

**PROFILE OF SUJALA WATERSHED PROJECT BENEFICIARY FARMERS
IN DHARWAD DISTRICT**

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I. INTRODUCTION

Watershed development is aimed at conservation of natural resources and maintaining the ecology of the area by using the simple soil and water conservation techniques. In other words, watershed management is overall development of particular region including water conservation, maintaining soil fertility, pasture land, agriculture, horticulture, forestry and allied aspects.

In our country out of the total geographical area of 329 million ha, 143 million ha is under cultivation, 108 million ha area is rainfed (75%). Rainfed agriculture contributes about 44 per cent of the total food grain production in the country and supports 40 per cent of the population. Bulk of pulses, oil seeds, millets, coarse grains and commercial crops like cotton and ground nut etc., are accounted by the rainfed agriculture. Thus, dryland holds great prospect of contributing substantially to country's food production and unless the production from these areas increases, the real break through in agriculture may not be possible.

Karnataka has 19 million ha of cultivable land of which 15 million ha depend upon rainfall for cultivation. It is estimated that even after all the water and ground water resources are fully tapped, hardly 35 per cent of cultivated land will enjoy irrigation facilities leaving 65 per cent of cultivated land for rainfed agriculture. Hence, dry land development strategy is important for agriculture development in the state. Scanty rainfall on one hand and high density of rainfall on the other are the major threats to the dry land agriculture. Improved crop production technologies with the efficient utilization of available rainwater play an important role in increasing the dry land crop production (Anon, 1986).

Soil and water constitutes the vital resources of the country. These two elements nourish and support the plant and animal life. The prosperity and welfare of humanity is also depending on water, which is irreplaceable resource. Soil, water and vegetation are most important natural resources, they provide food, firewood, fiber and raw materials to satisfy variety of needs of people. Hence, its judicious management is a pre-requisite for overall development of the country. This clearly implies that judicious utilization of soil and water will increase substantially the present level of food grain production. In recent years more attention has been given for soil and management.

The common characteristics of rainfed areas are low and erratic rainfall, inadequate concentration of *in situ* moisture, soil erosion, degradation of soil fertility, deforestation and ecosystem imbalance in addition to low income and low purchasing capacity of the farmers.

Constant efforts are being made to tackle the problems of dry land agriculture through launching of various programmes such as Integrated Dryland Agriculture Development Project (1971), Drought Prone Area Programme (1970), Desert Development Programme (1977) and whole Village Development Programme (1974-75).

Development of dryland agriculture on watershed basis was launched as a national programme by the government of India in 1983. Indian Council of Agricultural Research in collaboration with the state governments established 7 model watersheds all over the country.

Karnataka is one of the pioneer states which has given high priority for dryland development. The watersheds in the state are treated as pilot projects, where each member of the watershed development programme is expected to cultivate and practice research, implemented in different agro-climatic conditions of the state in 1983. The data and results from this programme were used in fixing priorities of dryland development not only for the state but also for the country.

CONCEPT OF WATERSHED

Watershed development is a wholistic approach to build and strengthen the basic resources, so as to enable the establishment of sustainable life support. This is an integrated approach on a natural hydrological unit, "a watershed".

Watershed is a natural hydrological entity that covers a specific area expanded on land surface, within whose boundaries the entire rainfall run-off ultimately passes through a specifically defined stream. So, it is a unit of land on which all water that falls collects by force of gravity, runs via common outlet. It is thus an area of land that contributes run-off to a common point and is separated from adjoining areas by a natural ridgeline (Oswal, 1999).

Singh (2000) has defined watershed as a geographic area drained by stream of connecting streams such that all precipitation in this area leaves the area in a concentrated flow through a single outlet.

Watershed, as a natural unit of ecosystem planning and development, is widely used in most of the countries. It has a wide spectrum of characteristics like

- Watershed topography which consist of mountains, hills, plains, gullies, valleys and so on each is characterized by variable slope and the area, from one location in the watershed to the other location.
- Land mass includes land use soil type and underlying geology.
- Meteorological factors contain rain evaporation, radiation, wind, temperature etc.
- Vegetation involves agriculture, forestry and agro-forestry.

These resources are interdependent and ultimately management of these factors is determined with the proper consideration of ecological and socio-economic factors.

Watershed development project is aimed at conservation of natural resources and maintaining the ecological development of the area by using the simple soil and water conservation techniques.

Broadly there are five different watershed programmes operating in the country which differ in terms of water conserving techniques, administration, planning and ecosystem composition. The first group consists of operational research projects (ORP) taken up by ICAR at different locations. Secondly, World Bank financed watershed projects; Thirdly is state Government sponsored watershed projects. Fourthly central Government assisted a National Watershed Development Programme (NWDP) which was implemented by each state government with some modifications. The fifth one is watershed projects undertaken by the non-government organizations.

'Sujala', a watershed development project developed by the Government of Karnataka and implemented by the Watershed Development Department of Government of Karnataka with tripartite cost sharing arrangements. The World Bank through International Development association provides major portion of the plan outlay. The Government of Karnataka finances some portion of the budget and the watershed communities contributes some portion.

Sujala watershed is a community driven watershed development project and is being implemented in five districts viz., Kolar, Tumkur, Chitradurga, Haveri and Dharwad of Karnataka state. As planned the project started from 10-09-2001 and likely to end by 31-03-07.

The key development objectives is to improve the productive potential of selected watersheds and their associated natural resource base and strengthen community and institutional arrangements for natural resource management. This project prime objective is to Increase household income; Improve agriculture productivity; Improve vegetative cover; Increase milk and horticulture production; Increase fodder and fuel availability ; Enhance quality of life of village communities; Reducing soil erosion and runoff to improve water availability and to conserve the moisture status.

Since, the inception of the project, there are hardly any studies conducted to know knowledge level, adoption level and constraints faced by beneficiary farmers of Sujala watershed development project. Hence, an attempt is made on Sujala Watershed Project with the following objectives.

OBJECTIVES

1. To know the knowledge level of beneficiary farmers on integrated watershed management practices.
2. To study the adoption level of beneficiary farmers on integrated watershed management practices.
3. To study the socio-economic and psychological characteristics of beneficiary farmers of Sujala Watershed project.
4. To analyze the productivity level of major crops in the project area, and
5. To study the problems encountered by beneficiary farmers in adoption of integrated watershed management practices.

IMPORTANCE OF THE STUDY

The results of the study would help the concerned extension agencies, researchers, policy makers to give thought and redesign the extension efforts by knowing empirically the level of knowledge, adoption and constraints. It also helps to take appropriate measures to overcome certain practical difficulties in the practices. It will help to modify the feasible practices based on the constraints faced by the farmers.

LIMITATION OF THE STUDY

Present study is an effort to evaluate the impact of watershed development programme, limitations of time and resources of the investigator made to restrict the area of investigation to only one watershed project. Therefore, the findings obtained can not be generalized to other watershed areas in the state.

II. REVIEW OF LITERATURE

A brief review of previous researches relating to the various dimensions of the present study has been made and presented in this chapter. The review is presented as below under various subsections in accordance with the objectives set for the study.

- 2.1 Knowledge level of beneficiary farmers on integrated watershed management practices
- 2.2 Adoption level of beneficiary farmers on integrated watershed management practices
- 2.3 Socio-economic and psychological characteristics of beneficiary farmers of Sujala Watershed project
- 2.4 Productivity level of major crops in the project area and,
- 2.5 Problems encountered by beneficiary farmers in adoption of integrated watershed management practices

2.1 KNOWLEDGE LEVEL OF BENEFICIARY FARMERS ON INTEGRATED WATERSHED MANAGEMENT PRACTICES

Rajkumar (1981) found that most of the beneficiaries of water management scheme possessed medium level of knowledge (76.77%) in soil and water management techniques followed by low (15%) and high (8.33%) level of knowledge.

Jaiswal *et al.* (1985) reported that majority (63%) of the respondents from Vaghnadi and 94 per cent from Umaria watershed of Amreli district had fairly good knowledge about contour bunding, while 67 per cent of the Vaghnadi farmers and 42 per cent from Umaria watershed knew about the use of improved crop variety and cultural practices.

Krishnakumar (1987) opined that majority (63.34%) of the respondents had medium level of knowledge, 23.33 per cent had high level of knowledge and 13.33 per cent had low level of knowledge in case of adopter categories of soil conservation practices. In the non-adopter category, 66.66 per cent of the respondents had medium level of knowledge, 10 per cent had high level of knowledge and 23.33 per cent of them had low level of knowledge.

Savithri (1992) inferred that 50.67 per cent of farm women had medium level of knowledge on dry land technologies and 30 per cent of them possessed high level followed by low level (19.33%).

Reddy and Iqbal (1993) revealed that majority 81.34 per cent of beneficiaries of watershed development programme possessed high knowledge and 70.68 per cent of non-beneficiaries possessed low knowledge of soil and moisture conservation measures.

Sudarshan Reddy and Iqbal (1993) revealed that majority (18.34%) of the beneficiaries possessed high knowledge on watershed development components followed by medium level of knowledge (18.66%). None of the beneficiaries had low knowledge about the programme.

Khedkar and Ingle (1994) in their study revealed that majority (87%) of the farmers had knowledge of some practices viz., brush wood dam to outlet (100%) intercropping (100%), farm pond (100%), *kharif* fallow (95.83%), boundary bunds (92.92%) and sowing across the slope (87.5%), sizeable number of farmers (30%) had knowledge of vetivar bunds, soil amendments, grass water way, sowing on the contour and surface drains about soil and water conservation practices.

Lakshmi and Manoharan (1994) revealed that most of large farmers (80%) possessed high knowledge about the soil and moisture conservation practices, followed by 63.33 per cent of medium farmers, 43.33 per cent of small and 36.67 per cent of marginal farmers. On the other hand, 56.67 per cent of small and 53.33 per cent of marginal farmers had medium knowledge. Low level of knowledge was observed with 36.67 per cent, 20 per cent of large and 10.00 per cent of marginal farmers about dryland technologies.

Mahipal and Prasad (1995) found that majority of the participants has gained medium level of knowledge in most of the training programmes. However, majority of participants (68.24%) were found in the medium level of knowledge gain in the alternate land use systems training programme. Whereas, the minimum knowledge gain (64.29%) was the case of crop planning and cropping system under rainfed conditions.

Manjunath *et al.* (1995) revealed that a more number of farmers (53%) belonged to medium knowledge category, while 24.00 and 23.00 per cent of them belonged to high and low knowledge category, in respect of dry land farming practices.

Dhanorkar (1998) in his study entitled impact of government and non-government organizations on agricultural growth of tribals in Gadchiroli district of Maharashtra state found extremely low level of knowledge amongst the tribals about watershed practices.

Kadam *et al.* (2001) reported that majority of the beneficiaries had knowledge about the practices namely dividing the fields with small bunds (82.00%) and small earthen bunds (76.66%). More than two-fifth of the beneficiaries had knowledge about the practices namely stubble and agro waste plucking (46.00%), drains per trenches (43.33%) and intercropping (42.00%).

Sridhar (2002) in his evaluative study of watershed programme in pavagada taluk of tumkur district in Karnataka revealed that knowledge about soil and water conservation practices, more than 50.00 per cent changes was observed in case of contour bunds (53.94%), ploughing across the slope (58.00%), strengthening of existing bunds (56.66%) and water ways (57.33%).

Raghunandan (2004) reported that about 17.50 per cent of respondents had the complete knowledge of contour cultivation purpose.

Based on the overall analysis of earlier studies, it could be concluded that there existed by and large medium to high degree of knowledge on soil and water conservation practices among the farmers involved in soil and water conservation schemes.

2.2 ADOPTION LEVEL OF BENEFICIARY FARMERS ON INTEGRATED WATERSHED MANAGEMENT PRACTICES

Kunnal and Itnal (1984) reported that 46 per cent of farmers had adopted soil and moisture conservation measures such as contour bunding, deep ploughing and surface collection of water in black cotton soil areas of Bijapur.

Jaiswal and Yaradappanar (1985) while evaluating Guddadarangavanhalli watershed in Chitradurga district found that all farmers were adopted sowing across the slope and majority were adopted improved varieties in ragi and jowar crops. The percentage of adoption was low in respect of other crops.

Jaiswal *et al.* (1985) observed that in DVC watershed area, the farmers from outside watershed area adopted bunding and levelling to the extent of 47 per cent when they had been exposed to the tangible benefits of these practices in the watershed area.

Venugopal (1985) found that more than 60 per cent of participant farmers in dryland agricultural project had adopted practices like ploughing across the slope, land smoothing and levelling and opening of dead furrows at 10 feet interval in Chintamani taluk of Kolar district.

Venkataswamy Reddy (1987) in his study on Kabbalanala watershed project in Karnataka revealed that 54 per cent of the respondents belonged to high adoption category in case of soil and water conservation practices. The specific practices such as graded bunds, growing grasses on bunds, maintaining grass out-lets and sowing across the slope were adopted by all farmers. Whereas, no adoption was found with respect to opening of dead furrows at every 10 feet across the slope and sowing seeds of stylozanthus on bunds. Besides, the adoption level of big farmers was significantly higher than that of small farmers in all the above said practices.

Sundar Rao (1988) found that majority (60%) of large farmers had adopted all the soil and moisture conservation practices, whereas, 83 per cent of the marginal farmers, 78 per cent of small farmers and 54 per cent of medium farmers did not adopt. In all, only 30 per cent of farmers adopted fully all the soil and moisture conservation practices, 4 per cent of them partly and the remaining did not adopt these practices.

Singh and Sharma (1989) reported that farmers in Mijzapur operational research project of Uttar Pradesh had adopted most of the soil and moisture conservation practices like graded bunding, grass waterways and water regulating spillways. The effect of adoption of these practices was observed through improvements in soil moisture status, control of soil erosion and increase in crop productivity.

Katam Reddy *et al.* (1989) found significant differences in the adoption of all improved dryland technology of groundnut growing participants as compared to benchmark survey report in Terracherva model watershed of Andhra Pradesh.

Farooque (1990) that 91.33 per cent of farmers adopted contour cultivation, 97.33 per cent crop rotation, 99.33 per cent application of FYM, 83.33 per cent mixed cropping, 94.67 per cent deep ploughing. While, 100 per cent of them were using drought resistant varieties, chemical fertilizers and following interculture practices in drought prone areas of Auranhabad district of Maharashtra.

Boite and Girase (1991) emphasized that low and high adoption level rates were 38.75 and 61.25 per cent, respectively regarding the adoption of improved dryland technologies with reference to pearl millet in Maharashtra.

Sahukar (1991) in his study found that a majority of both members and non-members had fully adopted like variety (84.00% and 74.67%), sowing time (80.00% and 82.67%), seed rate (81.33% and 82.67%), seed treatment (69.33% and 77.33%), application of phosphorus (52.00% and 53.33%), potash (54.00% and 57.35%) and time of fertilizer application (53.33% and 54.67%).

