power possessed by individual farmer to carry out different SWC structures in their fields. The farmers having poor socio economic status are usually less capable to know and adopt new improved agricultural innovations, as compared to the farmers having high socio economic status. The high socio economic status farmers are already aware about new soil and water conservation technologies. Therefore, the farmers having high socio economic status may be easily motivated to adopt soil and water conservation technologies. The variable socio economic status of farmer is very much justified in the study, because it shows the capacity of farmer to contribute the available physical facilities such as implements, equipment, material etc. during implementation of soil and water conservation programme. Which may affect the participation of farmers in soil and water conservation programme.

1.6.4 Socio economic status (specific indicators)

(i) Land holding:

Soil and Water Conservation technologies are adopted on the basis of contour lines of the land. Most of the technologies are adopted collectively by the large number of farmers on watershed catchment area basis. The large size of land holdings are very conducive for adoption of SWC practices. Therefore, the farmers having large size

land holdings may easily adopt soil and water conservation technologies due to suitability of conservation structures to their land. The big farmers may participate and contribute more in soil and water conservation programme by adopting the soil and water conservation practices. The farmers having small land holdings may not be able to adopt easily the soil and water conservation practices. The SWC practices are adopted on the basis of contour lines of watershed catchment area. Therefore, the conservation practices are adopted beyond the boundaries of farmers land holdings. Hence, land holdings also may affect the adoption of soil and water conservation technology.

(ii) Education:

The academic achievement can reflect the mental ability of the farmers. In rural villages a varying levels of education standards are found. The high education level of farmers may find them easier to grasp knowledge and importance of soil and water conservation technologies. The educated farmers and farm women can easily be trained and motivated for their participation in SWC programme. The educated farmers and farm women are seems to be quite open-minded to exchange their ideas with each other. The educated farmers may also contribute their experiences by decision making ability in planning of soil and water conservation programme.

Rakholia (1996) reported that in case of beneficiaries of watershed programme, the increasing education had influence on the level of knowledge about soil and water conservation. While, in case of non-

beneficiaries the increasing education had no influence on level of knowledge about soil and water conservation.

Therefore, education was considered as a variable for the present study.

(iii) Farm Power:

Farm power was selected as a variable. It is a major asset needed for cultivation of agricultural crops. Farm power includes different agricultural machines, irrigation facilities, farm implements and also drought animals to carry out different cultivation operation on the land. Without the help of agricultural machines like tractor, trailer, different kinds of ploughs, cultivators etc., the construction of SWC structure would not be possible. Therefore, the farm power is an essential requirement of the farmers for participation in SWC programmes.

(iv) Material possession:

The farmers having more materials may be exposed more to soil and water conservation programmes. In such situations, it is very easy to transfer the soil and water conservation technologies. The farmers having television, radio, tape recorder may have more opportunities to learn about SWC programme by watching different agricultural development programmes telecast on television or listening to radio programme. Many researchers revealed that the audio visual aids had impact on learning behaviour of rural farmers. The rural families, who use more of television, radio, magazines

etc. tend to be more knowledgeable than the other farmers.

Ingole et. al. (1993) also reported that the rural viewers preferred television mainly as an entertaining purpose (86%) followed by other purposes like education (61%), advertisement (36%) and information (15%).

(v) Family size:

The respondents of Antisar watershed may vary in the size of their family. The farmers and farm women may belong to larger or small families in the rural area. The larger families may have more labour hands to works on their farms. The large family interactions are also useful in exchanging the knowledge and skills regarding soil and water conservation among the members of family. On the other hand, the small family may have less number of persons to work on their agricultural land. The larger family may provide more labour power to farmers for participation in the rural soil and water conservation programme.

(vi) Family Income:

The farmers and farm women differ in the total income of their family. The farmers and farm women from high income families may have more resources and implements to help in adoption of soil and water conservation technologies. The farmers having more family income can contribute more money in construction of soil and water conservation structures in their watershed area. The farmers having more resources viz., implement,

materials, machines etc., they can provide their resources to the soil and water conservation project implementing agency as their contribution of participation. The high economic status of a family also helps to learn more about soil and water conservation technologies by having more information sources.

1.6.5 SOCIAL PARTICIPATION

The farmers and farm women having more contacts with rural social organizations may be interested in rural development programmes. Social participation is a voluntary contribution of services by a farmer or a farm woman to the village institution like; Panchayat, Co-operative societies, Youth club, Anganawadi etc. as a member or office bearer. It is understood that, if a farmer or farm woman participate or have more contacts with social institutions, can contribute or participate more in soil and water conservation programme by contributing labour, money, guidance, resources, experiences etc.

