ADOPTION OF WATERSHED MANAGEMENT PRACTICES BY FARMERS IN SUJALA WATERSHED PROJECT: A STUDY IN CHITRADURGA DISTRICT OF KARNATAKA

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DEPARTMENT OF AGRICULTURAL EXTENSION

UNIVERSITY OF AGRICULTURAL SCIENCES

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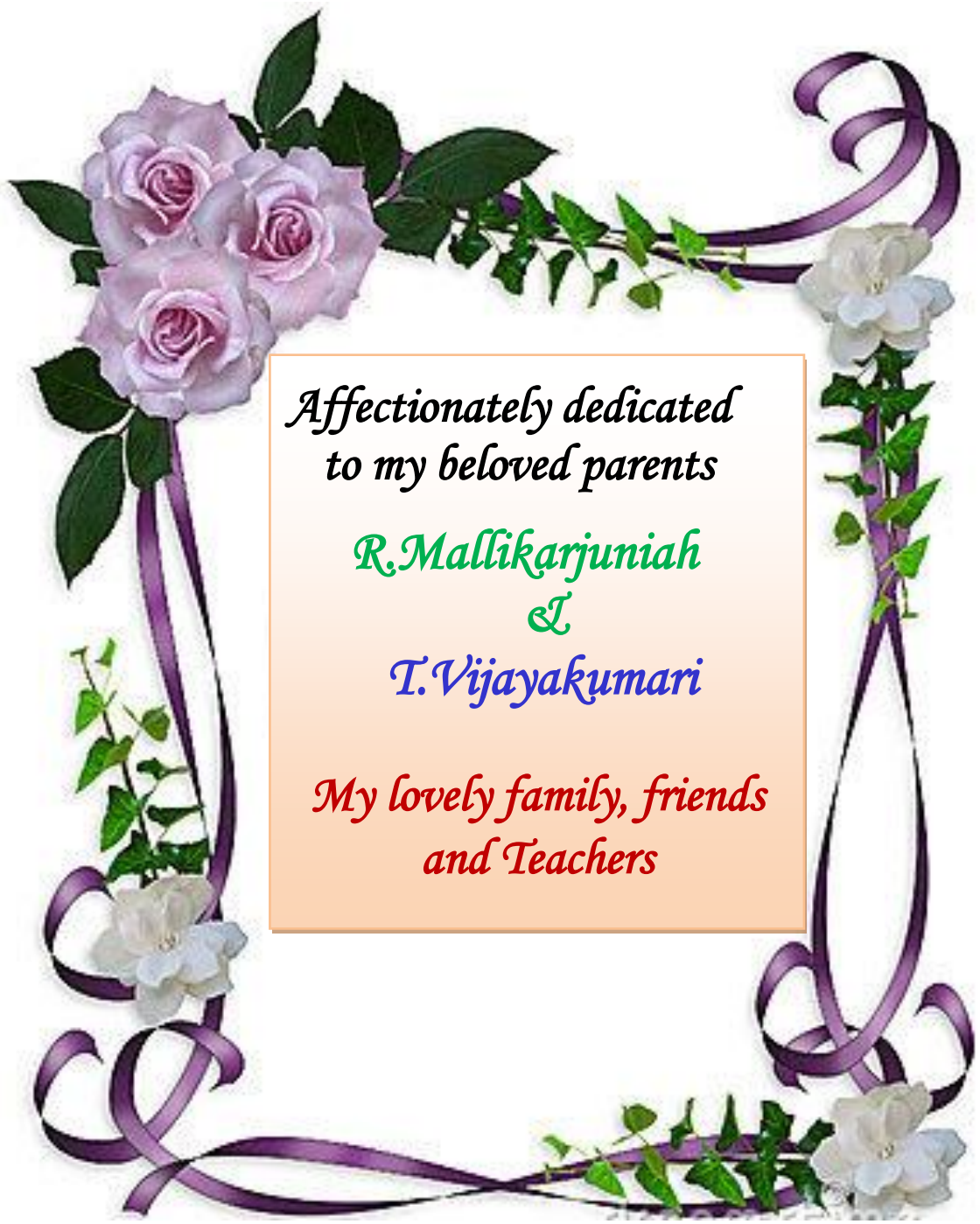
Affectionately dedicated
to my beloved parents
R.Mallikarjuniah
&
T.Vijayakumari
My lovely family, friends
and Teachers

DEPARTMENT OF AGRICULTURAL EXTENSION
UNIVERSITY OF AGRICULTURAL SCIENCES
BENGALURU

CERTIFICATE

This is to certify that the thesis entitled **ADOPTION OF WATERSHED MANAGEMENT PRACTICES BY FARMERS IN SUJALA WATERSHED PROJECT: A STUDY IN CHITRADURGA DISTRICT OF KARNATAKA** submitted by **Mr. MANJUNATH,M., ID No. PALB 2135** for the award of the degree of **MASTER OF SCIENCE (Agriculture) in AGRICULTURAL EXTENSION** to the University of Agricultural Sciences, Bengaluru, is a bonafide record of research work carried out by him during the period of his study in this University under my guidance and supervision and thesis has not previously formed the basis for the award of any degree, diploma, associateship, fellowship or other similar titles.

BENGALURU
June 14th, 2014

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Finally, I wish to thank the farmers of Central Dry Zone who have co-operated in conduct of my research work.

Bengaluru
June, 2014 ***(MANJUNATH.M.)***

ADOPTION OF WATERSHED MANAGEMENT PRACTICES BY FARMERS IN SUJALA WATERSHED PROJECT: A STUDY IN CHITRADURGA DISTRICT OF KARNATAKA

MANJUNATH.M

ABSTRACT

Karnataka is the eighth largest state in India, with highest proportion of drought prone area. Natural resource is being subjected for poor land management practices. in order to overcome this the Government of Karnataka has initiated Sujala watershed project. Chitradurga district was selected purposefully to study the impact of watershed project. The project covered with Hiriyur taluk. larger number of beneficiaries were of middle aged (61.00%) studied up to high school (34.00%), leaving in joint family (61.00%), having small land holding (56.00%), with medium level of risk orientation(39.00%), achievement motivation (43.00%), scientific orientation (57.00%), social participation (43.00%) and extension participation(39.00%) It was found that a considerable number of beneficiaries were having high level of mass media participation (54.00%) and innovativeness (38.00%), whereas 53.00 per cent of the beneficiaries had low level of market orientation. Around sixteen per cent increase in the yield level was noticed in Groundnut (15.67%) closely followed by Ragi (13.88%). While, more than 24.71 per cent increase in the yield level was observed in Pomegranate, 17.51 per cent increase in the yield level was observed in Sapota and drastic increase in Diary farming is (14.32%).When we compared data before and after implementation of the project, There was a significant relationship between extension participation, achievement motivation, risk orientation, innovativeness, scientific orientation and education had positive and significant relationship with adoption.