Sundaraswamy and Bavalatti (1991) in their study in Karnataka found that the pattern of adoption of various dryland farming practices *viz.*, contour cultivation was 68.87 per cent, crop rotation was 94.67 per cent, strip cropping was 26.67 per cent and deep ploughing was 76.67 per cent. Contour ploughing was 48 per cent, ridge and furrow cultivation was 56.67 per cent, zig zag terracing was 7.33 per cent and stubble mulching was only 15.33 per cent.

Padmaiah *et al.* (1992) found that majority (52%) of farmers from inside the watershed were in medium adoption group followed by high adoption group (34%) and low adoption (14%). In case of outside the watershed majority of farmers (66%) was in the medium adoption group followed by 34 per cent low adoption group. There was no high adoption group indicating that there were some constraints felt by the farmer of Karnataka.

Shaikh *et al.* (1993) reported that all the growers adopted the technology of recommended spacing and 50 per cent of farmers adopted the recommended doses of fertilizer.

Girase *et al.* (1994) in their study in Maharashtra reported that a majority of farmers adopted recommended practices of kharif jowar like selection of proper soil type, proper preparatory tillage, use of improved varieties, seed rate, time of sowing, spacing and intercultural operation. The adoption was noted to be less of proper doses of chemical fertilizers, use of manure and plant protection measures.

Sundarambal (1994) found that majority of the farmers of Tamil Nadu and medium level of adoption of sorghum crop production technology followed by high and low adoption levels.

Deshmukh *et al.* (1995) revealed that 47.50 per cent of the respondents had high adoption regarding improved farm practices like use of improved seed. In case of application of chemical fertilizers among various crops, 32.5 per cent of them were under medium adoption category. Whereas, 16.66 per cent fall in the category of low adoption.

Meti and Hanchinal (1995) found that the majority of the respondents (56.66%) had fallen in medium adoption category. Whereas, high and low adopter respondents were 26.66 and 16.66 per cent, respectively.

Farooque *et al.* (1997) indicated that all the respondents adopted the recommended drought resistant varieties, chemical fertilizers and intercultural operations while majority of them adopted the practices like farmyard manure (99.33%), deep ploughing (94.67%), crop rotation (97.33%), mixed cropping (83.33%) and contour cultivation (91.33%). It is likely to due to continuous exposure to the hazards of the dryland farming, the farmers in all the categories must have perceived the importance and profitability of these farm practices.

Narayana Gowda and Jayaramaiah (1997) revealed that the adoption level of participants of soil and moisture conservation practices in respect of ragi was significantly higher than non-participants. Thus, sowing a wide gap between two group in this aspect.

Khade *et al.* (1998) indicated that 70.83 per cent of the respondents had medium level of adoption of the dryland technology of kharif jowar followed by 15.83 per cent of them having low level of adoption and only 13.34 per cent of them had high level of adoption of dryland technology of jowar crop.

Dubolia and Jaiswal (2000) the study revealed that the different practices performed by farmers with the extent of adoption of groundnut cultivation were maximum in sowing time, method of sowing, improved varieties, land preparation, seed rate, intercultural operation, other practices like summer ploughing, doses of fertilizer *etc.* were partially adopted. However, the method of fertilizer application soil treatment and seed treatment was very low adoption and cent per cent farmers were not using the groundnut culture.

Jondhale *et al.* (2000) revealed that the recommended practices *viz.*, across the slope sowing, growing grasses in gullies, natural grasses on boundaries, water ways and afforestation practices were adopted only 13.13, 11.88, 7.50, 5.00 and 10.00 per cent of respondents, respectively.

Majority (46.67%) of them had medium level adoption, while 36.25 per cent of their were found to be in low level adoption category and the percentage in high adoption category was to the tune of 16.88 per cent only.

Shinde *et al.* (2000) revealed that the adoption of indigenous agricultural practices by the dryland farmers were found to be quite satisfactory *i.e.*, above 90 per cent of the respondents adopted these practices. It was further noted that the cent per cent respondents adopted the crop rotation, seed treatment (90%) with cow urine and dung slurry. East-west sowing in kharif and North-South in rabi season, intercropping (56.67%) under rainfed condition.

Kadam *et al.* (2001) in their study revealed that majority of the beneficiaries (68%) had adopted only one practice namely, dividing fields with small bunds. The practices namely stubble and agro-waste plucking (38.66%) and small earthen bunds (23.33%) were also adopted by a considerable number of the beneficiaries.

Waghmore and Ingle (2001) revealed that selection of crop as per fertility of land was adopted by 75.67 per cent, boundary bunds by 44.59 per cent brush wood dam by 94.59 per cent and all respondents adopted the practice harrowing for levelling and intercropping. In 10-15 km area brush wood dam was adopted by 49.18 per cent and intercropping was adopted by 63.93 per cent respondents.

2.3 SOCIO-ECONOMIC AND PSYCHOLOGICAL CHARACTERISTICS OF BENEFICIARY FARMERS OF SUJALA WATERSHED PROJECT

2.3.1 Age

Saikrishna (1998) in his study “A study on knowledge of paddy cultivation practices and adoption behaviour of Andhra Migrant farmers in Raichur district” reported that more than half of the respondents (55.33%) belonged to the group of 35-50 years.

Patil *et al.* (2000) in his study correlates of knowledge and adoption of Konkani tribal farmers found that the most of the tribal farmers were in age group of 35-45 years.

Madhavareddy (2001) in his study on peoples’ participation in watershed development programme implemented by government and non-government organization – A comparative analysis revealed that equal percentage of respondents (38.30% each) belonged to the middle age category in both government organization and non-government organization watershed. Higher per cent of farmers (38.30%) of government organization watershed belong to young age category compared to 23.30 per cent of farmers belonging to old age group.

Sridhar (2002) in his evaluative study of watershed programme in Pavagada taluk of Tumkur district in Karnataka found that 44.67 per cent of the respondents were middle aged, while, 28.00 per cent of them were young and remaining 27.33 per cent belong to old age.

Raghunandan (2004) in his study a study on knowledge and adoption level of soil and water conservation practices by farmers in northern Karnataka reported that 45.00 per cent of the respondents (45.33%) belonged to the middle age group, followed by old age (36.25%) and young age group (18.75%), respectively.

2.3.2 Education

Marilingannavar and Manjunath (1992) reported that majority of the respondents (76.00%) were found to be illiterate. Whereas, only 17.33 per cent of them had education upto primary school and 5.33 per cent of them could just read and write, while, negligible (0.67%) of the respondents had education upto high school and college level.

Gupta (1999) found that 43.34 per cent of the respondents were educated upto middle school, followed by 19.33 per cent each in primary school and high school. Whereas, only 0.67 per cent of them were graduates.

Sridhar (2002) found that 26.67 per cent of the respondents were educated upto high school, 24.66 per cent upto middle school, 12.67 per cent upto primary school, 12.00 per cent could read and write, 11.33 per cent had collegiate education. The percentage of illiterates was 12.67.

Raghunandan (2004) revealed that majority (73.75%) of the respondents are literates of which 22.50 per cent studied upto primary school. 20.00 per cent studied middle school, 15.00 per cent respondents upto high school, 11.25 per cent of respondents upto pre-university, whereas, 5 per cent respondents had graduation, whereas, 23.28 per cent of the respondents were illiterate.

Ninga Reddy (2005) in his study a study on knowledge extent of participation and benefits derived by participant farmers of the watershed development programme in Raichur district of Karnataka reported that 30.00 per cent of the respondents had education upto high school, followed by middle school (28.00%) and primary school (27.33%). Nearly 12.00 per cent of them were illiterates, while a meager 4.00 per cent of them had education upto college and degree programme.

2.3.3 Family type

Hanumanaikar (1995) found that 45.50 per cent of the respondents belong to nuclear family, while 54.50 per cent of them belong to joint family.

Sakharkar (1995) reported that 54.53 and 45.67 per cent of the respondents belong to nuclear and joint families, respectively.

Sanyogita Deshmukh and Asha Mane [1999] reported that 54.00 per cent of respondents belonged to nuclear family whereas 46.00 per cent of them belonged to joint family.

Sridhar (2002) reported that more than half of the respondents (54.00%) belonged to nuclear family. While, 46.00 per cent of them were belonged to joint family.

Ninga Reddy (2005) reported that 62.67 per cent of respondents belong to nuclear family. Whereas, 37.33 per cent of them were belonged to joint family.

2.3.4 Family size

Balmatti (1993) found that 37.50 per cent of the respondents were belonged to small family size while 62.50 per cent of them belonged to large family size.

Hanumanaikar (1995) revealed that 34.50, 31.50 and 34.00 per cent of the farmers belonged to small, medium and large size families, respectively.

Sridhar (2002) reported that majority (75.33%) of families had belonged to medium family size. While, 14.67 per cent and 10.00 per cent of farmers belonged to small and big family size respectively.

Raghunandan (2004) reported that majority of the respondents belong to medium sized families (62.85%), followed by big families (25%) and small families (13.75%).

Ninga Reddy (2005) reported that majority of the respondents had medium family size (60.00%), followed by big (34.67%) and small family size (5.33%) respectively.

2.3.5 Land holding

Ramchand and Sohal (1985) reported that 15 per cent of the farmers had large land holding, whereas 42.00 per cent each had medium and small land holding.

Naik (1993) found that 40.00 per cent of the respondents were big farmers, followed by small landholders (30.00%) and marginal landholders (26.00%).

Nagaraj (1996) reported that 48 per cent of the participant farmers belong to medium land holding category, followed by 30.67 per cent in small landholding category, only 8 per cent of them were big farmers.

Madhavreddy (2001) reported that 35.00 per cent of the respondents were marginal farmers, 26.60 per cent were small farmers and 21.80 per cent were medium farmers.

Ninga Reddy (2005) reported that comparatively more number of farmers (64.00%) belonged to semi medium land holding category, followed by 22.00 per cent in medium category, whereas 10.67 per cent of them had small land holding and a meager 3.33 per cent of them belonged to big land holding category.

2.3.6 Annual income

Narasimha (1980) reported that 68 per cent of trained farmers had low income level.

Purushotham *et al.* (1988) reported that 62 per cent of the respondents belonged to low income group, 24.00 per cent to middle income group and 14.00 per cent to high income group.

Nagaraj (1996) revealed that 44.00 per cent of participant farmers had income between Rs. 5,000 and Rs. 10,000, while, 25.00 per cent of them had income of more than Rs. 10,000 annually.

Sridhar (2002) reported that 43.00 per cent of the respondents belonged to income group of Rs. 11,001 to Rs. 22,000 per annum, whereas only few of them (6.6%) belonged to higher income group of Rs. 22,001 to Rs. 33,000.

Ninga Reddy (2005) reported that majority (60.00%) of the respondents belonged to income group of Rs. 11,001 to Rs. 22,000 per annum. Whereas 20.00 per cent of them

belonged to income group of Rs. 22,001 to 33,000 an equal per cent of respondents (10.00%) belong to income upto Rs. 11,000 and Rs. 33,000 and above respectively.

2.3.7 Social participation

Srinivasareddy (1995) found that, 57 per cent of mango growers had medium level followed by low level (33.00%) and high (10.00%) levels of organizational participation.

Saikrishna (1998) conducted a study in Raichur district on Andhra migrant farmers reported that, six per cent of the respondents were members of milk co-operative society, only 1.33 per cent of farmers were office bearers. Only 3.33 per cent of farmers were the members of village Panchayat and no one was its office bearer and two per cent of migrant farmers were members of youth club and co-operative bank.

Siddappa (1999) found that 6.87 per cent and 6.25 per cent of the pomegranate growers were members of fruit growers association and youth club respectively. Only 4.37 per cent and 3.75 per cent of the respondents were the members of taluk panchayat and gram panchayat respectively.

Vijay Kumar (2000) conducted study on sugarcane growers in Belgaum district of Karnataka and found that, 29.00 per cent of the respondents were members of co-operative societies and 2.00 per cent are office bearers. Whereas, 8.00 per cent of the farmers were members of youth club and 5.33 per cent of the respondents were members of gram panchayat.

Sandesh (2004) found that, 39.17 per cent of the respondents were members co-operative societies only 3.33 per cent of the respondents were members of taluka panchayat and 0.83 per cent are members of zilla panchayata, among these 57.50 per cent of the respondents regularly participating in cooperative societies.

2.3.8 Mass media utilization

Gupta (1999) reported that all the respondents possessed radio, while 86.60 per cent of them possessed television sets and 72 per cent were of them regular listeners of agricultural programmes and 64.67 per cent listen other programmes. While 48.00 per cent and 41 per cent of them were occasionally viewing agricultural and general programmes, respectively on television.

Maraddi (1999) in a study on cotton growers reported that 49 per cent of the respondents were having low mass media exposure and 42 per cent and 9 per cent were having medium and high mass media exposure, respectively.

Kanavi (2000) reported that among the different mass media studied, 82 per cent of the respondents possessed radio and 42.66 per cent television, while 16.66 per cent of them subscribe newspapers and two per cent agricultural magazines. Further, it is reported that in case of television, 13.33 per cent viewed agricultural programmes regularly, followed by news (38.66%) and general programmes (15.33%).

Madhavareddy (2001) found that most of the respondents of Governmental organizations watershed had high (51.6%) mass media utilization, followed by low (16.8%) and medium level (31.6%) mass media utilization. Large number of non-governmental organization watershed farmers had medium level of participation (53.4%), followed by high (25.00%) and low level (21.6%).

Ninga Reddy (2005) reported that 80.00 per cent of the respondents possessed radio and 54.00 per cent television, while 40.61 per cent of them subscribed newspaper. Further, in case of radio it is reported that 22.0 per cent of them listened to agricultural programme regularly. In case of television 25.34 per cent of respondent farmers viewed the agricultural programme regularly.

2.3.9 Extension contact

Prasad (1994) observed that 51.00 per cent of farmers had medium extension contact, followed by 32.78 per cent had low and 16.66 per cent had high category of extension contact.

Angadi (1999) found that majority (65.62%) of the respondents had contact with Agricultural Assistants (AAs) whenever there was a problem, while 62.50 per cent of respondents had no contact with Assistant Agricultural Officers (AAO), only 13.12 per cent of them had contact with scientists whenever they cause problems.

Karpagam (2000) conducted a study on turmeric growers and found that 93.33 per cent of the respondents were aware of Assistant Agricultural Officers (AAOs), followed by 90 per cent of them knowing AOs or HO and 68.33 per cent respondents were aware of ADA or ADH, about half of the respondents have contacted AAOs, followed by 30.83 per cent AO or HO.

Sridhar (2002) revealed that 35.33 per cent of the farmers regularly contacted AAs, while 32.00 and 32.67 per cent of them occasionally and never contacted AAs, respectively. Forty two per cent of the farmers regularly contacted Raita Samparka Kendras, while 29.33 and 28.66 per cent of them occasionally and never contacted Raith Samparka Kendra, respectively.