The similar findings were also reported by Rakholia (1996) that there was positive and significant association between level of knowledge of soil and water conservation programme beneficiaries and their social participation.

Chaudhary (1996) also observed that social participation was positive and significantly correlated with the adoption of soil and water conservation practices by the farmers.

1.6.6 RISK PREFERENCE

The farmers and farm women differ in their ability to take risk in agricultural occupation. In rural area some farmers are willing to take risk in adoption of entirely new improved agricultural practices to earn more. On the other hand some farmers hesitate to adopt agricultural innovations. The high adopter farmers, who without any hesitation adopt new technology as soon as they come to know about new technology. There are also low adopter farmers, who do not try any new agricultural technology unless most other farmers have adopted them with success. The farmers having high risk taking ability may exhibit more participation in implementation of soil and water conservation programme by adopting new improved soil and water conservation technologies.

1.6.7 KNOWLEDGE REGARDING SWC TECHNOLOGIES

If a farmer or farm woman has more knowledge regarding soil and water conservation technologies, it helps in easy adoption of SWC technologies by him/her. The farmers having good knowledge of SWC practices, may help in teaching and guiding other farmers in adoption and encourage participation in Soil Water Conservation programme. The farmers and farm women having experiences in practicing different soil and water conservation technologies on their fields, may participate more in soil and water conservation programme and share their experiences with other farmers.

Padmaiah (1997) reported that knowledge level of farmers regarding soil and water conservation practices

has positive significant relationship with adoption of soil and water conservation technologies.

1.6.8 ATTITUDE TOWARDS SWC PROGRAMME

Farmers and farm women may vary in their attitude towards SWC programme. Farmers having more favourable attitude towards SWC programme may participate more often in planning, implementation and maintenance of SWC programme.

The farmers with favourable attitude may also contribute more ideas and suggestions in the planning of such natural resource conservation programmes. The farmers having more favourable attitude towards soil and water conservation programme may adopt easily different soil and water conservation practices by contributing more labour, equipment, money etc.

Reddy (1987) also revealed that majority of farmers had more favourable attitude towards (i) soil and water conservation (ii) improved dry farming technologies (iii) non-arable land development of watershed development programme. He also found that big farmers had more favourable attitude than small farmers towards watershed development programme.

1.6.9 ADOPTION OF SWC TECHNOLOGIES

Adoption behaviour varies from person to person, according to their knowledge and understanding. Some people accept innovations and put them into practices quickly, while some others are slow to put innovations in

practice. Adoption of innovations also depends on situation and needs of the ultimate user.

Adoption of soil and water conservation practices depends on knowledge and resources available with the farmers. The farmers differ in their knowledge, understanding and resources possession. The farmers having sufficient knowledge regarding SWC practices as well as sufficient resources availability may provide conducive situation to adopt soil and water conservation practices. Therefore, the adoption of soil and water conservation practices by farmers is affected by the availability of resources such as mechanical power, farm implements, material possession, land holding etc. Therefore, the variable adoption of soil and water conservation practices was selected for the present study.

Bhutiya (1993) observed that majority (70%) of the farmers were found in medium adoption category, followed by high level adoption category (30%), and none in low category of adoption with respect to watershed management programme.

1.7 OBJECTIVES OF THE STUDY

This study was undertaken to find out the extent of people's participation in watershed management and impact of selected independent variables on the people's participation in watershed management. The study was taken up with the following specific objectives:

1) To study the overall extent of people's participation in soil and water conservation programme in the Antisar watershed.

2) To study the extent of people's participation in planning of soil and water conservation programme in the Antisar watershed.

3) To study the extent of people's participation in implementation of soil and water conservation programme in the Antisar watershed.

4) To study the extent of people's participation in maintenance of soil and water conservation programme in the Antisar watershed.

5) To study the relationship between the overall extent of people's participation in soil and water conservation programme and the following variables:
   1. Gender
   2. Age
   3. Socio-economic status (overall)
   4. Socio-economic status (specific indicators):
      i) Family Land holding

ii) Education
iii) Farm power
iv) Family size
v) Family income

5. Social participation
6. Risk preference
7. Knowledge regarding SWC technologies
8. Attitude towards SWC programme
9. Adoption of SWC technologies

6) To study the relationship between the extent of people's participation in planning of soil and water conservation programme and the following variables:

1. Gender
2. Age
3. Socio-economic status (overall)
4. Socio-economic status (specific indicators):
   i) Family land holding
   ii) Education
   iii) Farm power
   iv) Family size
   v) Family income
5. Social participation
6. Risk preference
7. Knowledge regarding SWC technologies
8. Attitude towards SWC programme
9. Adoption of SWC technologies