July, 2014
Bengaluru

Signature of Major Advisor
(G. M. VARADARAJU)

ಸುಜಲಾ ಜಲಾನಯನ ಯೋಜನೆ,ರೈತರು ಮತ್ತು ಜಲಾನಯನ ಆಡಳಿತ ನಿರ್ವಹಣೆ ಬಗ್ಗೆ ಕರ್ನಾಟಕದ ಚಿತ್ರದುರ್ಗ ಜಿಲ್ಲೆಯ ಒಂದು ಅಧ್ಯಯನ

ಎಂ. ಮಂಜುನಾಥ

ಪ್ರಬಂಧ ಸಾರಾಂಶ

ಕರ್ನಾಟಕವು ಭಾರತದ ೮ನೇ ಅತಿ ದೊಡ್ಡ ರಾಜ್ಯವಾಗಿದೆ. ಇದರ ಜೊತೆಗೆ ಬರಪೀಡಿತ ಪ್ರದೇಶವು ಸಹ ಈ ರಾಜ್ಯದಲ್ಲಿ ಅತ್ಯಧಿಕ ಪ್ರಮಾಣದಲ್ಲಿದೆ, ಇದಕ್ಕೆ ಕಾರಣ ನೈಸರ್ಗಿಕ ಸಂಪನ್ಮೂಲದ ಕಳಪೆ ನಿರ್ವಹಣೆ ಆಗಿದೆ. ಇದನ್ನು ಸರಿಪಡಿಸುವ ಸಲುವಾಗಿ ಕರ್ನಾಟಕ ಸರ್ಕಾರವು ಸುಜಲಾಜಲಾನಯ ನಯೋಜನೆಯನ್ನು ಆರಂಭಿಸಿದೆ. ಈ ಅಧ್ಯಯನವನ್ನು ಚಿತ್ರದುರ್ಗ ಜಿಲ್ಲೆಯ ಜಲಾನಯನ ಅಭಿವೃದ್ಧಿಗಾಗಿ ಆಯ್ಕೆ ಮಾಡಿಕೊಳ್ಳಲಾಗಿದೆ. ಜಿಲ್ಲೆಯ ಹಿರಿಯೂರು ತಾಲ್ಲೂಕನ್ನು ವಿಶೇಷವಾಗಿ ಅಧ್ಯಯನಕ್ಕಾಗಿ ಆಯ್ಕೆ ಮಾಡಿಕೊಳ್ಳಲಾಗಿದೆ.

ಈ ತಾಲ್ಲೂಕಿನ ಸುಜಲಾಜಲಾನಯನ ಯೋಜನೆಯಲ್ಲಿ ಹೆಚ್ಚಿನ ಪ್ರಮಾಣದಲ್ಲಿ ಮಧ್ಯ ವಯಸ್ಕ ಫಲಾನುಭವಿಗಳು ಒಳಗೊಂಡಿದ್ದಾರೆ ಇವರ ಪ್ರಮಾಣ ಶೇ ೬೧%ಷ್ಟಿದೆ, ಶೇ ೩೪% ಇವರುಗಳ ವಿದ್ಯಾಭ್ಯಾಸ ಮಟ್ಟ ಪ್ರೌಢಶಾಲೆಯಾಗಿದೆ, ಇದರಲ್ಲಿ ಶೇ ೬೧% ಅವಿಭಕ್ತ ಕುಟುಂಬ ವಾಸಿಗಳಾಗಿದ್ದಾರೆ ಅದಾಗ್ಯು ಶೇ ೫೬% ರಷ್ಟು ಸಣ್ಣ ಹಿಡುವಳಿದಾರರಾಗಿದ್ದಾರೆ ಜೊತೆಗೆ ಶೇ ೩೯% ಜನ ಕಷ್ಟ ಸಹಿಷ್ಣುಗಳಾಗಿದ್ದಾರೆ. ಸಾಧನಾ ಶ್ರೇಣಿ ಶೇ ೪೩%, ವೈಜ್ಞಾನಿಕ ದೃಷ್ಟಿಕೋನ ಶೇ ೫೭%, ಸಾಮಾಜಿಕ ಭಾಗವಹಿಸುವಿಕೆ ಶೇ ೪೩%, ಕೃಷಿ ವಿಸ್ತರಣ ಭಾಗವಹಿಸುವಿಕೆ ಶೇ ೩೯% ರಷ್ಟಾಗಿದೆ, ಫಲಾನುಭವಿಗಳು ಗಣನೀಯ ಸಂಖ್ಯೆಯು ಸಮೂಹ ಮಾಧ್ಯಮಗಳಲ್ಲಿ ಭಾಗವಹಿಸುವಿಕೆ ಉನ್ನತ ಮಟ್ಟದ ಪ್ರತಿಲಾಭಾಂಶ ಶೇ ೫೪% ಹೊಂದಿರುವರೆಂದು ಕಂಡುಬಂದಿದೆ. ಅವಿಷ್ಕಾರ ಮನೋಭಾವದ ಫಲಾನುಭವಿಗಳು ಶೇ ೩೮% ಮತ್ತು ಫಲಾನುಭವಿಗಳಲ್ಲಿ ಶೇ ೫೩% ರಷ್ಟು ಕಡಿಮೆ ಮಾರುಕಟ್ಟೆ ದೃಷ್ಟಿಕೋನ ಹೊಂದಿರುವರಾಗಿದ್ದಾರೆ ಅದರ ಜೊತೆಗೆ ಸರಿಸುಮಾರು ಶೇ ೧೫.೬೭% ಇಳುವರಿಯು ಕಡಲೆಕಾಯಿ ಫಸಲಿನಲ್ಲಿ ಕಂಡುಬಂದಿದೆ, ನಂತರರಾಗಿ ಇಳುವರಿಯಲ್ಲಿ ಶೇ ೧೩.೮೮ % ಫಸಲಿನಲ್ಲಿ ಕಂಡುಬಂದಿದೆ ನಂತರದಲ್ಲಿ ದಾಳಿಂಬೆಯಲ್ಲಿ ಶೇ ೨೪.೭೩% ರಷ್ಟು ಇಳುವರಿ ಹೆಚ್ಚಾಗಿರುವುದನ್ನು ಕಾಣಲಾಯಿತು, ಸಪೋಟದಲ್ಲಿ ಶೇ ೧೭.೫೧% ರಷ್ಟು ಹೆಚ್ಚಾಗಿರುವುದನ್ನು ಕಾಣಲಾಯಿತು ಮತ್ತು ಡೈರಿ ಕೃಷಿಯಲ್ಲಿ ಶೇ ೧೪.೩೨ ರಷ್ಟು ಹೆಚ್ಚಳಗೊಂಡಿದೆ.

ಯೋಜನೆಯ ಅನುಷ್ಟಾನದ ಮೊದಲು ಮತ್ತು ನಂತರದ ದಶಮಾಸ ಹೊಲಿಸಿದರೆ ಯೋಜನೆಯ ವಿಸ್ತೀರ್ಣ, ಭಾಗವಹಿಸುವಿಕೆ, ಸಾಧನೆ, ಪ್ರೇರಣೆ, ಆವಿಷ್ಕಾರ ಮನೋಭಾವ, ಹೊಸತನದ ವೈಜ್ಞಾನಿಕ ದೃಷ್ಟಿಕೋನ ಮತ್ತು ಶಿಕ್ಷಣದ ನಡುವೆ ಒಂದು ಧನಾತ್ಮಕ ಮತ್ತು ಅರ್ಥಪೂರ್ಣ ಸಂಬಂಧ ಹೊಂದಬಹುದೆಂದು ಭಾವಿಸಲಾಗಿದೆ.