Ninga Reddy (2005) reported that 68.00 per cent of the respondents regularly contacted AAs followed by 60.00 per cent of them contacting AAOS regularly. Also 54.67 and 46.67 per cent of them regularly contacted NGO officials and Raita Samparka Kendra respectively.

2.3.10 Risk orientation

Balasubramanian (1985) reported that 54.57 per cent of the cotton growers were found to have high level of risk preference. A little lesser than half of the respondents (45.33%) had low level of risk orientation.

Rathinsabapathi (1987) reported that considerable per cent of the cotton growers had medium level of risk preference (55.50%), followed by high level (24.20%) and low level (20.30%).

Gupta (1999) observed that majority (64.00%) of respondents were average risk bearers, followed by low (24.67%) and high (11.33%) risk bearers respectively.

Madhavareddy (2001) revealed that more than two-third, of NGO beneficiaries had low risk orientation (66.7%) and rest belong to high (23.3%) and medium (10.00%), risk orientation categories respectively. Almost, an equal percentage of governmental organization beneficiaries belong to low (46.6%) and high (43.3%) risk orientation categories, respectively.

Ninga Reddy (2005) observed that considerable per cent (56.00) belonged to medium risk orientation category followed by high (28.00%) and low (19.33%) risk orientation categories respectively.

2.3.11 Innovativeness

Farooque (1990) in his study on the adoption behaviour of farmers of drought prone area of Aurangabad district of Maharashtra state reported that majority of the farmers (71.92%) had high innovative proneness. Whereas, 53.66 per cent of medium adopters and 51.92 per cent of high adopters had low innovative proneness.

Nataraju and Perumal (1996) revealed that majority of them reading farm magazines belonged to medium level of innovativeness.

Sawant (1999) conducted a study on effectiveness of different modes of presentation of information on mushroom cultivation in Maharashtra state and reported that 72 per cent of the respondents belonged to medium innovativeness category.

Shashidhara (2003) in his study a study on socio-economic profile of drip irrigation farmers reported that the distribution of high innovativeness was noticed by 52.22 per cent of farmers followed by 31.11 per cent of them having medium innovativeness. The remaining 16.67 per cent of the farmers were found to exhibit low innovativeness.

Ninga Reddy (2005) revealed that majority of the respondents (82.00%) belonged to medium innovativeness category, whereas 11.3 and 6.66 per cent of them belong to high and low level of innovativeness categories, respectively.

2.3.12 Management orientation

Visweswaran (1979) noticed that migrant farmers had better planning orientation than non-migrant farmers.

Sakharakar (1995) noticed that two third of the respondents belonged to medium category of management orientation. However, an equal number of respondents had low and high level of management orientation.

Chikhale *et al* [1996] revealed that majority of the respondents (71.00%) belonged to medium management orientation category. while 16.5 and 12.5 per cent of them belonged to low and high management orientation categories respectively.

Chaudhari *et al* (1999) revealed that 50.00 per cent of respondents belonged to high management orientation category

Ninga Reddy (2005) revealed that majority of the respondents (70.66%) belonged to medium management orientation category, whereas 15.33 and 14.00 per cent of them fall under high and low level of management orientation categories, respectively.

2.4 PRODUCTIVITY LEVEL OF MAJOR CROPS IN THE PROJECT AREA

Chandre Gowda and Jayaramaiah (1990) in their study reported that the average yield of ragi increased by 3.09 and 2.14 q per acre in case of small and marginal farmers, respectively over a period of four years. In case of groundnut also there was increase from 3.32 and 2.25 q per acre in the fields of small and marginal farmers, respectively.

Singh (1990) in his study conducted in Uttar Pradesh reported that the productivity increased by 21.4 per cent (pigeonpea) 24.58 per cent (wheat) in about five years. The increase in productivity in other prime crops like mustard (23.9%), groundnut (22.5%), pearl millet (22.0%), blackgram (17.0%), lentil (11.7%), grain (10.7%) and pea (7.5%), respectively.

Hazra (1993) found that watershed programme has helped to increase the irrigation potential by farmers, which definitely helped to increase the productivity of crops.

Vanamoorthy and Shankarmurthy (1994) revealed that there is positive effect of watershed development activity on production, productivity and increased the manday of work of the farmers, which indicated the increase in employment.

Singh *et al.* (1995) in their study revealed that after implementation of project for five years (1988-89 to 1992-93). The project was evaluated in terms of conservation and development of resources and increased in productivity. The watershed management programme has not only increased the crops yield but also developed fodder resources in the area. The productivity of maize, paddy, jowar, blackgram and wheat have increased by about 2.15, 2.16, 1.79, 3.62 and 2.07 times, respectively. Over the base year (1988-89) yield of 5.0, 4.5, 5.0, 2.0 and 6.5 q per ha, respectively.

Hazra (1998) found that dairy and fishery production has increased, increased in fodder production and also increase in employment after the execution of watershed development programmes.

Patil (1999) found that there was positive change in productivity and increase in fodder production due to watershed development programme in various parts of the country.

2.5 PROBLEMS ENCOUNTERED BY BENEFICIARY FARMERS IN ADOPTION OF INTEGRATED WATERSHED MANAGEMENT PRACTICES

Bhoite and Dysane (1990) in their study conducted in Maharashtra on constraints in adoption of sunflower technology indicated that 56 per cent of farmers did not have bullock pair, while 48 per cent reported that preparatory tillage practices were not profitable. Other constraints were non-availability of seed and labour intime. Besides this, number of constraints were reported regarding use of improved varieties and seed treatment practices more than 50 per cent of the farmers reported that the yield of recommended varieties of sunflower was poor.

Shivaprasad (1990) observed that lack of required finances, soil and water conservation works were not executed properly as per technical recommendations, lack of technical guidance from extension officers and cost of recommended inputs were the major constraints as perceived by the farmers of Andhra Pradesh in adoption of recommended watershed practices.

Iqbal (1991) in his study conducted in Andhra Pradesh indicated the constraints in adoption of recommended watershed management practices were non-availability of farm implements suited to dryland, untimely supply of agricultural inputs, lack of timely credit, high cost of seeds and fertilizer, lack of training on improved dryland agricultural practices and failure of rains.

Prasad and Mahipal (1991) in a study conducted in Ranga Reddy district of Andhra Pradesh found that lack of knowledge, lack of credit, lack of conviction, non-availability of inputs intime, delay in rains, operational difficulty and unfavourable attitude towards using chemical fertilizers for dryland crops were the major constraints in the adoption of package of practices of sorghum cultivation in red soil.

Sundaraswamy and Bavalatti (1991) in a study conducted in Bijapur district of Karnataka reported that the reasons for non-adoption of dryland farming implements were non-availability, heavy soils and lack of conviction about the advantages of technology.

Padmaiah *et al.* (1992) in a study conducted in Karnataka reported the reasons for non-adoption of soil conservation practices were risky (70%), high cost (52%) and requires high skill (40%), ranking first, second and third, respectively. Whereas, lack of credit (36%) was ranked fourth followed by shortage of money and lack of water lifting devices.

Raghuprasad (1992) in his study indicated the constraints faced by the sericulturists of Dharwad district was distant market, non-availability of labour, non-availability of disease free laying and non-availability eggs at proper time as the main constraints.

Jagadale and Nimbalkar (1993) identified the constraints such as lack of knowledge about importance of bunding, uncertainty of rains, high cost of improved seed drill, poor breed quality of HYV, high cost and diversion of fertilizers to irrigated crops and non-availability of chemicals and plant protection equipment as experimented by the farmers of Maharashtra.

Venkatapirabhu and Perumal (1995) identified lack of irrigation, lack of incentives, lack of knowledge, lack of technical guidance, lack of choice of tree seedlings, management problems, long gestation period, non-availability of tree seedlings, inadequate land, fragmentation of land *etc.* were the major constraints encountered by the farmers of Tamil Nadu in the adoption of agro-forestry practices.

Ranganathan (1995) in his study observed that low rainfall, lack of labour, lack of conviction, lack of credit facilities, lack of good short duration sorghum varieties and lack of redgram varieties suited for cooking were the constraints faced by the farmers of Tamil Nadu in rainfed farming.

Trivedi and Patel (1996) in their study revealed that lack of inputs, implements, lack of credit, lack of irrigation facility, poor communication facility, poor economic status were the constraints has been observed.

Dhanorkar (1998) found that lack of understanding, hesitation of tribal farmers, create the problem of communication and these problem of communications definitely affect adoption of new technologies.

Jhariya *et al.* (1999) in their study revealed various constraints which reduced the crop productivity in the follow up of watershed programme. The major constraints faced by the farmers under watershed programme were lack of irrigation facilities (82%), lack of inputs (55%), improper extension contact (86%), lack of practicability in training programme (64%) and non-availability of improved seed and varieties (85%).

III. METHODOLOGY

The present investigation was carried during 2004-05 to study the profile of Sujala Watershed Project beneficiary farmers in Dharwad and Kalaghatgi taluks of Dharwad district in Karnataka. The procedure and techniques followed are described under the following headings.

- 3.1 Locale of the study
- 3.2 Description of the study area
- 3.3 Research design
- 3.4 Selection of the villages
- 3.5 Selection of the respondents
- 3.6 Methods followed for measurement and quantification of variables
- 3.7 Tools used for data collection
- 3.8 Statistical tools and tests used

3.1 LOCALE OF THE STUDY

The study was conducted in purposively selected Sujala watershed project of Dharwad and Kalaghatgi taluks of Dharwad district in Karnataka. This watershed project was started during the year 2001 in a phased manner and is likely to complete by 2007. Most of cultivated land in the project area is under rainfed farming and this area is the most backward. Hence, it requires more efforts to bring changes in the socio-economic conditions of the farmers of this area. Further, easy accessibility and convenience of the student researcher were also taken into account for selection of watershed.

3.2 DESCRIPTION OF THE STUDY AREA

Dharwad district falls in the Northern Transitional Zone (Zone 8), it is situated in the interior part of Deccan peninsular and lies between north latitude $14^{\circ}50'$ and $15^{\circ}15'$ and east longitude $74^{\circ}88'$ and 76° . Its altitude ranges between 365 to 730 m. It bounded by Belgaum district in the north, Bijapur district in the northeast, Raichur and Bellary district in the east, Uttar Kannada in the west and Shimoga and Chitradurga districts in the south.

Dharwad district occupies an area of 1378200 ha. The normal annual rainfall of the district comes to 791.1 mm and the climate is moderate and healthy.

The main crops of the area grown are paddy, cotton, groundnut, jowar, pulses like belgalgram, redgram, cowpea, greengram etc.

In agriculture sector, soil conservation measures such as strengthening of existing bunds, farm ponds, gully plugs, check dam etc., were carried out intensively to conserve soil and moisture. Under forest sector, block planting, roadside planting, bund planting were undertaken. In horticulture plantation on community and government lands and production of planting materials were taken up.

3.3 RESEARCH DESIGN

Research design as defined by Kerlinger (1995) is the plan and structure of investigation so conceived as to obtain answers to research questions. Ex post facto research design was followed for conducting the study. Robinson (1976) defined ex post facto research design as any systematic empirical enquiry in which the independent variables have not been directly manipulated because they have already occurred or they are inherently not manipulable. Cooper and Schindler (1992) defined ex post facto as a research design in which investigators have no control over the variables in the sense of being able to manipulate them. They can only report what has happened or what is happening. Keeping in view, the adaptability of the prepared design with respect to the type of study variables under

consideration, size of respondents and phenomenon to be studied. The ex post facto design was selected as an appropriate research design.

3.4 SELECTION OF THE VILLAGES

'Sujala watershed' consists of 79 villages, but for the purpose of the study 10 villages were purposively selected based on maximum area covered under watershed. The selected villages are as follows.

- | | |
|------------------|---------------------|
| 1. Manasur | 6. Muttagi |
| 2. Managundi | 7. Arebasavanakoppa |
| 3. Salakinakoppa | 8. Tumarikoppa |
| 4. Nigadi | 9. Hullambi |
| 5. Yarikoppa | 10. Galagihulakoppa |

3.5 SELECTION OF THE RESPONDENTS

A list of all farmers of the selected villages who were covered by the Sujala watershed project and availed facilities of the project was prepared. From each village, 15 respondents were selected randomly. Thus, totally 150 respondent farmers constituted sample size of the study.

3.6 METHODS FOLLOWED FOR MEASUREMENT AND QUANTIFICATION OF VARIABLES

3.6.1 Dependent variables

3.6.1.1 Knowledge of recommended watershed practices

Knowledge is operationally defined as the body of understood information about recommended watershed practices by the respondents.

Experts made test was developed to measure the knowledge of the farmers about the selected soil and water conservation practices. Knowledge of the respondents regarding recommended watershed practices was measured by using 29 simple questions eliciting information on knowledge of watershed practices. The list of practices was finalized by consulting district watershed development authority. Each practice was given a score of 'zero' and 'one' for no knowledge and complete knowledge respectively. The total possible score was 29. An individual's knowledge index was calculated by the following formula.

$$\text{Knowledge index} = \frac{\text{Score obtained}}{\text{Maximum obtainable score}} \times 100$$

Thus, after computing the knowledge scores, the respondents were grouped into high, medium and low categories by taking the mean and standard deviation as a measure of check.

Category	Score
High	More than (Mean + SD)
Medium	Between (Mean \pm SD)
Low	Less than (Mean- SD)

The percentage increase in knowledge was calculated on the basis of difference between knowledge after watershed year and knowledge before watershed.

The percentage increase in knowledge was calculated as follows.

$$\text{Percentage increase} = \frac{\text{Knowledge after watershed} - \text{knowledge before watershed}}{\text{Total number of respondents}} \times 100$$

3.6.1.2 Adoption of recommended watershed practices

A list of recommended practices to be followed in case of watershed area was prepared in consultation with district watershed development authority. Respondents were asked questions to know whether they adopted them or not. Each practice was given a score of 'zero' and 'one' for no adoption and complete adoption respectively. The total possible score was 26. A respondent's general adoption level was determined quantitatively by adopting the adoption quotient developed by Sengupta (1967).

$$\text{Adoption quotient} = \frac{\text{Adoption score of respondents}}{\text{Maximum adoption score}} \times 100$$

Thus, after computing the adoption quotient, the respondents were grouped into high, medium low categories by taking the mean and standard deviation as a measure of check.

The percentage increase in adoption was calculated on the basis of difference between the practices adopted after watershed and before watershed.

The percentage increase in adoption was calculated as follows

$$\text{Percentage increase} = \frac{\text{Adopted after watershed} - \text{adopted before watershed}}{\text{Total number of respondents}} \times 100$$

3.6.1.3 Production and productivity

Production refers to the total potential in farms of biological and economic crop.

Productivity refers to the economic production of plant product of economic importance, expressed in standard units per unit area.