7) To study the relationship between the extent of people's participation in implementation of soil and water conservation programme and the following variables:

1. Gender

2. Age
3. Socio-economic status (overall)
4. Socio-economic status (specific indicators):
   i) Family Land holding
   ii) Education
   iii) Farm power
   iv) Family size
   v) Family income
5. Social participation
6. Risk preference
7. Knowledge regarding SWC technologies
8. Attitude towards SWC programme
9. Adoption of SWC technologies

8) To study the relationship between the extent of people's participation in maintenance of soil and water conservation programme and the following variables:

1. Gender
2. Age
3. Socio-economic status (overall)
4. Socio-economic status (specific indicators):
   i) Family Land holding
   ii) Education
   iii) Farm power
   iv) Family size
   v) Family income
5. Social participation
6. Risk preference
7. Knowledge regarding SWC technologies
8. Attitude towards SWC programme
9. Adoption of SWC technologies

9) To study the constraints faced by the farmers and farm women during development of soil and water conservation programme of Antisar watershed.

10) To suggest an appropriate participatory approach for sustainable agricultural production in watershed management.

1.8 ASSUMPTIONS

1. The rural farmers and farm women participate in planning, implementation and maintenance of soil and water conservation programme in Antisar watershed.

2. The rural farmers and farm women vary in their following traits:
   1. Gender
   2. Age
   3. Socio-economic status (overall)
   4. Socio-economic status (specific indicators):
      i) Family Land holding
      ii) Education
      iii) Farm power
      iv) Family size
      v) Family income
   5. Social participation
   6. Risk preference
   7. Knowledge regarding SWC technologies
   8. Attitude towards SWC programme
   9. Adoption of SWC technologies

1.9 NULL HYPOTHESES

1. There will be no significant relationship between the overall people's participation in soil and water conservation programme and the following variables:
   1. Gender
   2. Age
   3. Socio-economic status (overall)
   4. Socio-economic status (specific indicators):
      i) Family land holding
      ii) Education
      iii) Farm power
      iv) Family size
      v) Family income
   5. Social participation
   6. Risk preference
   7. Knowledge regarding SWC technologies
   8. Attitude towards SWC programme
   9. Adoption of SWC technologies

2. There will be no significant relationship between the extent of people's participation in planning of soil and water conservation programme and the following variables:
   1. Gender
   2. Age
   3. Socio-economic status (overall)
   4. Socio-economic status (specific indicators):
      i) Family Land holding
      ii) Education
      iii) Farm power
      iv) Family size
      v) Family income

5. Social participation
6. Risk preference
7. Knowledge regarding SWC technologies
8. Attitude towards SWC programme
9. Adoption of SWC technologies

3. There will be no significant relationship between the extent of people's participation in implementation of soil and water conservation programme and the following variables:
   1. Gender
   2. Age
   3. Socio-economic status (overall)
   4. Socio-economic status (specific indicators):
      i) Family land holding
      ii) Education
      iii) Farm power
      iv) Family size
      v) Family income
   5. Social participation
   6. Risk preference
   7. Knowledge regarding SWC technologies
   8. Attitude towards SWC programme
   9. Adoption of SWC technologies

4. There will be no significant relationship between the extent of people's participation in maintenance of soil and water conservation programme and the following variables:
   1. Gender
   2. Age
   3. Socio-economic status (overall)
   4. Socio-economic status (specific indicators):

i) Family Land holding
ii) Education
iii) Farm power
iv) Family size
v) Family income

5. Social participation
6. Risk preference
7. Knowledge regarding SWC technologies
8. Attitude towards SWC programme
9. Adoption of SWC technologies

1.10 LIMITATIONS

The study has been undertaken as a student research project and consequent upon the time and other resources available with the investigator, the following are the limitations of the study.

1. The study is delimited to the farmers and farm women of the Antisar watershed.

2. The study of people's participation in soil and water conservation programme in Antisar watershed is delimited to the following phases of the programme:
   i) Programme planning
   ii) Programme implementation
   iii) Programme maintenance

OPERATIONAL DEFINITIONS

1. People's participation:

Peoples' participation was operationalized in this study as concerted effort in contributing labour, money, implements, materials, guidance etc. by the local farmers and farm women of Antisar watershed for achieving common goal of soil and water conservation for increasing sustainable agricultural production.

2. Land holding:

It refers to total area including irrigated and unirrigated owned by the respondents in acres. This was measured by direct questioning.