ಜುಲೈ ೨೦೧೪ ಜಿ. ಎಂ. ವರದರಾಜು

ಕೃಷಿ ವಿಸ್ತರಣಾ ವಿಭಾಗ (ಪ್ರಧಾನ ಸಲಹೆಗಾರ)

ಕೃಷಿ ವಿಶ್ವ ವಿದ್ಯಾನಿಲಯ, ಜಿಕೆವಿಕೆ, ಬೆಂಗಳೂರು

Adoption of watershed management practices by farmers of Sujala watershed project : A study in Chitradurga district of Karnataka

Manjunath. M and Varadaraju, G. M.

Department of Agricultural Extension UAS ,GKVK Bangalore-65

Introduction

Watershed development is a holistic 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 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.

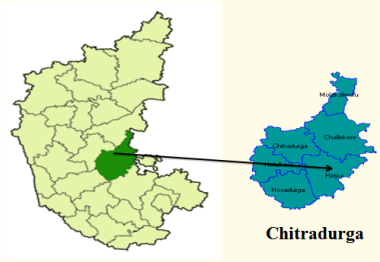
Objective

- To study extent of adoption of soil, water conservation and crop production techniques by the beneficiaries.

Materials and Methods

Research design: Ex-post facto research design was employed.

Locale of the study: Chitradurga district of Hiriyur taluk Karnataka state. two Sub Watershed Gandhinagar and M.D Kote were selected for the study.



Sample Size: 100 respondents were selected from 10 villages.

Data Collection: Data was collected by interview schedule method

Analysis of Data: Percentage, mean and standard deviation, frequencies and correlation were employed.

Results

Overall adoption of beneficiaries of farmers about watershed practices.

The data revealed in the table indicated that a majority (43.00%) of the beneficiaries belonged to high adoption level category. Only 39.00 and 18.00 per cent of the respondents belonged low and medium adoption level categories. With respectively towards adoption of beneficiaries of farmers watershed practices.

S.No	Category	Beneficiary	
		Frequency	per cent
1	Low	39	39.00
2	Medium	18	18.00
3	High	43	43.00

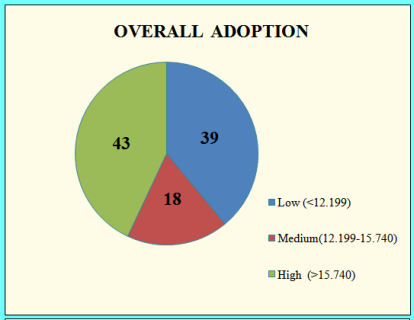
Specific adoption of beneficiaries of farmers about watershed practices.

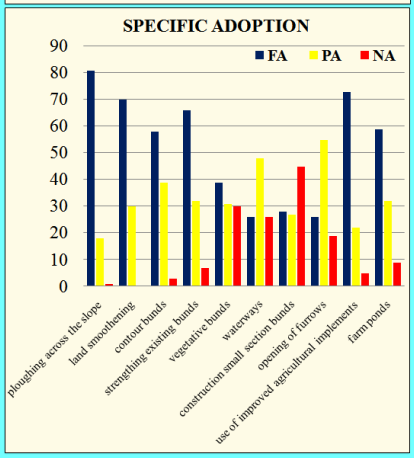
The large majority of beneficiaries adopted the practices like ploughing across the slope (81.00%), improved agricultural implements (73.00%), land smoothening (70.00%). The practice like strengthening of existing bunds, contour bunds was practiced by 66.00 and 58.00 per cent of beneficiaries respectively. Whereas very less per cent of beneficiaries (39.00%, 28.00%, 26.00% and 26.00%) adopted vegetative bunds, construction small section bunds, opening of furrows and waterways respectively.

Discussion

A higher per cent of beneficiary farmers were found in high adoption category (43.00%) and 37.00 per cent farmers belonged to low adoption category. Beneficiary farmers were benefited by Sujala Watershed Project and they have good extension participation and Achievement motivation. They are exposed to other transfer of technology programmes like study tour, demonstrations etc.

The results indicated that majority of beneficiary farmers adopted practices like ploughing across the slope, improved in agricultural implements and land smoothening. The reason attributed was, these are commonly followed practices, further no high cost and technical guidance is required for adopting these practices However, least per cent of beneficiaries adopted waterways, opening furrows, vegetative bunds, and farm ponds The reasons attributed for above findings are requirement of strong technical guidance is required for adopting these practices.





Summary

Watershed development main aim to improve productivity watersheds areas and improve to the natural resources by using land use practices like simple soil and water conservation techniques as well as crop production practices.

In this background the research has been designed to study adoption of soil water conservation practices and crop production practices. The results of the study indicated beneficiaries had better adoption of crop production practices due to extension educational efforts. Also adopted low cost and improved crop production practices.

Advisory committee

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CHAPTER I

INTRODUCTION

India is one the major agricultural countries with nearly 52 per cent of the population depending on it. Nearly three fourth of the cultivable land in India is dependent on monsoon, which is contributing approximately 42 per cent of the total production from agriculture. The productivity of any crop mainly depends on two natural resources like land and water in addition to management practices. Therefore, the conservation upgradation and utilization of these two natural resources on scientific principle is essential for sustainability of rainfed agriculture. In this context, the concept of watershed for development of rain-fed agriculture is gaining importance. The mission of watershed development department is to develop, promote and implement through participatory approaches, a decentralized, cost effective/reproductive, transparent and sustainable watershed treatment packages which include,

To meet rural needs

To enhance employment and income for the poor,

To improve the productive potential.and

To reduces the degradation

Karnataka has given an importance to watershed development because 75 per cent of the cropping area is rainfall

CONCEPT OF WATERSHED

Watershed development is a holistic 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 contribute some portion.

Sujala watershed is a community driven watershed development project and is being implemented in three phases. In the first phase (2001-2006) the project was implemented in the area of 4.29 lakh ha covering five districts (Chikkabalapur, Tumkur, Chitradurga, Haveri and Dharwad) with the financial assistances of World bank. During the second phase (2007-2012) 1.56 lakh ha was treated in six districts (Belgaum, Madikeri, Hassan, Chitradurga Chikmagulur and Shimoga) with the financial assistances of NABARD. In the third phase (2013-2018) the project is proposed to treat 2.53 lakh ha in Seven Districts (Bidar, Gulbarga, Yadgir, Gadag, Koppal, Davanagere, Chamarajanagr and untreated areas of Chitradurga and Tumkur) with the financial assistance of World Bank

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 study extent of adoption of soil, water conservation and crop production techniques by the beneficiaries.
2) To study impact on crop productivity and livestock among beneficiaries
3) To ascertain the relationship between personal psychological and socio – communication characteristics of beneficiaries with adoption level.
4) To enlist the constraints and suggestions of Sujala watershed beneficiaries.

CHAPTER 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.

OBJECTIVES

2.1 To study the extent of adoption of soil, water conservation and crop production techinques by the beneficiaries.

2.2 To study the impact of crop productivity and livestock among benificaires

2.3 To ascertain the relationship between personal, psychological and socio - communication characteristics of beneficiaries with adoption level.

2.4 To enlist the constraints and suggestions of Sujala watershed beneficiaries.

2.1 To Study the extent of adoption of soil, water conservation and crop production techniques by the beneficiaries

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 and yaradappanar (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 smoothening 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 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.

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 56.67per cent, zigzag 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%) were 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.

Deshmukh *et al*. (1995) revealed that 47.50 per cent of the respondents had high adoption regarding 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 26.66and 16.66 per cent, respectively.