An attempt has been made to study the production and productivity of groundnut crop or combinations thereof adopted by the respondents in the watershed area before and after watershed programme implementation periods. The crop which account for significantly large percentage of the cropped area have been selected to assess the impact of watershed development programme. The crop viz, paddy was selected. The data on the above crop was collected during interview with the farmers.

The difference in production and kg per acre productivity before and after project period enables us to see the changes in crop production and productivity during two points of time due to the implementation of Sujala Watershed Project and the impact of the programme can be deduced.

3.6.2 Independent variables

3.6.2.1 Age

It refers to the chronological age of the respondent in year at the time of interview was considered. Categorization of age was done as follows by using mean and standard deviation as a measure of check.

Categories	Age
Young	upto 34 years
Middle	35-40 years
Old	above 40 years

Procedure followed by Hiremath (2000) was used with some modification in this study.

3.6.2.2 Education

It refers to the formal schooling of an individual from school to the university degree number of classes completed by the respondents was considered as his educational score.

Categories	Education
Illiterate	Cannot read and write
Can read and write	Can read and write
Primary school	1 – 4 th standard
Middle school	5- 7 th standard
High school	8 – 10 th standard
College education	11 th and above

Then frequencies and percentage were calculated for each categories. The procedure followed by Hiremath (2000) was used with suitable modification.

3.6.2.3 Type and size of family

a) Type of family

The respondents were categorized into two different categories namely joint and nuclear based on which type of family the respondent belongs (Dahama and Bhatnagar, 1980).

b) Size of family

Family size was operationalised as total number of members residing together at the time of investigation. Categorization of size of family was done by using mean and standard deviation as a measure of check.

Categories	Number of members
Small	Upto 5 members
Medium	5-8 members
Large	Above 8 members

The procedure followed by Usha Rani (1999) was used in this study.

3.6.2.4 Annual income

It was measured by considering the total income of the family from all the sources. The classification as suggested by Ministry of Rural Development, Government of India (Anonymous 1998) as followed by Hiremath (2000) was followed.

Category (income Rs./annum)

Upto Rs. 11,000
Rs. 11,001 to Rs. 22,000

Rs. 22,001 to Rs. 33,000

Rs. 33,000 and above

The frequencies and percentages were calculated under each category of annual income.

3.6.2.5 Land holding

It is the actual land owned by the family of farmers in acres. The conversion procedure as specified in the notification brought out by government of India “circular on 280 –12/16/19-RD-III-Vol.-X dated 15 Nov. 1991” (Anonymous 1992) was used. Accordingly one acre of wet land is equated to three acres of dryland. The respondents were categorized based on procedure followed by Hiremath (2000).

Category	Area in acres
Marginal farm	Upto 2.50 acres
Small farm	2.51 to 5.00 acres
Semi-medium	5.01 to 10.00 acres
Medium farm	10.01 to 25.00 acres
Big-farm	More than 25 cares

The results were also expressed in frequency and percentages for each category.

3.6.2.6 Economic status

It refers to respondents, agricultural implements, material possession and type of animals possessed by the families of farmer. Frequencies and percentages were calculated for each of the sources.

A. Agricultural implements and machinery

Items :

Wooden plough

Iron plough

Seed drill

Seed-cum-fertilizer drill

Sprayer/duster

Tractor

B. Material possession

Items :

Bicycle

Scooter

Radio

Television

Gobar gas plant

C. Live stock possession

Buffaloes

Cows

Bullocks

Sheep/goats

Poultry birds

The producer followed by Hiremath (2000) was used

3.6.2.7 Social participation

It is the degree of involvement of the respondents in formal organizations either as a member or office bearer. It was quantified on the basis of scoring system followed by Hiremath (2000) was used.

Items	Score
Not a member in any organization	0
Member in any one of the organization	1
Office bearer	2

Attendance of the meeting of the organization

Never	0
Occasionally	1
Regularly	2

Based on this, the frequencies and percentage were calculated for each degree of participation

3.6.2.8 Mass media utilization

Mass media utilization referred to the degree to which the respondents utilized them in terms of listening to farm broadcast, viewing their telecast, reading newspaper and farm magazine.

The qualification of the variable was done according to the procedure followed by Hiremath (2000) was used.

Item	Possessor /subscriber	Extent of participation		
		Regular	Occasional	Never
Reading news paper	1	2	1	0
Reading farm magazine	1	2	1	0
Listening to radio (general programme)	1	2	1	0
Listening to radio (Agricultural programme)	-	2	1	0
Viewing to T. V. (general	1	2	1	0

programme)				
Viewing to T. V. (Agricultural programme)	-	2	1	0

Then the frequencies and percentages were calculated for each programmer of each mass media.

3.6.2.9 Extension contact

Extension contact has been operationally defined as the frequency of contacts of respondent with the different extension personnel and extension agencies for seeking information about watershed practices. It was measured on three point continuum i.e., regular, occasional and never with score of 2, 1 and 0 respectively. Then the frequencies and percentage were calculated for each extension contact. The procedure followed by Hiremath (2000) was used.

3.6.2.10 Risk orientation

It was operationalized as the degree to which the respondent was oriented towards risk and uncertainty in adopting new ideas or technologies in farming. Risk orientation scale of Supe (1969) was used in this study. The scale consists of one positive item and five negative items. The responses for positive items were scored as 2, 1 and 0, while for negative items the scores were reversed in the order of magnitude, respectively.

The scores obtained for each statement were summed up to get individual respondents risk orientation score. The possible range of score in this scale was from 0 to 12. The respondents were grouped into three categories based on the mean and standard deviation.

3.6.2.11 Innovativeness

It is the degree to which a farmer is eager to adopt the innovations early in his field. In this study, the farmer's innovativeness was measured by using the scale constructed by Moulik and Rao (1973) with some suitable modifications.

Five statements of the scale were fitted against a 5 point continuum. The scoring pattern followed is as given below.

Statements	Scores				
	SA	A	UD	DA	SDA
+ve items	5	4	3	2	1
-ve items	1	2	3	4	5

Note : SA = Strongly agree; A = Agree; UD = Undecided; DA = Disagree;

SDA = Strongly disagree

The summated scores obtained by the respondents on this scale formed the innovativeness score of that individual.

3.6.2.12 Management orientation

It refers to the degree to which a farmer is oriented towards scientific farm management comprising of planning, production and marketing functions on his farm.

In order to know the respondents management orientation, the scale developed by Samanta (1977) was used. The scale consists of 18 statements : six statements each for

planning production and marketing aspects. In each group positive and negative statements were mixed, retaining at the same time, more or less a psychological orders of statements. The positive statements were given a score of 2, 1 and 0 for 'agree', 'undecided', 'disagree', respectively. The scoring was reversed in case of negative statements. Thus, the maximum and minimum scores for each respondents were 90 and 18, respectively. The mean score of the management orientation of the respondent was used for all purpose of analysis. Higher score reveals the more scientific ways of farm management.

3.7 INSTRUMENT USED FOR DATA COLLECTION

The information was elicited from the respondents with the help of structured interview schedule. The tentatively prepared schedule was presented in a non-sample area to test the relevancy and practicability. Based on the experience gained the schedule was modified wherever needed and finalized. The final schedule was used to elicit the information from the respondents by personal interview method.

3.8 STATISTICAL TOOLS AND TEST USED

The statistical tools such as mean, standard deviation, frequency and percentage were employed wherever found appropriate and data were analyzed to draw valid inferences.

IV. RESULTS

The results are presented in this chapter under the following heads.

- 4.1 Overall knowledge level of the respondents about watershed practices
- 4.2 Overall adoption level of the respondents about watershed practices
- 4.3 Impact of watershed development programme on production and productivity
- 4.4 Personal, socio-economic and psychological characteristics of the farmers
- 4.5 Constraints faced by farmers in adoption of watershed management practices

4.1 OVERALL KNOWLEDGE LEVEL OF THE RESPONDENTS ABOUT WATERSHED PRACTICES

The data in Table 1, revealed that majority (45.34%) of the respondents belong to medium level of knowledge about watershed practices with a mean knowledge score of 20.09, whereas 31.33 and 23.33 per cent of respondents belong to high and low knowledge levels with mean knowledge score of 25.96 and 17.23, respectively.

4.1.1 Knowledge of the respondents about individual watershed practices

Table 1. Over all knowledge level of the respondents about watershed practices

n= 150

Sl. No.	Knowledge category	Frequency	Percentage	Mean knowledge score
1.	Low (mean - SD) <18.51	35.	23.33	17.23
2.	Medium (mean \pm SD) 18.52 –23.95	68	45.34	20.09
3.	High (mean + SD) >23.95	47	31.33	25.96

Mean = 21.23

SD = 2.72

From Table 2, it could be observed that in respect of knowledge about soil and water conservation practices, there was increase in the number of respondents by 55.34 per cent in case of waterways, ploughing across the slope (49.34%), strengthening of existing bunds (49.33) and contour bunds (49.27%). It was also evident from the table that percentage increase in number of respondents having knowledge due to the programme was to the extent of 19.23 per cent in land smoothening, 33.33 per cent in opening of furrows, 28.66 per cent in construction of small section bunds, 25.33 per cent in case of vegetative bunds, 18.00 per cent in use of improved agricultural implements and 63.33 per cent in farm pond was found.

In case of improved crop production practices more than 50.00 per cent change was observed only in case of spacing (55.34), fertilizer application (45.33%), using improved varieties (43.33%), across the slope sowing (41.34%) and seed rate (33.34). It was also

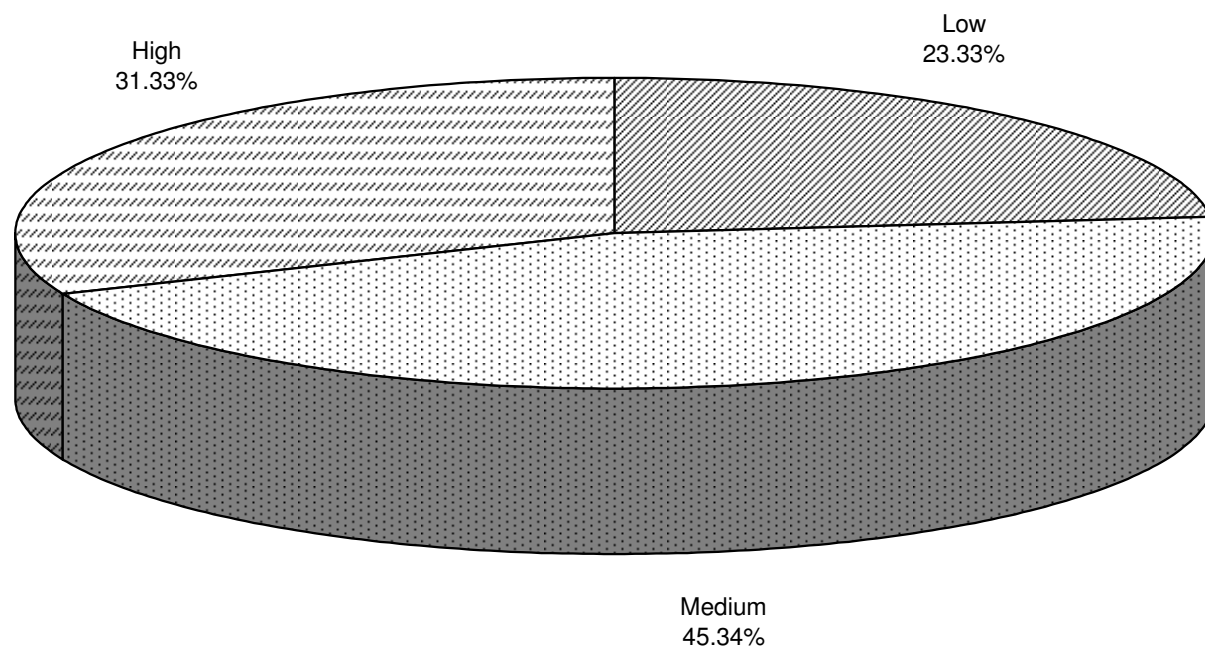


Fig. 1: Over all knowledge level of the respondents about watershed practices

Fig. 1: Over all knowledge level of the respondents about watershed practices

evident from the Table a considerable percentage change in number of respondents having knowledge about intercropping techniques (7.33%), application of FYM (2.00%), summer ploughing (5.34%), green manuring (11.33%), and seed treatment (16.66%) was found after the programme.

It was observed that in case of alternative land use system there was much difference in the number of respondents having knowledge with respect to Agro-horticulture (56.66%) and Agro-forestry (42.33%), there was not much difference in the number of respondents having knowledge about silvi-pasture (12.00%) after the programme.

In case of drainage line treatment the number of respondents, having knowledge after the implementation was increased by over 50.00 per cent in Nala bunds (52.66%) and loose boulder structure (52.00%). It was also evident from the table that there was increase in number of respondents having knowledge about earthen check dam (46.00%) and vegetative break dam (35.33%) due to programme.

4.2 OVERALL ADOPTION LEVEL OF THE RESPONDENTS ABOUT WATERSHED PRACTICES

The data presented in the Table 3 indicated that a majority (58.00%) of the respondents belonged to medium adoption level category with mean adoption score of 13.78. Only 30.67 and 11.33 per cent of the respondents belonged to low and high adoption level categories with mean adoption scores of 6.92 and 20.50, respectively towards adoption of watershed practices.

4.2.1 Adoption of the respondents about individual watershed practices

In sight into Table 4, projects the adoption of individual watershed practices by respondents. The results of adoption are presented in the following paragraphs.

The data in the table revealed that there was increase in the number of respondents with respect to adoption of soil and water conservation practices by respondents like contour bunds (55.34%), water ways (44.00%), strengthening of existing bunds (42.67%) and ploughing across the slope (29.33%) due to the programme. It was also evident from the table that there was increase in number of respondents by considerable percentage who adopted land smoothening (24.00%), opening of furrows (11.33%), construction of small section bunds (5.33%), vegetative bunds (10.00%), use of improved agricultural implements (10.00%) and farm pond (14.66%) after the programme,

The data in the table further revealed that in case of improved crop production practices. There was increase in number of respondents with respect to adoption about seed rate (45.34%) followed by spacing (51.33%) and improved variety seeds (41.33%). Further, the table also revealed that increase in number of respondents who adopted application of FYM (12.67%), fertilizer application (36.00%), plant protection (36.00%) seed treatment (18.67%) and cent per cent of the respondents had adopting recommended time of sowing was found after the watershed programme. It was also evident from the table that there was increase in number of respondents by considerable percentage who adopted transplanting (7.33%) and sowing by seed drill (6.6%) after the programme.

It was observed that in case of alternate land use system, around 20 per cent increase in respect to adoption about Agro-horticulture (18.67%). It also revealed that no one adopted agro-forestry and silvi pasture system.

4.3 IMPACT OF WATERSHED DEVELOPMENT PROGRAMME ON PRODUCTION AND PRODUCTIVITY OF PADDY

The data recorded in Table 5 reveals the increase in the mean production (q) and productivity (kg/ac) of the main crop; paddy grown by the respondents over the base year.

Table 2. Knowledge of the respondents about individual watershed practices

Sl. No.	Description	Before watershed		After watershed		% increase
		Freq.	%	Freq.	%	
I	Soil and water conservation practices					
1.	Ploughing across the slope	70	46.66	144	96.00	49.34
2.	Land smoothening	117	78.00	146	97.33	19.33
3.	Contour bunds	74	49.33	148	98.60	49.27
4.	Strengthening of existing bunds	68	45.33	142	94.66	49.33
5.	Vegetative bunds	14	9.33	52	34.66	25.33
6.	Water ways	43	28.66	126	84.00	55.34
7.	Construction of small section bunds	79	52.66	122	81.33	28.67
8.	Opening of furrows	93	62.00	143	95.33	33.33
9.	Use of improved Agril implements	16	10.66	43	28.66	18.00
10.	Farm pond	17	11.33	112	74.66	63.33
II	Improved crop production practices					
1.	Summer ploughing	139	92.66	147	98.00	5.34
2.	Across the slope sowing	82	54.66	144	96.00	41.34
3.	Improved varieties	32	21.33	97	64.66	43.33
4.	Seed treatment	18	12.00	43	28.66	16.66
5.	Seed rate	85	56.66	135	90.00	33.34
6.	Spacing	68	45.33	126	84.00	55.34
7.	Application of FYM	140	93.33	143	95.33	2.00
8.	Green manuring	35	23.33	52	34.66	11.33
9.	Inter cropping techniques	138	92.00	149	99.33	7.33
10.	Fertilizer application	71	47.33	139	92.66	45.33
III	Alternate land use system					
1.	Agro-forestry	32	21.33	95	63.33	42.33
2.	Agro-horticulture	27	18.00	112	74.66	56.66
3.	Silvi-pasture	12	8.00	30	20.00	12.00
IV	Drainage line treatment					
1.	Nala bunds	42	28.00	121	80.66	52.66
2.	Loose boulder structure	38	25.33	116	77.33	52.00
3.	Vegetative break dam	10	6.66	63	42.00	35.34
4.	Earthen check dam	68	45.33	137	91.33	46.00

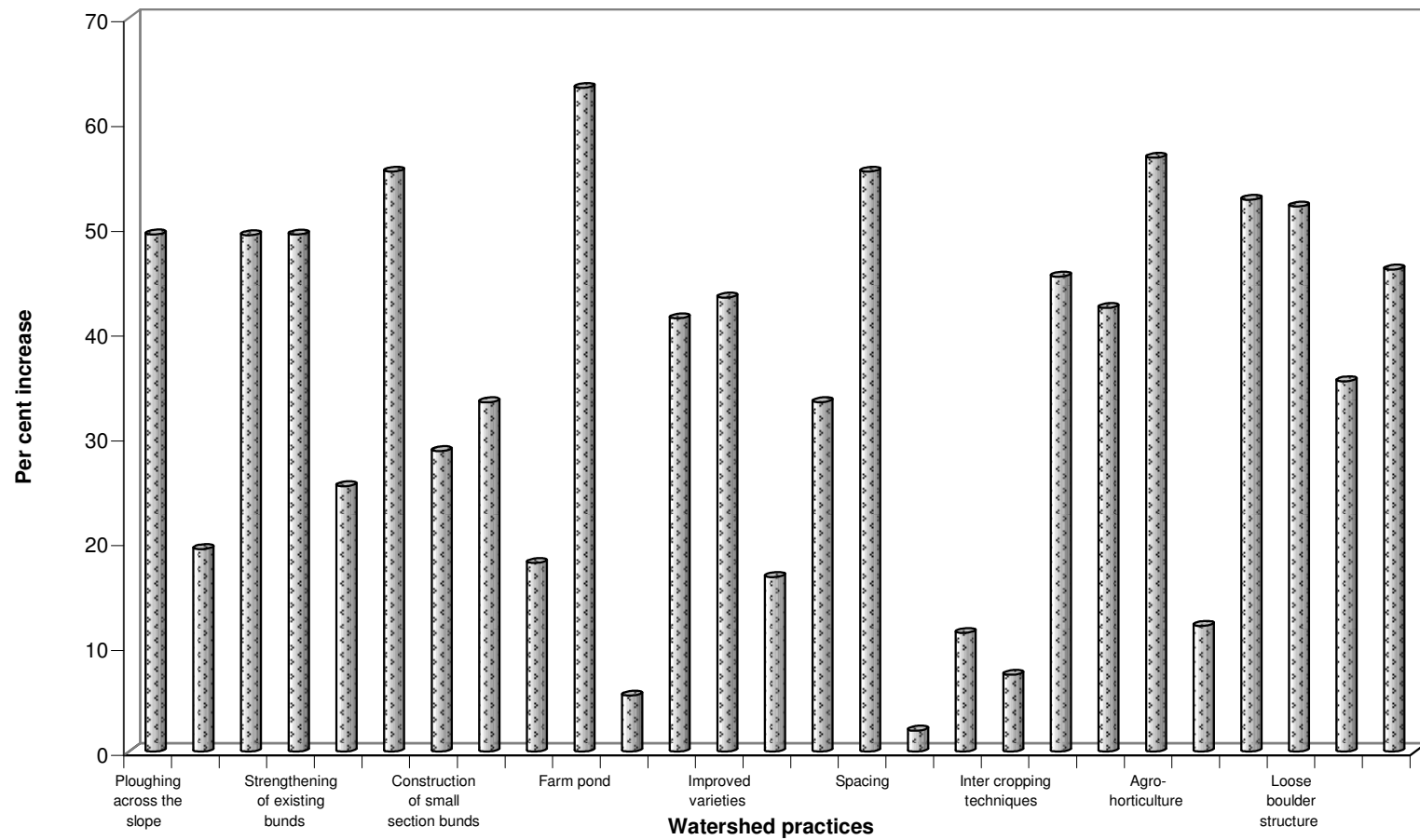


Fig. 2: Percentage increase in knowledge level of the respondents about individual watershed practices

Fig. 2: Percentage increase in knowledge level of the respondents about individual watershed practices

Table 3. Overall adoption level of the respondents about watershed practices

n = 150

Sl. No.	Adoption category	Frequency	Percentage	Mean adoption score
1.	Low (mean - SD) <8.06	46	30.67	6.92
2.	Medium (mean \pm SD) 8.07 – 16.58	87	58.00	13.78
3.	High (mean + SD) >16.58	17	11.33	20.50

Mean = 12.32 SD = 4.26

It could be observed from the above table that average production and productivity obtained by the respondents from kharif season increased by 25.00 and 27.77 per cent, respectively over production and productivity of base year.

4.4 PERSONAL, SOCIO-ECONOMIC AND PSYCHOLOGICAL CHARACTERISTICS OF THE RESPONDENTS

The data in Table 6 depicts the personal and socio-economic characteristics of farmers. The results are presented under the following paragraphs.

4.4.1 Age

The table indicated that 46.00 per cent of the respondents were middle aged, 24.67 per cent were young and 29.33 per cent were old.

4.4.2 Education

It was found that 28.00 per cent of the respondents were educated upto high school, 27.00 per cent upto middle school, 14.67 per cent upto primary school, 11.33 per cent could read and write, 8.00 per cent had college education and degree. The percentage of literates was 10.67.

4.4.3 Family type

Majority (55%) of the respondents belonged to nuclear family while, 45 per cent of the respondents were belonging to joint family.

4.4.4 Family size

Majority (56.00%) of families had members in family ranging from 5 to 8. While, 13.33 per cent and 30.67 per cent of families had members ranging upto 5 and above 8, respectively.

Table 4. Adoption of the respondents about individual watershed practices

n = 150

Sl. No.	Description	Before watershed		After watershed		% increase
		Freq.	%	Freq.	%	
I	Soil and water conservation practices					
1.	Ploughing across the slope	62	41.33	106	70.66	29.33
2.	Land smoothening	102	68.00	138	92.00	24.00
3.	Contour bunds	22	14.66	105	70.00	55.34
4.	Strengthening of existing bunds	38	25.33	102	68.00	42.67
5.	Vegetative bunds	6	4.00	21	14.00	10.00
6.	Water ways	23	15.33	89	59.33	44.00
7.	Construction of small section bunds	66	44.00	74	49.33	5.33
8.	Opening of furrows	71	47.33	88	58.66	11.33
9.	Use of improved Agril implements	4	2.66	19	12.66	10.00
10.	Farm pond	0	0.00	22	14.66	14.66
II	Crop production practices (paddy)					
1.	Variety → Intan, Abhilash	12	8.00	74	49.33	41.33
2.	Seed rate → 30-35 kg/ac	67	44.66	135	90.00	45.34
3.	Seed treatment	14	9.33	42	28.00	18.67
4.	Time of sowing (May-June)	150	100.00	150	100.00	-
5.	Spacing → 20 cm × 10 cm	54	36.00	131	87.33	51.33
6.	Method of planting					
a.	Sowing by seed drill *	138	92.00	148	98.60	6.60
b.	Transplanting *	27	18.00	38	25.33	7.33
6.	Application of FYM	107	71.33	126	84.00	12.67
7.	Fertilizer application	58	38.66	112	74.66	36.00
8.	Plant protection	13	8.66	67	44.66	36.00
III	Alternate land use system					
1.	Agro-forestry	12	8.00	43	28.66	20.66
2.	Agro-horticulture	8	5.33	36	24	18.67
3.	Silvi-pasture	0	0	0	0	0

* Multiple responses possible

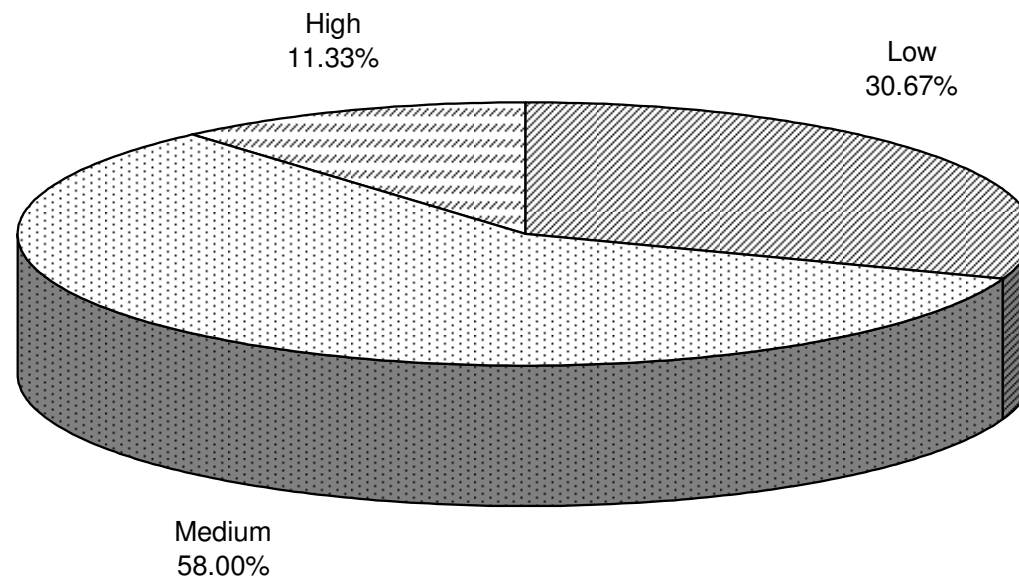


Fig. 3: Over all adoption level of the respondents about watershed practices

Fig. 3: Over all adoption level of the respondents about watershed practices

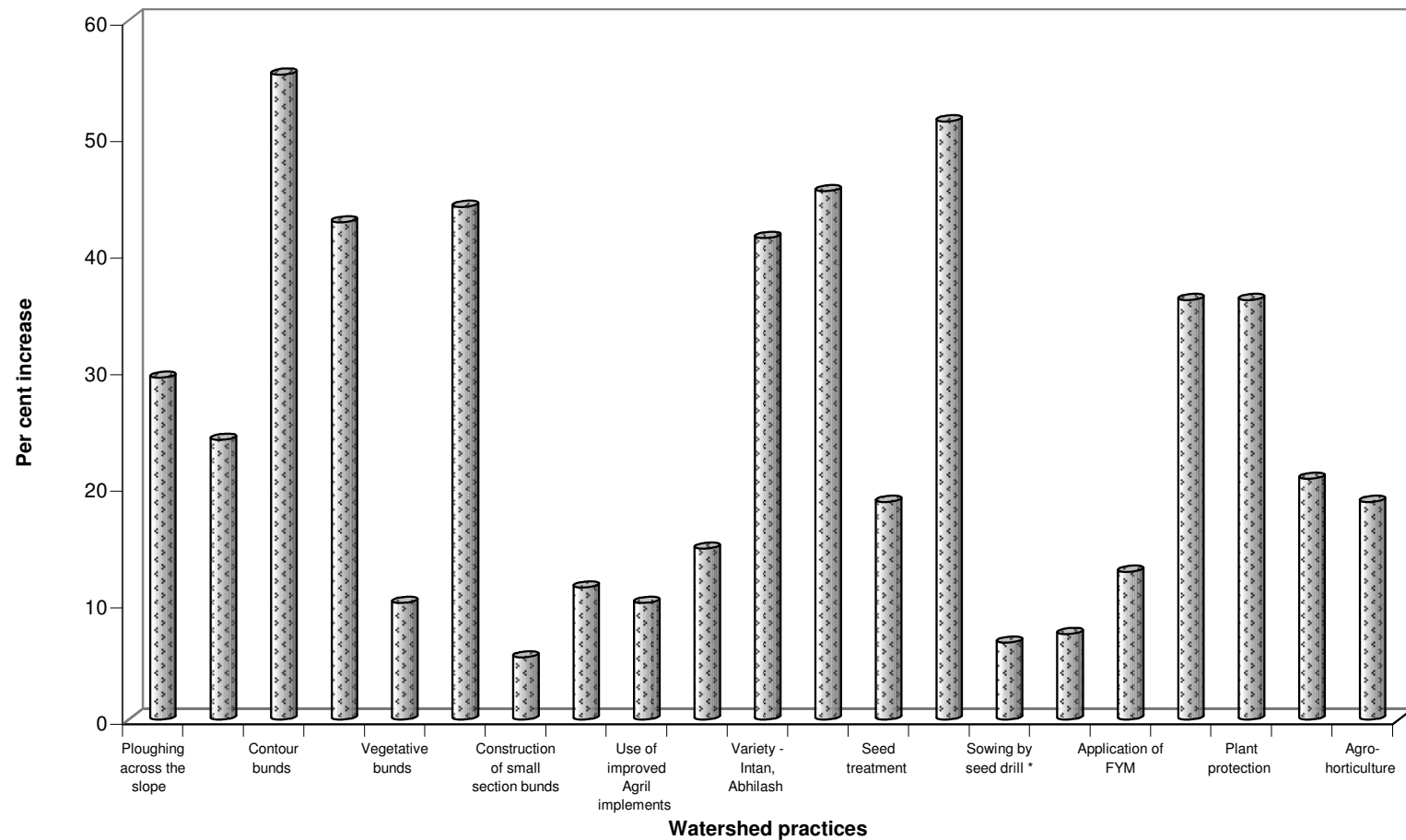


Fig. 4: Percentage increase in adoption level of the respondents about individual watershed practices

Fig. 4: Percentage increase in adoption level of the respondents about individual watershed practices

Table 5. Production and productivity level of paddy

Sl. No.	Category	Before watershed programme	After watershed programme	Percentage increase
1.	Mean production (q/acre)	12	15	25.00
2.	Mean productivity (kg/acre)	1300	1650	27.77

4.4.5 Annual income

The results indicated that majority (48.00%) of the respondents belonged to income group of Rs. 11,001 to Rs. 22,000 per annum, whereas only few (19.33%) of the respondents belonged to income group of Rs. 22,001 to 33,000.