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 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.

2.2 Impact study on crop productivity and livestock among benificaries

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) and 24.58 per cent (wheat) in about five years. The increase in productivity in other prime crops were 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) in his study on management of rainwater resources on watershed basis for sustainable agriculture production – An experience of Tejpur Watershed 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 man day 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 increase 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 there is increase in dairy, fishery production, fodder production and 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.

Manu and Kulkarni (2002) reported that as a result of check dams, water was stored like stagnant water in recharged open well. He also found that about 1412 hand pumps and 227 tube wells were recharged.

Sastry *et al.* (2004) in their study on watershed land management in different semiarid regions of India has reported that water harvest structures augmented the groundwater resources. Groundwater table increased from 2.1 meter to 3.4 meter.

Ram Mohan Rao *et al.* (2004) carried their impact study on watershed in Chinnhatekar in before and after project framework found that there has been an increase in the net returns of irrigated crops like paddy, groundnut, cotton and vegetables by 90 per cent, 70 percent, 36 percent, 24 percent, respectively.

Dogra (2005) in this study on participation process development in watershed projects the implementation experience of Punjab shivaliks, revealed that the average yield of maize was increased from 0.8 to 1.4 t ha-1 and wheat 0.9 to 1.8 t ha-1.

Dyani (2006) in this study on impact of watershed development and land use dynamics on agricultural productivity and also socio-economic status of farmers in central Himalayas indicated that the after implementation of the project significantly increased the yield of the crops by 21% in potato at Mohnagad to 126% in wheat at

Khootgad. The total food grain production increased by 135% in Mohnagad and 41.4% in Khootgad.

Kannan (2006) in his study on impact evaluation of micro level water resources development and improved agricultural practices on crop productivity and economics in Orissa revealed that productivity of *Kharif* rice increased from 2.13 t ha-1 to 3.52 t ha-1 during 2001(normal monsoon year) and 1.5 t ha-1 to 3.6 t ha-1 in 2002(drought year).

Jain (2007) in his study on impact of organizational instruments on agricultural watershed development project in Andrapradesh in his study observed that yields of the major crops *viz.,* Groundnut, Redgram, Setaria, Sorghum, Vegetables, Onion, Cut flowers *etc.* Have increased due to implementation of watershed based technology. It could be inferred from above reviews that productivity of crops has been increased after implementation of watershed project

2.3 To ascertain the relationship between personal psychological and socio - communication characteristics of beneficiaries with adoption level

2.3.1 Age

Madhavareddy (2001) in his study on peoples' participation in watershed development programme implemented by government and non-government organization – Acomparative 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 toold 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.

NingaReddy (2005) in his study on knowledge, extent of participation and benefits derived by participant farmers of the watershed development programme in Raichur district of Karnataka reported that majority of the respondents (75.33%) belonged to the middle age group, followed by old age (16.67%) and young age group (8.00%) category, respectively. Hence it can be inferred from the above studies that majority of farmers belong to middle age group.

2.3.2 Education

Marilingannavar and Manjunath (1992) in his study on socio-economic characteristics and existing sheep rearing pattern of shepherd in Dharwad district of Karnataka 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%) percent of the respondents had education upto high school and college level.

Gupta (1999) in his study on the knowledge and adoption behavior of rice growers in Jammu district of Jammu and Kashmir s 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. Where as, 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) in his study on knowledge and adoption level of soil and water conservation practices by farmers in northern Karnataka 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 upto middle school, 15.00 per cent upto high school, 11.25 per cent upto pre university, Where as, 5 per cent respondents had graduation, less than 25 per cent of the respondents were illiterate.

Ningareddy (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%) percent of them had education upto college and degree programme.

Kulshresta and Kushwaha. (2010) in his study on impact of kheri nala watershed in Madhya pradesh revealed that majority of the respondents were illiterate belong to middle age group ST caste category had small family size upto 5 members.In most of studies reviewed and reported above, one third of respondents were educated up to, primary and middle school and remaining two thirds had education of varied levels

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.

Ningareddy (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 Land holding

Naik (1993) in his study on study of awareness attitude and sue pattern of seed supplying agencies by the farmers of Dharwad district found that 40.00 per cent of the respondents had big land holding, followed by small landholders (30.00%) and marginal landholders (26.00%).

Nagaraj (1996) in his study on knowledge and adoption pattern of improved cultivation practices of groundnut among farmers of Pavagada taluk in Tumkur district 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.

Ningareddy (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 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.

Singh and Prakash (2010) in his study on socio-economic impact of watershed development project in Manipur revealed that the distribution of land holdings in Khamenlok watershed was highly skewed. Majority of the farmers in the watershed were either landless or having holding less than 1 ha. About 3 percent of the house hold occupied 25 percent of total holdings. From above studies it could be inferred that majority of the farmers had small and medium land holdings.

2.3.5 Risk orientation

Balasubramaniam (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.

Rathisabapathi (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.

Ningareddy (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.

2.3.6 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%).

Ningareddy (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.

2.3.7 Achievement Motivation

Gopala (2010) revealed that majority (46.67 %) of the respondents belonged to high achievement orientation category. whereas, 33.33 per cent and 20.00 per cent of them belonged to low and medium achievement orientation categories, respectively.

Sunitha (2012) reported that 40.00 per cent of the participants had high achievement orientation. Whereas, 36.70 per cent and 23.30 per cent possessed medium and low achievement orientation, respectively.

2.3.8 Innovativeness

Farooque (1997) in his study on the adoption behaviour of farmers of drought prone area of Aurangabad district of Maharashtra state reported that majority of the farmer (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.

Ningareddy (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 andlow level of innovativeness categories, respectively

2.3.9 Market orientation

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

Sakharkar (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

Ningareddy (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.

2.3.10 scientific orientation

Gour (2002) found that slightly more than two fifth (41.86%) of the dairy farmers had medium level of scientific orientation, followed by 37.21 per cent with high and 20.93 per cent with low level of scientific orientation.

Chauhan and Patel (2003) revealed that more than half of the respondents (51.25%) had medium scientific orientation followed by low (25.00%) and high (23.75%) levels of scientific orientation,

2.3.11 Extension Participation

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 Raitha Samparka Kendras, while 29.33 and 28.66 per cent of them occasionally and never contacted Raitha Samparka Kendra, respectively.

Ningareddy (2005) in his study on knowledge, extent of participation and benefits derived by participant farmers of the watershed development programme in Raichur district of Karnataka reported that 68.00 percent regularly contacted AAs followed by 60.00 percent of them contacting AAOS regularly .also 54.67 percent of them regularly contacted NGO officials. Hence, it is inferred from above reviews that Agricultural Assistants and Assistant Agricultural Officers were frequently contacted by the respondents.

2.3.12 Social participation

Srinivasa reddy (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.

VijayKumar (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 of cooperative societies, only 3.33 per cent of the respondents were members of taluka panchayat and 0.83 per cent are members of zilla Panchayat, among these 57.50 per cent of the respondents regularly participating in cooperative societies.

Chandra Charan (2005) in his study on profile of Sujala Watershed Projectbeneficiary farmers in Dharwad district revealed that 11.33 percent of farmers were members of watershed organization. Out of which 52.00 and 30.66 percent regularly and occasionally attended meetings.