4.4.6 Land holding

The results indicated that majority (30.00%) of the respondents land holding (10.1 – 25.0 acres). Whereas, least number of respondents (4.67%) were found to be having big size land holding (>25 acres).

4.4.7 Farm power possession

The data presented in above table revealed that 96.67 per cent of the respondents were having a seed drill followed by 68.00 per cent having wooden plough, 27.33 per cent having sprayer or duster and 36.00 per cent were possessed iron plough. Only 5.53 per cent of the respondents were in possession of tractor.

4.4.8 Household material possession

The data revealed that majority (64%) of the respondents possessed radio followed by 48.66 per cent having television, 38.00 per cent having bicycle and 14.00 per cent respondents were possessing scooters.

4.4.9 Live stock possession

The data revealed that majority (88.00%) of the respondents possessed bullocks, followed by cows (54.00%), buffaloes (48.00%), poultry birds (23.33%) and sheeps/goats (12%).

4.4.10 Mass media utilization by the respondents

It could be seen from Table 7, Radio sets were possessed by 64.00 per cent of the farmers. While 20.67 and 39.34 per cent of the farmers regularly listened the general and agricultural programmes, respectively. Further, 28.66 and 45.33 per cent of the farmers occasionally listened the general and agricultural programmes. On the other hand 50.67 and 15.33 per cent of the farmers never listened to these programmes.

Television was possessed by 48.66 per cent of the farmers. While 60.67 and 32.00 per cent regularly viewed general and agricultural programmes, further 72.00 and 26.00 per cent of the farmers occasionally viewed general and agricultural programmes. Only 32.00 per cent of the farmers never viewed the agricultural programmes.

Table 6. Personal and socio-economic characteristics of the respondents

n=150

Sl. No.	Characteristics	Frequency	Percentage
I	Age		
1.	Young - <34 years	37	24.67
2.	Middle - 34-40 years	69	46.00
3.	Old - >40 years	44	29.33
II	Education		
1.	Illiterate	16	10.67
2.	Can read and write	17	11.33
3.	Primary school	22	14.67
4.	Middle school	41	27.33
5.	High school	42	28.00
6.	College and degree	12	8.00
III	Family type		
1.	Nuclear	83	55.33
2.	Joint	67	44.67
IV	Family size		
1.	Small - <5 members	20	13.33
2.	Medium - 5-8 members	84	56.00
3.	Large - >8 members	46	30.67
V	Annual income		
1.	Upto Rs. 11,000	22	14.67
2.	Rs. 11,001 to Rs. 22,000	72	48.00
3.	Rs. 22,001 to Rs. 33,000	29	19.33
4.	Above Rs. 33,000	27	18.00

Contd.....

VI	Land holding		
1.	Upto 2.5 acres	18	12.00
2.	2.6 – 5.0 acres	38	25.33
3.	5.1 – 10 acres	42	28.00
4.	10.1 – 25 acres	45	30.00
5.	> 25 acres	7	4.67
VII	Farm machinery possession		
1.	Wooden plough	102	68.00
2.	Iron plough	54	36.00
3.	Seed drill	145	96.67
4.	Tiller	18	12.0
5.	Sprayer/duster	41	27.33
6.	Tractor	8	5.33
VIII	House hold material possession		
1.	Bicycle	57	38.00
2.	Scooter	21	14.00
3.	Radio	96	14.00
4.	Television	73	48.66
IX	Livestock possession		
1.	Buffaloes	72	48.00
2.	Cows	81	54.00
3.	Bullock	132	88.00
4.	Sheep/goats	18	12.00
5.	Poultry birds	35	23.33

Table 7. Mass media utilization by the respondents

n=150

Sl. No.	Mass media	Possession/ subscriber	Listening/viewing/reading					
			Regularly		Occasionally		Never	
			No.	%	No.	%	No.	%
1.	Radio	96 (64.00)						
	i) General programmes		59	39.34	68	45.33	23	15.33
	ii) Agricultural porgrammes		31	20.67	43	28.66	76	50.67
2.	Television	73 (48.66)						
	i) General programmes		108	72.00	42	28.00	0	0.00
	ii) Agricultural programmes		39	26.00	63	42.00	48	32.00
3.	Newspaper	18 (12.00)	28	18.66	53	35.34	69	46.00
4.	Farm magazines	4 (2.66)	9	6.00	21	14.00	120	80.00

Figures in parentheses indicate percentage

Table 8. Social participation of the respondents

n=150

Sl. No.	Institution/ organization	Membership				Participation					
		Member		Office bearer		Regularly		Occasionally		Never	
		No.	%	No.	%	No.	%	No.	%	No.	%
1.	Gram Panchayat	7	4.66	3	2.00	45	30.00	65	43.33	40	26.66
2.	Co-operative society	16	10.66	4	2.66	37	24.66	45	30.00	68	45.33
3.	Youth club	9	6.00	6	4.00	51	34.00	65	43.33	34	12.66
4.	Watershed sanghas	10	6.67	4	2.66	78	52.00	46	30.66	26	17.34

Table 9. Extension contact by the respondents

n=150

Sl. No.	Extension worker	Frequency of contact					
		Regularly		Occasionally		Never	
		No.	%	No.	%	No.	%
1.	AA's	46	30.67	58	38.66	46	30.67
2.	AAO's	27	18.00	87	58.00	36	24.00
3.	NGO's officers	42	28.00	61	40.67	47	31.33
4.	Raitha samparka kendra	36	24.00	68	45.33	46	30.67

Newspaper was subscribed by 12.00 per cent of the farmers. While 18.66 per cent regularly read the newspaper. Further 35.34 per cent of the farmers occasionally read newspaper.

Farm magazine was subscribed by 4.00 per cent of the farmers, among the subscribers of farm magazines 9.00 per cent regularly read farm magazines, 14.00 and 80.00 per cent of the farmers occasionally and never read farm magazines, respectively.

4.4.11 Membership and participation of the respondents in social organizations

The data in Table 8 revealed that only 4.00 and 2.66 per cent of the farmers were members and office bearers, respectively of Gram Panchayat. Whereas, 30.00 and 43.33 per cent of respondent farmers attended the meetings regularly and occasionally, respectively.

It was also seen that 10.66 and 2.67 per cent of the farmers were members and office bearers of farmers union, respectively. The respondent farmers attended meetings regularly and occasionally in the order of 24.66 and 30.00 per cent, respectively while 45.33 per cent never attended the meetings.

The table also revealed that 6.00 and 4.00 per cent of the farmers were members and office bearers of youth club. Whereas, 34.00 and 43.33 per cent regularly and occasionally attend the meeting. While, 22.66 per cent never attended the meetings.

The table also revealed that 11.33 per cent of the farmers were members of watershed organization. Out of which, 52.00 and 30.66 per cent regularly and occasionally attended the meetings.

4.4.12 Extension contact of the respondents

The data in Table 9 revealed that 30.64 per cent of the farmers regularly contacted AAs, while 38.66 and 30.67 per cent of the farmers occasionally and never contacted AAs, respectively.

It was also seen that 18.00 per cent of the farmers regularly contacted AAOs, while 58.00 per cent of the farmers occasionally contacted AAOs. Majority (24.00%) were never contacted AAOs.

The table also revealed that 28.00 and 40.67 per cent of the farmers regularly and occasionally contacted NGO officials, while majority (31.33%) never contacted NGO officers.

The table also revealed that 24 per cent of the farmers regularly contacted Raita Samparka Kendra, while 45.33 and 30.67 per cent of the farmers occasionally and never contacted Raita Samparka Kendra, respectively.

4.4.13 Innovativeness

The data in Table 10 indicates that majority of the respondents (78.00%) belonged to medium innovativeness category, whereas 12.67 and 9.33 per cent of them belonged to high and low level of innovativeness category, respectively.

4.4.14 Risk orientation

The data in Table 11 revealed that considerable per cent of the respondents (58.00%) belonged to medium risk orientation category, followed by high (24.00%) and low (18.00%) risk orientation categories, respectively.

4.4.15 Management orientation

The data in Table 12 revealed that majority of the respondents (64.00%) belonged to medium management orientation category, whereas 14.67 and 21.33 per cent of them fall under high and low level of management orientation categories, respectively.

Table 10: Innovativeness

n=150

Sl. No.	Categories	Frequency	Percentage
1.	Low (Mean – SD) <16.17	14	9.33
2.	Medium (Mean \pm SD) 16.17 – 20.53	117	78.00
3.	High (Mean + SD) >20.53	19	12.67

Mean = 18.35 SD = 2.18

Table 11: Risk orientation

n=150

Sl. No.	Categories	Frequency	Percentage
1.	Low (Mean – SD) <7.33	27	18.00
2.	Medium (Mean \pm SD) 7.34 – 9.27	87	58.00
3.	High (Mean + SD) >9.27	36	24.00

Mean = 8.30 SD = 0.97

Table 12: Management orientation

n=150

Sl. No.	Categories	Frequency	Percentage
1.	Low (Mean – SD) <56.62	32	21.33
2.	Medium (Mean \pm SD) 56.63 – 65.84	96	64.00
3.	High (Mean + SD) >65.84	22	14.67

Mean = 8.30

SD = 0.97

Table 13. Constraints in adoption of soil and water conservation practices

n=150

Sl. No.	Constraints	Frequency	Percentage
1.	Time consuming operation	112	74.66
2.	Fragmentation of land into unconventional shape	106	70.67
3.	Water stagnation near bunded area	74	49.33
4.	Obstruction for cultural operations	59	39.33
5.	Bunding is not useful in low rainfall area	55	36.67
6.	Loss of cultivable area	41	27.33
7.	Lack of cooperation by neighbour	37	24.66
8.	Belief that putting bunds serve no purpose	32	21.33

Multiple responses possible

4.5 CONSTRAINTS FACED BY FARMERS IN ADOPTION OF WATERSHED MANAGEMENT PRACTICES

4.5.1 Constraints in adoption of soil and water conservation practices

The data in Table 13 revealed the constraints faced by farmers in continued adoption of soil and water conservation practices. A large majority of the farmers expressed, 'Time consuming operation' (74.67%), 'Fragmentation of land into inconvenient shape' (70.67%). Whereas, 49.33 per cent of respondents expressed that there is 'Water stagnation near bunded area and 'Obstruction for cultural operations' (39.33%). Some of them also expressed bunding is not useful in low rainfall area' (36.67%), 'Loss of cultivable area' (27.33%), 'Lack of cooperation by neighbour' (24.66%), 'Belief that putting bunds serve no purpose' (21.33%) as the main constraints in continued adoption of soil and water conservation practices.

4.5.2 Constraints in continued adoption of improved crop production practices by farmers

From the Table 14, indicates the constraints faced by farmers in continued adoption of improved crop production practices. A great majority of the farmers indicated 'Non-availability of labour' (73.33%), 'inadequate finance' (81.33%), 'Heavy risk due to failure of monsoon' (82.66%) and 'expensive chemicals' (74.66%). Whereas, 70.00 per cent of the farmers expressed 'Cost of fertilizer is high', 64.66 per cent of the farmers expressed low returns from dryland crops. About 43.33 per cent of the farmers expressed non-availability of inputs intime, 'Non-availability of drought tolerant crop varieties' (59.33%). 'Some of them also expressed 'Lack of market facility' (18.00%) as some of the constraints of farmers.

Table 14. Constraints in adoption of improved crop production practices

n=150

Sl. No.	Constraints	Frequency	Percentage
1.	Heavy risk due to failure of monsoon	124	82.66
2.	Inadequate finance	122	81.33
3.	Expensive chemicals	112	74.66
4.	Non-availability of labour	110	73.33
5.	Cost of fertilizer is high	105	70.00
6.	Low returns from dryland crop	97	64.66
7.	Non-availability of drought tolerant crop varieties	89	59.33
8.	Non-availability of inputs intime	65	43.33
9.	Lack of market facility	27	18.00

Multiple responses possible

V. DISCUSSION

The results of the study are interpreted and discussed in this chapter in the same order and sequence followed for the presentation of the results in the previous chapter.

5.1 OVERALL KNOWLEDGE LEVEL OF THE RESPONDENTS ABOUT WATERSHED PRACTICES

The results in Table 1 revealed that a large majority of respondents possessed medium knowledge about watershed practices and only a less number of respondents possessed low level of knowledge. The probable reasons may be due to fact that over fifty per cent of the respondents were educated upto middle and high school level, which might have prompted these respondents to acquire more knowledge and their varying degree of exposure to different mass media and interaction with extension personnel might have helped the respondents to acquire more knowledge about watershed practices. Hence, majority of the respondents were found to have medium knowledge level.

This finding is in conformity with the findings of the studies conducted by Meti and Hanchinal (1995) and Singh *et al.* (1999).

5.1.1 Knowledge of the respondents about individual watershed practices

The results in Table 2 revealed that there was an increase in the number of the respondents by about fifty per cent regarding soil and water conservation practices like contour bunding, ploughing across the slope, strengthening of existing bunds and water ways. The reasons being, timely guidance given by Sujala Watershed extension workers. Further, it was also observed that increase by few number of respondents who had knowledge about land smoothening, opening of furrows, construction of small bunds, vegetative bunds, use of improved agricultural implements and farm pond. The reason might be inadequate understanding about the importance of practices.

The results also indicated that in case of crop production practices over 50 per cent increase was observed only in case of across the slope sowing. This may be due to reason that the farmers might have perceived importance of this practice to control the erosion of soil.

It was also observed that few of the respondents had knowledge about practices like application of FYM. Intercropping techniques, fertilizer application and summer ploughing after the programme. The reasons that could be attributed that farmers are familiar with these simple practice and they do not require any special skills and understanding. Added to this fact, the experience over a period of time might have also added to their present level of knowledge.

The results from Table 2 also revealed that only 20 per cent of the respondents had knowledge about silvi-pasture land use system after the implementations of programme. The reason that could be attributed is inadequate understanding about importance of practices, less contact with the extension personnel.

It was further observed that only 35.34 per cent of the respondents had knowledge about vegetative break dam after the programme. The reason may be inadequate technical guidance, less mass media participation and low education.

5.2 OVERALL ADOPTION LEVEL OF THE RESPONDENTS ABOUT WATERSHED PRACTICES

The results presented in Table 3 revealed that majority (58.00%) of the respondents belonged to medium adoption category, whereas 11.33 and 30.67 per cent of the respondents belonged to low and high adoption level categories, respectively. Probable reasons for the respondents to be in medium adoption category might be the medium to high knowledge possessed by majority of the respondents. Since, knowledge limits the action of individuals, as it is the basic pre-requisite for any individual to think of the pros and cons in making a decision, either to adopt or reject practice, majority of the respondents never

contacted extension personnel. The findings are in conformity with the results of Sundarambal (1994), Khade *et al.* (1998) and Jandhale *et al.* (2000).

5.2.1 Adoption of the respondents about individual watershed practices

The results presented in Table 3 indicated that there was less per cent change with regard to adoption of soil and water conservation practices namely land smoothing, opening of furrows, construction of small section bunds, vegetative bunds and use of improved agricultural implements. The reasons for low adoption by the respondents were given as these practices are not suitable, require more time, difficult to do intercultivation, scattered land holding, non-availability of required plant types in time are problems as expressed by the respondents.

In the present study, it was observed that cent per cent of the respondents adopted time of sowing. The reason that may be attributed to the above finding is, as the study area is rainfed the recommended time of sowing is before June and most probably monsoon sets within June and July. The above finding was in congruity with the findings of Balamatti (1993) and Saikrishna (1998).

It was also observed that more than 40.00 per cent increase in respect of adoption about seed rate 45.34 per cent, spacing 51.33 per cent and improved seed variety 41.33 per cent. This may be due to simplicity, low cost of the practices as well as to obtain more yield. It may be also due to their experience and guidance received from extension personnel.

It was also evident from Table 4 that very few respondents had adopted seed treatment and plant protection. The possible reason for this might be that very few respondents had knowledge about seed treatment and expensive chemicals.

Cent per cent of the respondents had not adopted the silvi-pasture land use system. The main reason was due to non-availability of planting materials and inadequate knowledge of the respondents.

These findings are in conformity with the results of Balamatti (1993) and Saikrishna (1998).

5.3 IMPACT OF WATERSHED DEVELOPMENT PROGRAMME ON PRODUCTION AND PRODUCTIVITY OF PADDY

The results presented in Table 5 give better idea about the difference in crop production and productivity in the pre and post-project period by virtue of implementation of Sujala Watershed Project. It could be inferred that percentage increase in crop production and productivity obtained by the farmers was considerably higher over pre-project period.

The possible reasons that could be attributed to this phenomenon is that the farmers had medium level of knowledge and adoption of recommended cultivation practices of paddy crop. When the farmers were interviewed by probing into production and productivity, they said that the increase in production and productivity directly depends on the availability of water. As a result of watershed treatment, there was additional storage of moisture in the soil profile due to the in situ conservation, groundwater recharge and surface storage. Due to this factor, production and productivity have increased considerably in project area.

The result is in conformity with the findings of Singh *et al.* (1995), Hazra (1998) and Patil (1999).

5.4 PERSONAL AND SOCIO-ECONOMIC CHARACTERISTICS OF THE RESPONDENTS

5.4.1 Age

The results presented in Table 6 indicated that majority of the respondents were middle aged, usually farmers of middle aged are more enthusiastic and have more work efficiency than the old and young farmers. Further, individuals of 34 to 40 years of age group

have more physical vigour and feel more family responsibility than the younger farmers. These might be the important reason to find majority of the respondents in the age group of 34 to 40 years.

The result is in line with the findings reported by Joshi (1992) and Saikrishna (1998).

5.4.2 Education

The results revealed that 28.00 per cent of the respondents were educated upto high school, followed by 27.33 per cent upto middle school, 14.67 per cent upto primary school, 10.67 per cent of respondents were illiterate, 11.33 per cent can read and write, and only 8.00 per cent were educated upto college and degree.

In general, the respondents are educated. This could be as a result of a common social environment. In the present scenario, almost everybody wants to be literate because of awareness about the importance of the education by the various government programmes.

5.4.3 Family type

The results revealed that 55.33 per cent of the respondents were from nuclear family and 44.67 per cent respondents from joint family. This might be due to the changing values of family system.

The result is in line with the findings reported by Sakharkar (1995).

5.4.4 Family size

The results revealed that majority of the respondents were of medium family size and had 5 to 8 members, followed by small and large family size. The reason might be the agriculture is the main occupation, which needs team work and more resources, more number of persons were in labour intensive work.

The above findings got support from the studies conducted by Sakharkar (1995) and Balamatti (1993).

5.4.5 Annual income

The results regarding the annual income indicated that 18.00 per cent of the respondent families had annual income above Rs. 33,000. The possible reason that could be attributed was their large size land holdings. The existence of families of size of 5 to 8 members, where number of earning members were found engaged in different occupations other than agriculture might also be considered as another reason.

Majority 48.00 per cent of the respondent families had annual income between Rs. 11,001 to Rs. 22,000. It may be due to their lower socio-economic status, the results in this regard showed that about 37.33 per cent of them had land holding upto 5 acres, as a result income earning would be naturally lower and they did not have any additional source of income.

The results gained the support from the findings of Hanumanaikar (1995).

5.4.6 Land holding

Majority 37.33 per cent of the respondent families had land holding upto 5 acres. The fragmentation of ancestral land from generation to generation might have led to smaller size of land holdings, because 58.00 per cent of the respondents belonged to nuclear family. The other reason being that those who had other occupation might have less acres of land.

However, 34.67 per cent of the respondent families had land holding above 10 acres. The possible reasons that could be attributed to this were those who had agriculture as the main occupation of the family almost depended on their land for their livelihood.

The result is in consonance with the results of studies conducted by Sakharkar (1995).

5.4.7 Farm machinery possession

It was found that majority 96.67 per cent of the respondent families were possessing seed drill and 68.00 per cent had wooden plough. This might be due to smaller size of land holding of respondent families.

About 27.33 per cent of the respondent families were possessing sprayer, iron plough (36.00%) and tractor (5.33%). Because of the fact that only 34.67 per cent of the respondents' families had land holding more than 10 acres and only 18.00 per cent had annual income more than Rs. 30,000.

5.4.8 Household material possession

It was found that majority (48.66%) of the respondents possessed television followed by Radio (64.00%), bicycle (38.00%) and scooter (14.00%). This might be due to over 50.00 per cent of the respondents having considerably moderate income.

5.4.9 Livestock possession

It was found that majority 88.00 per cent of the respondents were possessing bullocks. This might be due to subsistence farming.

About 48.00 and 54.00 per cent of the respondents possessed buffaloes and cows, respectively. The buffaloes and cows were maintained since they provide additional income to the family in terms of milk and manure, which were sold for money or used for their own purpose in the farming activities.

Very few of the respondents (23.33%) possessed poultry birds followed by sheep/goat (12.00%). The reasons were non-availability and high cost of fodder, concentrates and smaller size of land holding made the farmers think twice before going for rearing goats/sheep and poultry birds.

The findings were not exactly same but in the approachable line with the findings of Sheela (1991).

5.4.10 Mass media participation

Among the different mass media Table 7 indicated that radio was possessed by 64.00 per cent of the farmers. While, 20.67 and 39.34 per cent of respondents regularly listened the general and agricultural programmes, respectively. This might be due to the reason that a common man could easily afford to possess radio as one of the medium of communication.

In recent years, television being one of the most popular media was possessed by 48.66 per cent of the respondents. This might be due to the availability of single entertainment media for farmers. When the television behaviour was analysed it could be easily noted that the habit of viewing to television mainly depended on individual interest and the results revealed that 72.00 and 26.00 per cent of respondents were regularly viewing the general and agricultural programmes, respectively.

The results also revealed that only 12.00 and 2.66 per cent subscribed to newspaper and farm magazines respectively by the respondents. Never reading was found in most of the subscribers. Reasons for this might be that majority of the farmers were functional literates but might not have realized the importance of newspaper and farm magazine. The other reason might be that they may feel television may meet their needs of getting required information and entertainment.

The findings got support from the studies conducted by Sakharkar (1995).

5.4.11 Social participation

The data in Table 8 revealed that about 10.66 and 6.67 per cent of the respondents were members of co-operative society and watershed organization, respectively and only

2.67 per cent of them were office bearer of the co-operative society organization and nearly 30.00 per cent and 24.66 per cent of the respondents participated occasionally and regularly.

About 6.00 and 4.66 per cent of the respondents were members in youth club and village panchayat. Nearly 43.33 and 34.00 per cent of the respondents occasionally and regularly participated, respectively. This might be mainly because co-operative works on the "Principle of democracy" and "Service is the main motto".

The findings were in conformity with the results of the studies conducted by Channal (1995) and Hanumanaikar (1995) who found that majority of the farmers had low level of social participation.

5.4.12 Extension contact

The results presented in Table 9 indicated that 30.67 per cent of the respondents contacted Agricultural Assistants regularly, Assistant Agricultural Officers (58.00%) and NGO Officers (40.67%) were occasionally contacted by the farmers. This might be due to the fact that the Agriculture Assistants Headquarters is in village and Assistant Agriculture Officer's Headquarters is in panchayat level. Hence, they were easily available for contact and for discussion to acquire information. Majority (45.33%) of the farmers occasionally contacted Raita Samparka Kendra, reasons for this might be that the Raita Samparka Kendra are setup at Hobli level for the benefit of farmers.

5.4.13 Innovativeness

The data presented in Table 10 indicated that majority of the respondents (78.00%) were found to have medium innovativeness, while 12.67 and 9.33 per cent of them had high and low innovativeness, respectively.

This could be attributed to the medium level of education of the respondents which helped them to acquire new technology on their fields. Further, because of dryland farming, they might be interested to adopt new innovation to increase their income level.

The result was in conformity with the result of Birajdar (2002).

3.4.14 Risk orientation

The data presented in Table 11 indicated that 58.00 per cent of the respondents had medium risk taking ability, while 24.00 per cent had high risk taking ability. The possible reason could be the dryland nature of farming in the study area. Farmers in such areas tend to possess medium risk based on profits assumed.

Results are in consonance with the findings of Venkataramulu (2003).

3.4.15 Management orientation

It could be observed from the Table 12 that majority of the respondents (64.00%) belonged to medium management orientation category, while 21.33 and 14.67 per cent of them were found to have low and high management orientation, respectively. The possible reason could be due to their low income level and their education level, which is upto high school, by which they could take up moderate management activities whichever is at their reach.

The findings get support from the studies conducted by Sakharkar (1995) and Venkataramulu (2003).

5.5 CONSTRAINTS FACED BY FARMERS IN ADOPTION OF WATERSHED MANAGEMENT PRACTICES

5.5.1 Constraints of soil and water conservation practices

About 74.67 per cent respondents expressed constraints like time consuming operation and fragmentation of land into unconventional shape (70.67%), whereas 49.33 per cent of respondents expressed that there is water stagnation near bunded area. The reason

may be because of inadequate conviction of technologies and utility of these practices, which are not observable immediately.

5.5.2 Constraints of crop production practices

The results presented in Table 14 revealed that majority 73.33 per cent of the respondents expressed non-availability of labour. The reason is that labours were attracted by higher wages offered by the industries around the city resulting in scarcity of skilled labour.

About 81.33, 74.66 and 70.00 per cent of the respondents expressed interrelated constraints viz., inadequate finance, expensive chemicals and high cost of fertilizer, respectively. In recent years government hiked the prices of fertilizers by reducing the subsidy on them and naturally it bothered many farmers, especially small and medium farmers. Similarly, the inadequate finance is a constraint more with the farmers. Nearly 60.00 per cent of the farmers expressed non-availability of drought resistant variety as a major constraint. The reason might be that there was no commercial center in the study area, so they can not get the drought resistant variety easily when needed, because sale of seeds at commercial level is not still routine practice there. This might have led the farmer to express non-availability of drought resistant variety as major constraints.

Majority of the respondents (82.66%) faced heavy risk due to failure of monsoon as a major constraint in paddy cultivation. In the study area, paddy is grown in rainfed conditions. Hence monsoon plays a major role in successful paddy cultivation. The other constraints expressed by farmers were non-availability of inputs intime (43.33%). This might be due to non-availability of seeds, fertilizers because of heavy demand as compared to other inputs supply in appropriate seasons.

The result is in confirmity with the results of Ranganathan (1995) and Jhariya *et al.* (1999).

VI. SUMMARY

Soil and water constitutes the vital resources of the country. These two elements nourish and support the plant and animal life. The prosperity and welfare of humanity is entirely depending on and water which irreplaceable resources. Soil, water and vegetation are most important natural resources, they provide food, firewood, fiber and raw materials to satisfy a variety of needs of people.

Development of dryland agriculture and watershed basis was launched as a national programme by the government of India in 1983. Karnataka is one of the pioneer states which has given high priority for dryland development. The watersheds in the state are treated as pilot projects, where each member of the watershed development programme is expected to cultivate and practice research. Watershed development is an approach to build and strengthen the basic sources in a watershed, so as to enable establishment of sustainable life support.

Keeping this in view, the present investigation was designed to evaluate a watershed with the following specific objectives.

1. To know the knowledge level of beneficiary farmers on integrated watershed management practices.
2. To study the adoption level of beneficiary farmers on integrated watershed management practices.
3. To study the socio-economic and psychological characteristics of beneficiary farmers of Sujala Watershed project.
4. To analyze the productivity level of major crops in the project area, and
5. To study the problems encountered by beneficiary farmers in adoption of integrated watershed management practices.

The present study was conducted in Sujala Watershed in Dharwad and Kalaghatgi taluks of Dharwad district during 2004-05. The taluks were purposively selected as it stands first in total area under rainfed in Dharwad district. The watershed comprised 87 villages. For the purpose of research study, 10 villages were selected based on maximum area covered under watershed. Following random sampling method fifteen farmers were selected from each village, making the total sample size of 150 farmers.

In the light of the objectives set for the study, the dependent variables studied were knowledge, adoption level, production and productivity of major crop in the project area of the farmers with respect to watershed practices. The independent variables included were age, education, family type and family size, annual income, land holding, economic status, mass media participation, extension contact, social participation, innovativeness, risk orientation and management orientation. Further, the constraints encountered by the farmers in adoption of watershed practices were also ascertained.