Bagadi and Joshi (2007) in his study on peoples participation in planning of soil and water conservation programme in Anrtisar watershed of Gujrat revealed that majority of the respondents (79%) exhibited moderate level of participation while 12% and 8-9% respondents less and more participation levels, respectively. From above reviews it could inferred that majority were members in co-operative society followed by gram Panchayat and taluka Panchayat.

2.4 To enlist the constraints and suggestions of Sujala watershed beneficiaries

Shivaprasad (1990) observed that lack of required finances, soil and water conservation works were not executed properly as per technical recommendations, and 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 as 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 watershed area found that lack of knowledge, lack of credit, lack of conviction, nonavailability of inputs intime, delay in rains, operational difficulty and unfavorable 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 as 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.

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 expected by the farmers of Maharashtra

Venkataprabhu 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, and poor economic status were the constraints observed.

Jhariya *et al*. (1999) in their study revealed that various constraints which reduced thecrop 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%).

Purushottam *et al*. (2005) in this study on extension and management issues in watershed projects in Rajasthan revealed that in proper execution of programme (47%), lack of coordination (31%) and lack of training (29%) were the major problems to adopt the watershed practices.

Sisodia (2007) in this study constraint in adoption of watershed development technologies Rajsamand district of Rajasthan revealed that lack of irrigation facilities was one of the most important constraint for the beneficiary farmer, followed by unavailability of recommended fruit plants, lack of publicity about the programme which resulted in the lack of participation of beneficiaries.

Reddy *et al*. (2008) in this study on watershed development programme knowledge and involvement of people revealed that majority of the respondents disagreed for adequate demonstration (67.5%) pasture development (100%) restoration and development of existing structure (47.50%).

Sisodi *et al.* (2009) in his study on impact of training on natural resource management in charana watershed of Rajastan, revealed that the farmers realized the benefits of new technologies but the problems faced by the farmers were unavailability of worms for vermiculture, improved agricultural implements, bio-fertilizers and plant protection equipments.

Singh and Prakash (2010) in his study on socio-economic impact of watershed development project in Manipur revealed that most crucial thing is that increased income was not distributed uniformly to all sections of people in the watershed areas satisfactory.

Kulshrestha and Kushwaha (2010) in his study on impact of kheri nala watershed in Madhya Pradesh revealed that lack of capital (65.00%), completion of land procedures (62.50%), high cost of fertilizer and seed (61.25%), lack of training (57.50%), lack of transport facilities (46.25%) and lack of irrigation facilities were perceived as major constraints in adoption of watershed technologies.

From above reviews, it can be concluded that majority of the farmers were facing problem of lack of investments followed by high cost of seeds and fertilizer

CHAPTER III

METHODOLOGY

The present research was carried out during 2013-14 to study the adoption of watershed management practices by farmers of Sujala Watershed Project of Hiriyur taluk of Chitradurga 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 Hiriyur taluk of Chitradurga district in Karnataka. Most of cultivated land in the project area is under rainfed farming and this area is the most backward.

Two sub watershed of Chitradurga

Gandhinagar Micro sub watershed	Area (Ha)
Dindavara	856.00
Gollarahatti	910.00
Goudnahalli	613.00
Malogondanahalli	601.00
Rangapura	819.00

M.D .KOTE Micro sub watershed	Area(Ha)
Aimangala	998.00
Bandlarahatti	556.00
Burujanaroppa	771.00
Maradihalli	490.00
Talavatti	593.00

3.2 Description of the study area

Chitradurga district falls under Central Dry Zone (Zone 4), it includes Challakere, Chitradurga, Davangere, Harihara, Hiriyur, Hosadurga, Holalkere, Jagulur, Molakalmur, Arasikere, Kadur, Madhugiri. Pavagada, Korategere, C.N Hally, Sira and Tiptur. This zone covers an area 1.943M.ha. the annual rainfall of this ranges from 453.5-717.7mm out of which more than 55 Per cent is received in Kharif season. The elevation ranges between 450-900 m and soils are red sandy loams in major areas, shallow to deep black in the remaining areas The major crops of the area grown are ragi, cotton, groundnut, Jowar, sunflower and Redgram. In agriculture 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. Rabinson (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 research 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 respondents

In Chitradurga district Sujala watershed was implemented in nine sub watersheds spread over 108 villages. Out of nine sub watersheds in two sub watersheds and from each sub watershed10 villages were purposively selected based on maximum area covered. Ten beneficiaries from each village were selected by following simple random sampling techniques thus making a total. sample size of 100 for the study.

3.5 Selection of the variables

After discussing with the scientists of University of Agricultural Sciences, Bangalore and extension personnel of KANATAKA STATE DEPARTMENT OF AGRICULTURE (KSDA), District Watershed department and based on the review of literature appropriate dependent and independent variables were selected and listed below

3.5.1 Dependent variables

Adoption.