Expert made test was developed to measure the knowledge and adoption of watershed practices of farmers. The constraints encountered by the farmers in watershed practices were expressed in terms of frequencies and percentages. The other variables were quantified by developing appropriate scoring procedure and by using the scale developed by other researchers.

A pre-tested interview schedule was used to collect data from the respondents by personal interview method. The statistical tools used were frequencies, percentages, mean and standard deviation.

MAJOR FINDINGS OF THE STUDY

1. Majority 45.34 per cent of the respondents had medium level of knowledge in respect of watershed practices.

2. There was increase in the number of respondents by over 50 per cent who had knowledge in case of soil and water conservation practices about contour bunds, ploughing across the slope, strengthening of existing bunds and water ways after the implementation of programme.
3. There was increase in the number of respondents who had knowledge about crop production practices such as across the slope sowing, intercropping techniques and fertilizer application after the implementation of programme.
4. In case of drainage line treatment increase in knowledge level of respondents about nala bunds, loose boulders structure was found.
5. Majority 58.00 per cent of the respondents belong to medium adoption behaviour category in respect of watershed practices.
6. There was increase in number of respondents by more than 40 per cent who adopted soil and water conservation practices namely contour bunds, strengthening of existing bunds and waterways.
7. In case of crop production practices, there was increase in number of respondents who adopted seed rate, spacing and improved variety seed.
8. In case of production and productivity of the area, there was significant difference between before and after implementation of programme.
9. Majority 46.00 per cent of the respondents were middle aged.
10. About 28.00 per cent of the respondents were educated upto high school followed by middle school and primary school.
11. Majority 55.33 per cent of the respondents belonged to nuclear family.
12. Regarding land holding, nearly 37.33 per cent of the farmers had upto 5.0 acres of land.
13. Among mass media, radio [64.00%] and television (48.66%) were widely possessed by the respondents.
14. Regarding social participation, 10.66 and 6.67 per cent of the respondents were members of co-operative society and watershed sanghas, respectively.
15. Regarding extension contact, majority (58.00%) of the respondents occasionally contacted AAOs and 33.00 per cent regularly contacted AAs.
16. Majority of the respondents (78.00%) were found to have medium level of innovativeness, while 64.00 and 58.00 per cent of them belonged to medium level of management orientation and risk orientation, respectively.
17. Fragmentation of land into unconventional shape, water stagnation near bunded area and time consuming operations were the major constraints about soil and water conservation practices faced by the farmers.
18. Non-availability of labour, inadequate finance, heavy risk due to failure of monsoon and expensive chemicals were the major constraints about crop production practices faced by farmers.

IMPLICATIONS AND RECOMMENDATIONS

Based on the findings of the present study, the following implications and recommendations could be made.

Majority of the respondents possessed medium knowledge on watershed practices. So, there is need to educate the farmers using extension techniques like demonstration on their farms, field visits, field days, seminars and discussions. The extension worker should plan and execute appropriate extension programmes to provide better understanding to the farmers on operational and technically complex aspects of watershed practices.

It was observed that a large majority of respondents were unaware of the watershed technologies such as contour bunds, vegetative bunds, silvi-pasture development etc. The extension agencies will have to make sincere efforts to popularize these technologies among the farmers by preparing a watershed model which includes all soil and water conservation technologies and arrange a field visit to impart knowledge about improved practices and also to conduct a training programme whenever be needed.

Seed treatment, improved varieties and plant protection were not adopted by majority of the respondents, therefore the extension personnel should motivate the farmers and provide adequate knowledge and conduct method demonstration about the importance of practices which ultimately reflects in yield.

The crop production and productivity of the area has increased considerable after implementation of Sujala Watershed. However, there is still scope to increase crop production and productivity. It is therefore suggested that integrated extension efforts should be made through continuous persuasion, technical guidance and input support to motivate and convince others to practice the watershed recommendations to boost cropping intensity, crop production and productivity.

It was expressed by majority of the respondents that non-availability of input intime, non-availability of crop varieties, high cost of fertilizer and expensive chemicals, regarding this, it is suggested that extension workers should co-ordinate the activities of the concerned organizations like seed corporation, seed producing agencies, department of agriculture and input dealers to make available inputs to available well intime, efforts may also be made to inform the farmers regarding availability using different mass media. So that farmers can purchase the inputs well in advance.

SUGGESTIONS FOR FUTURE RESEARCH

The present study is pioneering attempt to analyze the impact of watershed development programme on the farmers in comprehensive way. However, the study has been limited to only one watershed area. Therefore, it is suggested that further investigations may be taken up in different regions of the state/country with varying ecological, cultural and socio-economic backgrounds. This will help to make valid and wider generalization regarding the impact of the programme on farmers which could be of immense significance in designing future dryland development strategies in meeting the needs of dryland farmers on one hand and overcoming the prevailing problems on the other.

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APPENDIX I

PROFILE OF SUJALA WATERSHED PROJECT BENEFICIARY FARMERS IN DHARWAD DISTRICT

INTERVIEW SCHEDULE

I. GENERAL INFORMATION

Name of the farmers :

Village :

Taluk :

II. PERSONAL, SOCIO-ECONOMIC AND PSYCHOLOGICAL CHARACTERISTICS

1. Age :

2. Education : Illiterate/can read and write/primary school/middle school/high school/college/graduate

3. Family type : a) Nuclear family
b) Joint family

4. Family size : a) Men _____
b) Women _____
c) Children _____
Total _____

5. Land holding

Dryland (acres)	Irrigated land (acres)	Total (acres)

6. Annual income

Source	Rs.
a) Agriculture	
b) Subsidiary occupation	
1. Dairy	
2. Poultry	
3. Sericulture	
4. Any other (specify)	
Total	

7. Source of irrigation

Sl. No.	Sources	No.
1.	Well	
2.	Borerwell	
3.	Tank	
4.	River/nala	

8. Agricultural implements and machinery possessed

Sl. No.	Particulars	No.
1.	Wooden plough	
2.	Iron plough	
3.	Seed drill	
4.	Seed-cum fertilizer drill	
5.	Power tiller	
6.	Sprayer/duster	
7.	Tractor	

9. Household material possessed

Sl. No.	Particulars	No.
1.	Bicycle	
2.	Scooter	
3.	Radio	
4.	Television	
5.	Gas gas plant	

10. Livestock possession

Sl. No.	Particulars	No.
1.	Buffaloes	
2.	Cows	
3.	Bullocks	
4.	Sheep/goats	
5.	Poultry birds	

11. Organizational participation

Sl. No.	Organization	Member/ Office bearer	Extent of participation		
			Regular	Occasional	Never
1.	Gram sabha				
2.	Taluk panchayat				
3.	Zilla panchayat				
4.	Co-operative societies				
5.	Youth club				
6.	Watershed sanghas				

12. Extension contact

Sl. No.	Extension worker	Extent of contact		
		Regular	Occasional	Never
1.	Agricultural Assistant			
2.	Assistant agricultural Officers			
3.	ADAs			
4.	NGO officers			
5.	Raita Samparka Kendra			

13. Mass media utility

Sl. No.	Mass media	Possession/ subscription	Reading/listening/viewing		
			Regular	Occasional	Never
1.	Newspaper				
2.	Farm magazine				
3.	Radio				
i.	General programme				
ii.	Agril. programmes				
4.	Television				
i.	General programme				
ii.	Agril. programmes				

14. Risk orientation

Sl. No.	Statements	Agree	Disagree	Undecided
1.	A farmer should take more number of chances to make big profit to be content with smaller but less risky profit			
2.	A farmer should grow tree crops to avoid greater risk involved in growing food crops			
3.	A farmer who is willing to take risk than the average usually does better financially			
4.	It is good for a farmer to take risk when he knows his chance of success is fairly high			
5.	It is better for a farmer not to try new farming method unless most other farmers have used it with success			
6.	Trying entirely a new method in farming by a farmer involve risk			

15. Innovativeness

Sl. No.	Statements	Response category				
		SA	A	UD	DA	SDA
1.	I am very much interested in adopting whatever new practices that are helpful in conserving soil and water					
2.	Since I am not sure of the success of the new watershed management practices. I would like to wait till others adopt					
3.	Since watershed management practices are not profitable I am not interested in any of them					
4.	I try to keep myself well informed about the improved watershed management practices and try to adopt as soon as possible					
5.	New watershed management practices are not easily adoptable and hence I do not adopt					

16. Management orientation

Sl. No.	Statements	Agree	Disagree	Undecided
I.	Planning orientation			
1.	Each year one should think a fresh about crops to be cultivable in each type of land			
2.	It is not necessary to make prior decision about the variety of crop to be cultivated			
3.	The amount of seed, fertilizer and plant protection chemicals needed for raising a crop should be assessed before cultivation			
4.	It is not necessary to think ahead of the cost involved in raising crop			
5.	One need not consult an agricultural expert for crop planning			
6.	It is possible to increase the yield through farm production plan			
II.	Production orientation			
1.	Timely sowing of crop ensures good yield			
2.	One should use as much as fertilizer as he likes			
3.	Determining fertilizer dose by soil testing saves money			
4.	It is a good practice to use recommended quality seeds			

5.	One should use plant protection chemicals at regular intervals irrespective of pest			
6.	One should use as much as irrigation water as possible when it is available			
III.	Marketing orientation			
1.	Market now is not much useful to farmer			
2.	A farmer can get good price by grading his products			
3.	Warehouse can help the farmers to get better prices for his produce			
4.	One should purchase his inputs from the shop, where his other relatives purchase			
5.	One should grow those crops which have more market demand			
6.	One should sell his produce to the nearest market irrespective of price			

III. KNOWLEDGE OF THE BENEFICIARY FARMERS ABOUT INDIVIDUAL WATERSHED PRACTICES

Sl. No.	Description	Known/not known before watershed	Came to know after watershed
I.	Soil and water conservation practices		
1.	Ploughing across the slope		
2.	Land smoothening		
3.	Contour bunds		
4.	Strengthening of existing bunds		
5.	Vegetative bunds		
6.	Water ways		
7.	Construction of small section bunds		
8.	Opening of furrows		
9.	Use of improved agril. implement		
10.	Farm pond		
II.	Improved crop production practices		
1.	Summer ploughing		
2.	Across the slope sowing		
3.	Improved varieties		
4.	Seed treatment		
5.	Spacing		
6.	Application of FYM		
7.	Plant protection		
8.	Intercropping techniques		
9.	Fertilizer application		
III.	Alternate land use system		
1.	Agro-forestry		
2.	Agro-horticulture		
3.	Silvi-pasture		

IV.	Drainage line treatment		
1.	Nala bunds		
2.	Loose boulder structures		
3.	Vegetative break dam		
4.	Earthen check dam		
V.	Livestock management		
1.	Poultry farming		
2.	Sheep/goats farming		
3.	Dairy farming		

ADOPTION OF THE INDIVIDUAL WATERSHED PRACTICED BY BENEFICIARY FARMERS

Sl. No.	Description	Adopted before watershed	Adopted after watershed
I.	Soil and water conservation practices		
1.	Ploughing across the slope		
2.	Land smoothening		
3.	Contour bunds		
4.	Strengthening of existing bunds		
5.	Vegetative bunds		
6.	Water ways		
7.	Construction of small section bunds		
8.	Opening of furrows		
9.	Use of improved agril. implements		
10.	Farm pond		
II.	Improved crop production practices		
1.	Variety : Intan, Abhilash		
2.	Seed rate : 30-35 kg/ha		
3.	Seed treatment		
4.	Time of sowing (May-June)		
5.	Spacing : 20 × 10 cm		
6.	Transplanting		
7.	Seed drill		
8.	Application of FYM		
9.	Fertilizer application		
10.	Plant protection		
III.	Alternate land use system		
1.	Agro-forestry		
2.	Agro-horticulture		
3.	Silvi-pasture		

IV.	Livestock management practices		
1.	Poultry/sheep/goat/dairy farming		

PRODUCTION AND PRODUCTIVITY LEVELS OF CROPS

Sl. No.	Crops	Area (acres)	Before watershed		After watershed	
			Production (q)	Productivity (kg/acre)	Production (q)	Productivity (kg/acre)
1.						
2.						
3.						
4.						

CONSTRAINTS IN ADOPTION OF WATERSHED PRACTICES

The constraints in adoption of improved crop production practices

Sl. No.	Constraints	Remarks
1.	Non-availability of inputs in time	
2.	Heavy risk due to failure of monsoon	
3.	Non-availability of drought tolerant crop varieties	
4.	Cost of fertilizer is high	
5.	Non-availability of labours	
6.	Lack of finance	
7.	Expensive chemicals	
8.	Low returns from dryland crop	
9.	Lack of market facility	
10.	Difficulty in identification of contour key lines	
11.	Improved agril. implements are heavy for local drought animals	

Constraints in adoption of soil and water conservation practices

Sl. No.	Constraints	Remarks
1.	Water stagnation near bunded area	
2.	Fragmentation of land into unconventional shape and size	
3.	Obstructions for cultural operations	
4.	Belief that putting bunds serve no purpose	
5.	Loss of cultivable area	
6.	Bunding is not useful in rainfall area	
7.	Lack of co-operation by neighbours	
8.	Time of operation	

EMPLOYMENT GENERATION (MANDAYS PER ANNUM)

Sl. No.	Nature of employment	Before watershed	After watershed
1.	On-farm employment		
2.	Off-farm employment		

PROFILE OF SUJALA WATERSHED PROJECT BENEFICIARY FARMERS IN DHARWAD DISTRICT

CHANDRA CHARAN V.

2005

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ABSTRACT

The study entitled Profile of Sujala Watershed Project beneficiary farmers in Dharwad district was carried out during 2004-05. Following proportionate random sampling 150 respondents were selected from ten villages and data were collected by personal interview method.

The important findings of the study were; majority (45.34%) of the respondents had medium level of knowledge in respect of watershed practices. There was increase in the number of practices by over 45.00 per cent who had knowledge about watershed practices namely contour bunds, ploughing across the slope, strengthening of existing bunds, water ways, fertilizer application and spacing after implementation of the programme.

Regarding adoption level of the watershed practices by respondents it was revealed that majority (58.00%) of them belonged to medium adoption category. There was increase in number of respondents by more than 40.00 per cent who adopted watershed practices namely contour bunds, improved varieties, strengthening of existing bunds and water ways after implementation of the programme.

A positive and significant difference was observed in case of production and productivity of paddy in project area between before and after implementation of the programme.

Majority of the respondents were middle aged, 28.00 per cent of the respondents studied upto high school, 58.33 per cent of the respondents belonged to nuclear family, 64.00 and 48.66 per cent of the respondents possessed radio and television, respectively, 30.67 per cent of the respondents regularly contacted AAs.

The major constraints in soil and water conservation practices faced by farmers were fragmentation of land into unconventional shape, water stagnation near bunded area and time consuming operations. In case of crop production practices, the constraints faced by farmers were non-availability of labour, inadequate finance, heavy risk due to failure of monsoon and expensive chemicals.