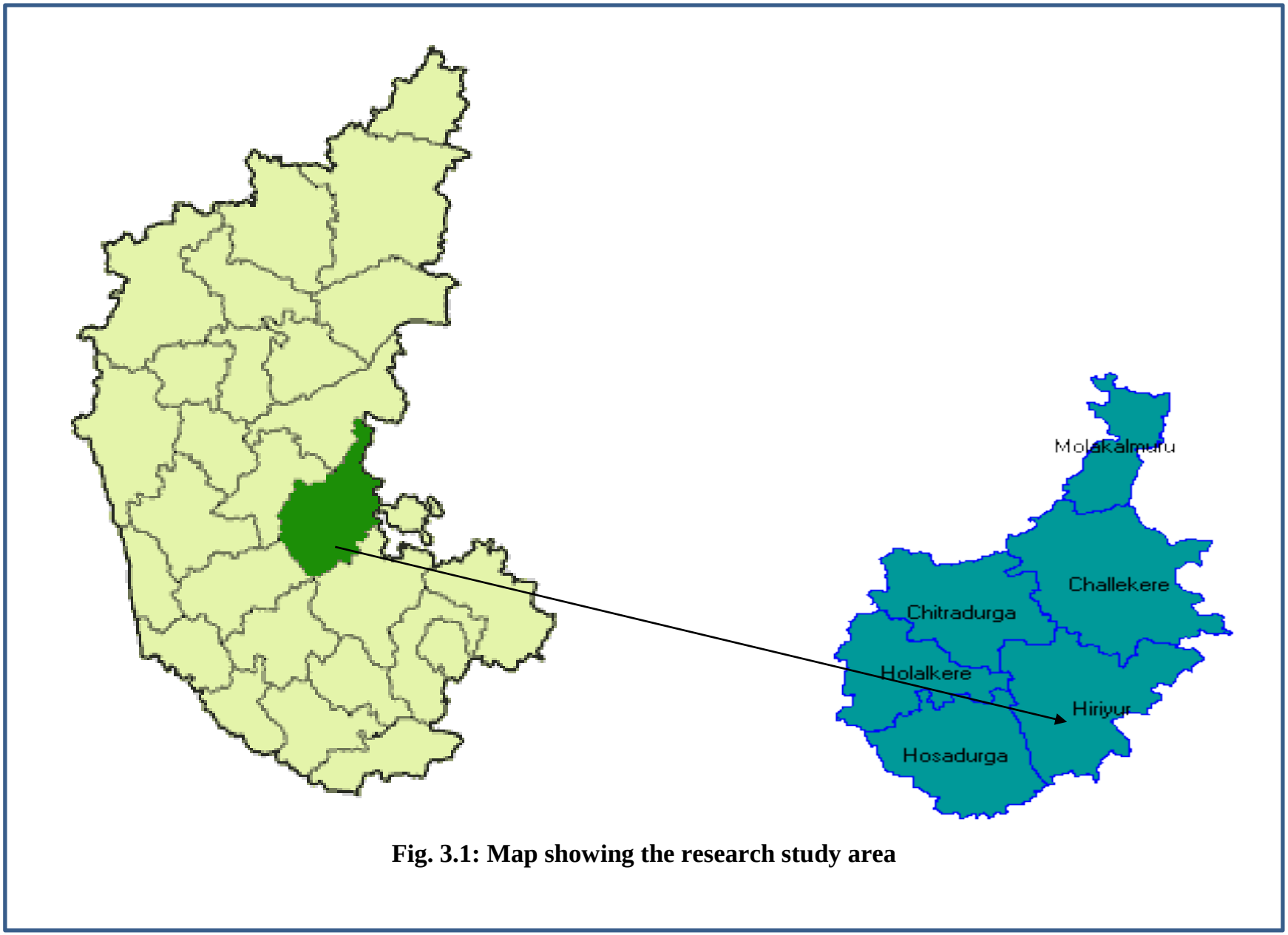


Fig. 3.1: Map showing the research study area

3.5.2 Independent variables

1. Age
2. Education
3. Family type
4. Land holding
5. Achievement motivation
6. Risk orientation
7. Social participation
8. Innovitaveness
9. Market orientation
10. Scientfic orientation
11. Extension participation
12. Mass media utilization

Sl. No.	Variable	Empherical Measurement
Dependent Variable		
1	Adoption of recommended watershed management practices	Procedure followed by Sengupta (1967) With suitable modification
Independent Variables		
1.	Age.	Chronological age classification Kenchanagoudra (2007)
2.	Education.	Prodedure followed by Kenchanagoudra (2007)
3.	Family type.	Prodedure followed by Dahama and Bhatanagar (1980)
4.	Land holding.	Scale developed by Hiremath (2000) with suitable modification
5.	Achievement motivation.	Procedure followed by Gopala (2010)
6.	Risk orientation.	Procedure followed by Supe (1969)
7.	Innovativeness.	Procedure followed by Moulik and Rao (1973)
8.	Scientific orientation	Procedure followed by Supe (1969)
9.	Market orientation.	Procedure followed by Samanta(1977)
10.	Social participation.	Procedure followed by Hiremath (2000)
11.	Mass media utilization.	Procedure followed by Hiremath (2000)
12.	Extension participation.	Prodcedure followed by Man Singh (1993)

3.6 Methods followed for measurement and quantification of variables

3.6.1 Dependent variable

3.6.1.1 Adoption

Adoption has been operationally defined as the extent of use of selected recommended soil and water conservation practices. A list of recommended practices to be followed in the watershed area was prepared in consultation with district watershed development. This response for each practice was studied on a three point continuum of non adoption, partial adoption, full adoption Each practice was given a score of zero, one and two for non adoption, partial adoption and full adoption respectively. The scores obtained by the individual respondents for all practices were summated to get the adoption score of individual respondents. The scale consisted of 15 Statements. Thus, maximum possible score of respondent was 30. A respondent's general adoption level was determined quantitatively by using the adoption quotient developed by Sengupta (1967).

3.6.2 Independent variables

3.6.2.1 Age

Age is refers to the chronological age of the respondents, in years completed at the time of investigation. The respondents were further categorized into three groups as followed by Kenchanagoudra (2007).

Category	Age (years)
Young age	18-30
Middle age	31-50
Old age	Above 50

3.6.2.2 Education

The education variable was operationalized as the number of years of formal education acquired by the respondents. The scoring and categorization of respondent's was done in accordance with the procedure followed by Kenchanagoudra (2007).

Category	Score
Llliterate	0
Primary school	1
Middle school	2
High school	3
PUC	4
Diploma	5
Graduate	6

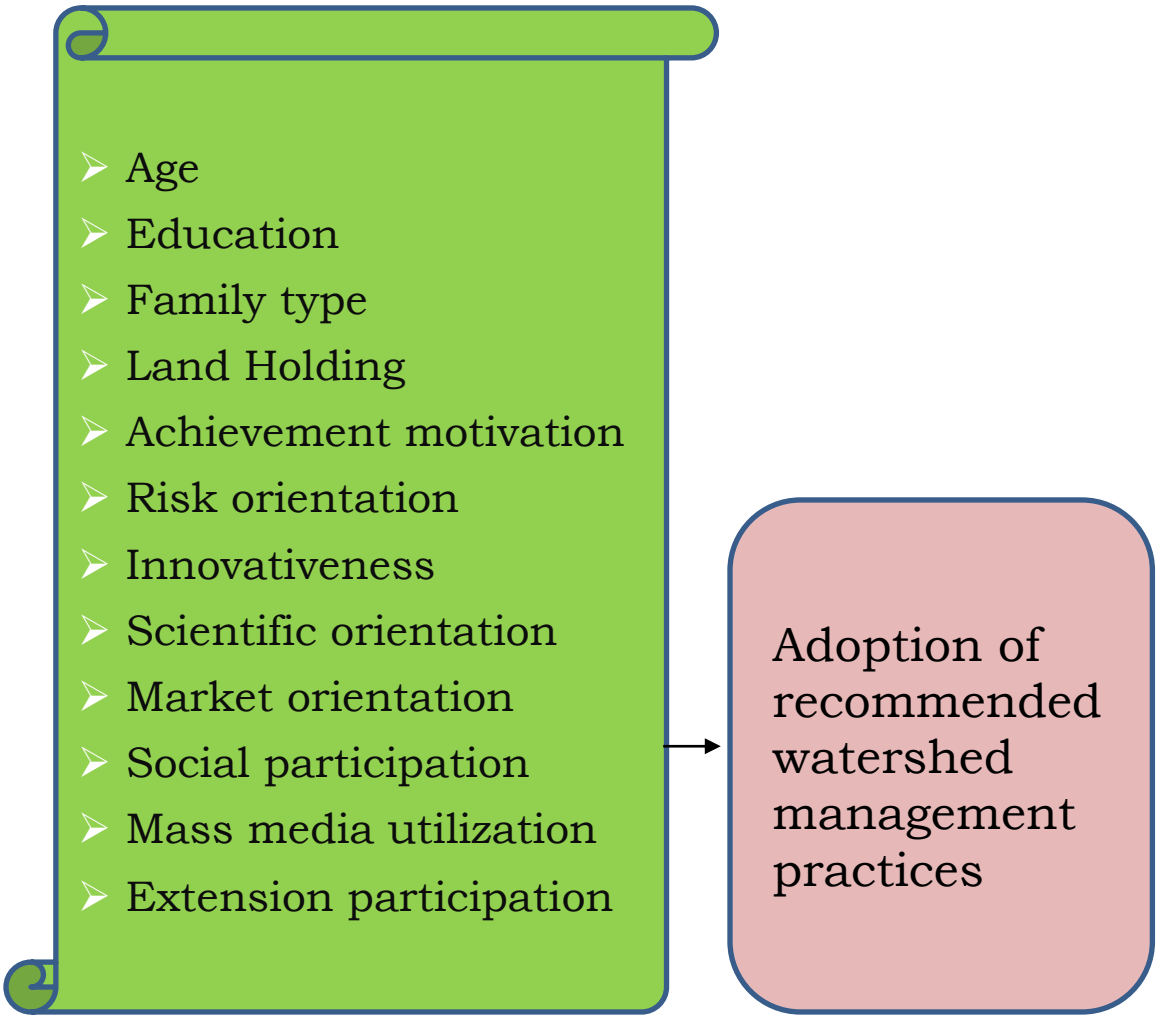


Fig. 3.2: Conceptual Model of the Study

3.6.2.3. Family type

Family type refers to two-way classification of family as nuclear and joint families. The basic grouping of parents and their children is called nuclear family of more living together than one nuclear family on the basis of close blood ties and common residence is called joint family (Dahama and Bhatnagar, (1980)

Family type	Scores
Nuclear type	2
Joint type	1

3.6.2.4. Land holding

It is the actual land owned by the family of farmers in acres. The conversion of 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". Accordingly, one acre of wet land is equated to three acres of dryland. The responses were categorized based on procedure as followed by Hiremath (2000).

Land holding category	Area in acres
Marginal farmers	Up to to 2.50 acres
Small farmers	2.51- 5.00 acres
Medium farmers	5.01-10.00 acres
Big farmers	More than 10.01 acres

3.6.2.5. 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 consisted 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

3.6.2.6. Achievement motivation

It refers to striving to do a good work with a standard of excellence which may be task related, self-related. The variable was measured by using the procedure followed by Gopala (2010). The scale consisted of seven statements to be rated on a five point continuum; namely, strongly agree, agree, undecided, disagree and strongly disagree with the score of 5,4,3,2 and 1 respectively.

Sl. No.	Statements	SA	A	UD	DA	SDA
1	Any farmer with ability and willingness to work hard has a good chance of success					
2	One should feel that he can achieve the things that he wishes					
3	A farmer should utilise the available resources to boost his level of production					
4	One should have to keep learning new skills for better management of watershed					
5	One should provide good education to all his children					

3.6.2.7. 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 five point continuum. The scoring pattern followed is as given below

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

Sl. No.	Statements	SA	A	UD	UA	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					

3.6.2.8. Market orientation.

It refers to the degree to which a farmer is oriented towards scientific market Orientation. In order to know the respondents' in market orientation, the scale developed by Samanta (1977) was used. The scale consisted of 6 statements The positive statements were given score of 2, 1 and 0 for 'agree', 'undecided', 'disagree, respectively. The scoring was reversed in case of negative statements. The mean score of the market orientation of the respondent was used for all purpose of analysis. Higher score reveals the more market orientation.

Sl. No.	Statements	Agree	Undecided	Disagree
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			

3.6.2.9. Scientific orientation

It is the degree to which a forever is oriented to the use of scientific methods in decision making and farming scientific orientation scale developed by supe (1969) was used with suitable modification to operationalise this variable. The scores assigned for positive statement are 5 strongly agree (SA), 4 for agree (A), 3 for undecided (UN), 2 for disagree (UA), 1 for strongly disagree (SDA). For negative statements, serials number 2 and 6 the scores given was reverse. So the maximum possible score was 30 and minimum possible score was 6

Sl. No.	Statements	SA	A	UD	UA	SDA
1	New methods of farming gives better results to a farmer than the old methods					
2	The way of fore fathers farming is still the best way to farm today					
3	Even a farmer with lot of experience should use new methods of farming					

4	Though it takes time for a farmer to learn new methods in farming it is worth the efforts					
5	A good farmer experiments with new ideas in farming					
6	Traditional methods of farming have to be encouraged in order to raise the level of living of a farmer					

3.6.2.10. Mass media utilization.

Mass media utilization referred to the degree to which the respondents utilized that in terms of listening to farm broadcast, telecast, viewing reading newspaper and farm magazine etc. The qualification of the variable was done according to the procedure followed by Hiremath (2000) was used.

Sl. No.	Mass media	Possession/ Subscription (Yes/No)	Regular	Occasional	Never
1	Newspaper				
2	Farm magazine				
3	Radio				
A	General programme				
B	Agril. Programmes				
4	Television				
A	General programme				
B	Agril. Programmes				

3.6.2.11. Extension participation

This is operationalized as the extent of participation of stakeholder in different extension activities like trainings, demonstrations, field visits etc. With a view to obtain new information, knowledge, skills. Extension participation was measured by using scale developed the necessary by Man Singh (1995) with necessary modifications. The frequency of extension participation was quantified with four points continuum namely always, most of the times, rarely and never scores 3,2,1 and 0 respectively. Respondent were classified into three categories as low, medium, and high based on the values obtained mean and standard deviation.

Sl. No.	Extension activity	Regularly	Occasionally	Never
1	Group meeting			
2	Demonstrations			

3	Field days			
4	Training programmes			
5	Agricultural exhibitions			
6	Krishimela			
7	Agricultural campaign			
8	Farmer field school			
9	Any others specify			

3.6.2.12. Social participation

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

Membership

Items	Scores
Not a member in any organization	0
Member in any one of the organization	1
Officer bearer	2

Participation

Items	Scores
Never	0
Occasionally	1
Regularly	2

The results were expressed in frequency, percentage and correlation

3.7 Tools used for data collection

A structured interview schedule was developed based on the objectives of the study and review of literature. This schedule was be pre-tested in sample area for practicability and relevancy. The data were collected through personal interview method.

3.8 Statistical tools and tests used

The collected data was scored, tabulated and analyzed using the following statistical tools and techniques.

3.8.1 Frequency and percentage

Frequency and percentage were used to categories the respondents based on socioeconomic and personnel characters and over all adoption of respondents. They were also used for interpreting the findings pertaining to benefits and problems of respondents in adoption of watershed practices.

3.8.2 Mean

The arithmetic mean is the sum of the scores divided by their number. This measure was used to categorize the dependent and independent variables into low, medium and high categories.

3.8.3 Standard deviation

It was defined as the square root of the arithmetic mean of the sum of the square of the deviation taken from the arithmetic mean. This measure was used to categorize the dependent and independent variables into low, medium and high categories.

3.8.4 Correlation co-efficient

Karl Pearson's product movement correlation coefficient (Simple correlation coefficient) was employed as to assess the relationship between the dependent and independent variables. The correlation coefficient was computed by using the following formula.

$$r = \frac{(\Sigma xy)-(\Sigma x)\,(\Sigma y)}{\sqrt{(n\Sigma x^2 - (\Sigma x)^2\,(n\Sigma y)^2-(\Sigma y)^2)}}$$

Where,

r = Simple correlation coefficient
Σx = Sum of x values
Σy = Sum of y values
Σx^2 = Sum of square of x value
Σy^2 = Sum of square of y value
$(\Sigma y)^2$ = Square of sum of y value
Σxy = Sum of xy values
n = Number of pair of observation

CHAPTER IV

RESULTS

The results are presented under the following major heads in accordance with the objectives of the study.

- Personal psychological and socio-communication characteristics of the farmers
- Overall adoption of watershed practices by beneficiaries farmers
- Adoption of specific watershed practices by beneficiaries farmers
- Impact of watershed development programme on productivity of major crops
- Relationship between adoption dependent and independent variables
- Extent of contribution of independent variables to the adoption of watershed practices.
- Constaints and suggestions faced by beneficiaries in adoption of watershed practices.

Personal psychological and socio-communication characteristics of the farmers

A profile of the personal psychological and socio- communication characteristics of beneficiary of farmers is presented in Tables

4.1 Personal characteristics of beneficiary

4.1.1 Age

The data revealed that 61.00 per cent of the beneficiary farmers were found in middle age group followed by old (39.00%) and young (02.00%) age group

4.1.2 Education

Majority of beneficiary farmers were educated upto High School level (34.00%). Whereas, only (28.00%) of farmers were educated upto middle school, graduate (13.00%), Diploma (12.00%), PUC (8.00%), six percent of the beneficiary farmers were primary school . On the other hand, very less per cent of beneficiaries farmers were found llliterate.

4.1.3 Family type

Majority (61%) of the respondents belonged to joint family while, 39 per cent of the respondents were belonged to nuclear family.

4.1.4 Land holding

Majority of beneficiaries farmers were found in small land holding category (56%) followed by marginal land holding category (28.00%). Less than 9.00 per cent of farmers were found in medium land holding and where as less per cent of big land holding category (7.00%).

Table 4.1: Personal characteristics of beneficiaries (n=100)

Sl. No.	Personal characteristics	Category	Beneficiaries farmers	
			Number	Per cent
1	Age	Young	02	02.00
		Middle	61	61.00
		Old	39	39.00
2	Education	Illiterate	05	05.00
		Primary school	06	06.00
		Middle school	28	28.00
		High school	34	34.00
		PUC	08	08.00
		Diploma	12	12.00
		graduate	13	13.00
3	Family type	Nuclear type	39	39.00
		Joint type	61	61.00
4	Land holding	Marginal farmers	28	28.00
		Small farmers	56	56.00
		Medium farmers	09	09.00
		Big farmers	07	07.00

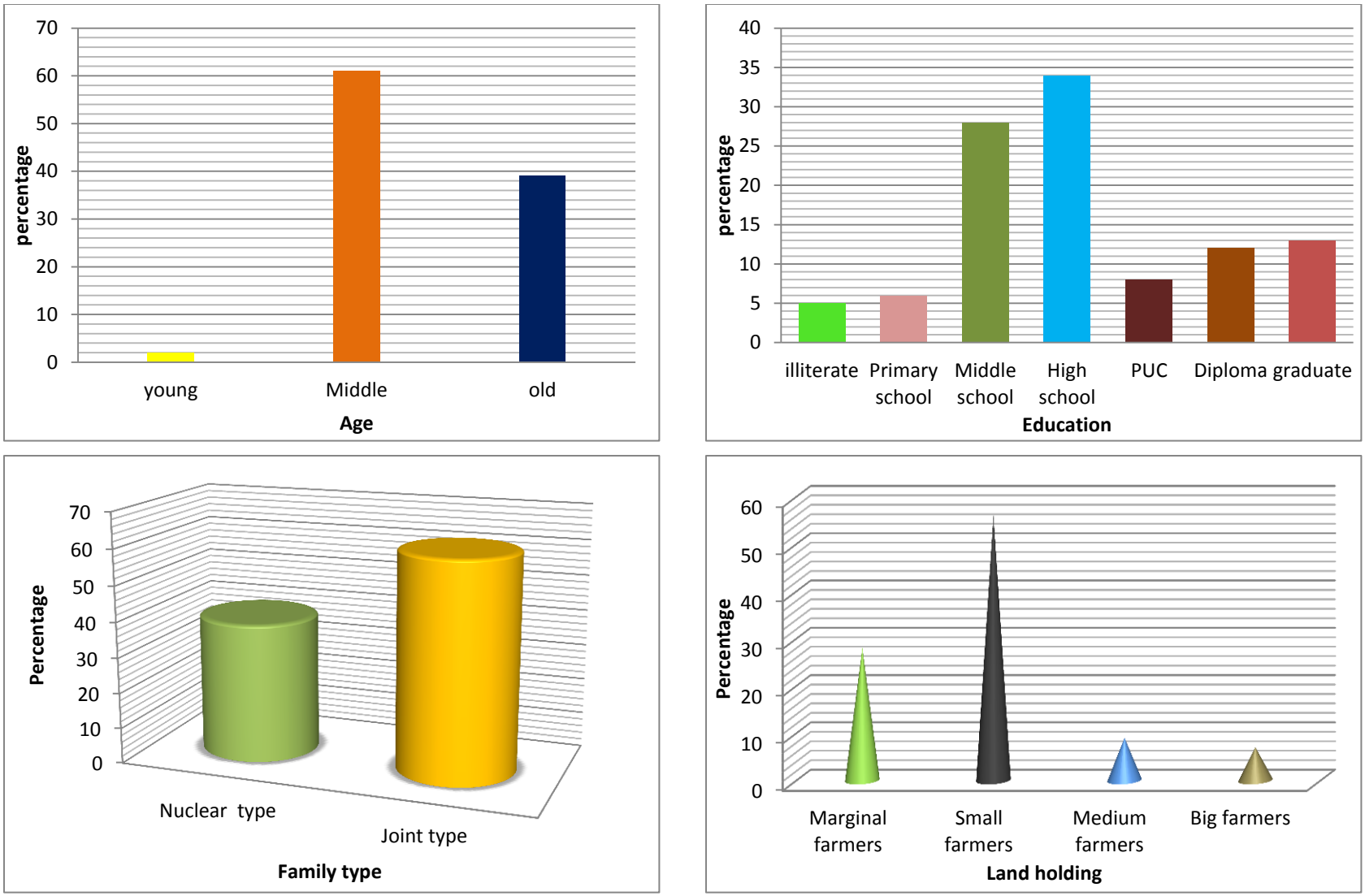


Fig. 4.1: personal characteristics of beneficiary

4.2 Psychological characteristics of beneficiary

4.2.1 Risk Orientation

The data in the Table 4.2 revealed that considerable per cent of the respondents (39.00%) belonged to medium risk orientation category, followed by high (35.00%) and low (26.00%) risk orientation categories respectively.

4.2.2 Achievement participation

It is clear from Table 4.2 that 43 per cent of the beneficiaries belonged to medium achievement motivation category. While, low thirty one Per cent of them had low and 26.00 Per cent of them had high achievement motivation and high achievement motivation categories.

4.2.3 Innovativeness

It is clear that Table 4.2 that 38 Per cent of the beneficiaries belonged to high innovativeness category. While, low 37.00 Per cent of them belong to low 25.00 Per cent belongs to medium innovativeness categories respectively.

4.2.4 Market orientation

The data in Table 4.2 revealed that majority of the beneficiaries (53.00%) belonged to low market orientation whereas 30.00 and 17.00 Per cent of them fall under medium and high level of market orientation categories respectively.

4.2.5 Scientific orientation

A more than half of the respondents 57.00 Per cent belonged to medium scientific orientation category. While, 23.00 per cent of the respondents fall under low scientific orientation and 20.00 per cent fall under high scientific orientation category.

4.3 Socio-communication characteristics of beneficiary (overall and specific)

4.3.1 Extension participation

The data in Table 4.3 shows that overall extension participation nearly half (39.00 %) of the respondents had medium extension participation, followed by 31.00 per cent and 30.00 per cent of the respondents had high and low level of extension social participation respectively.

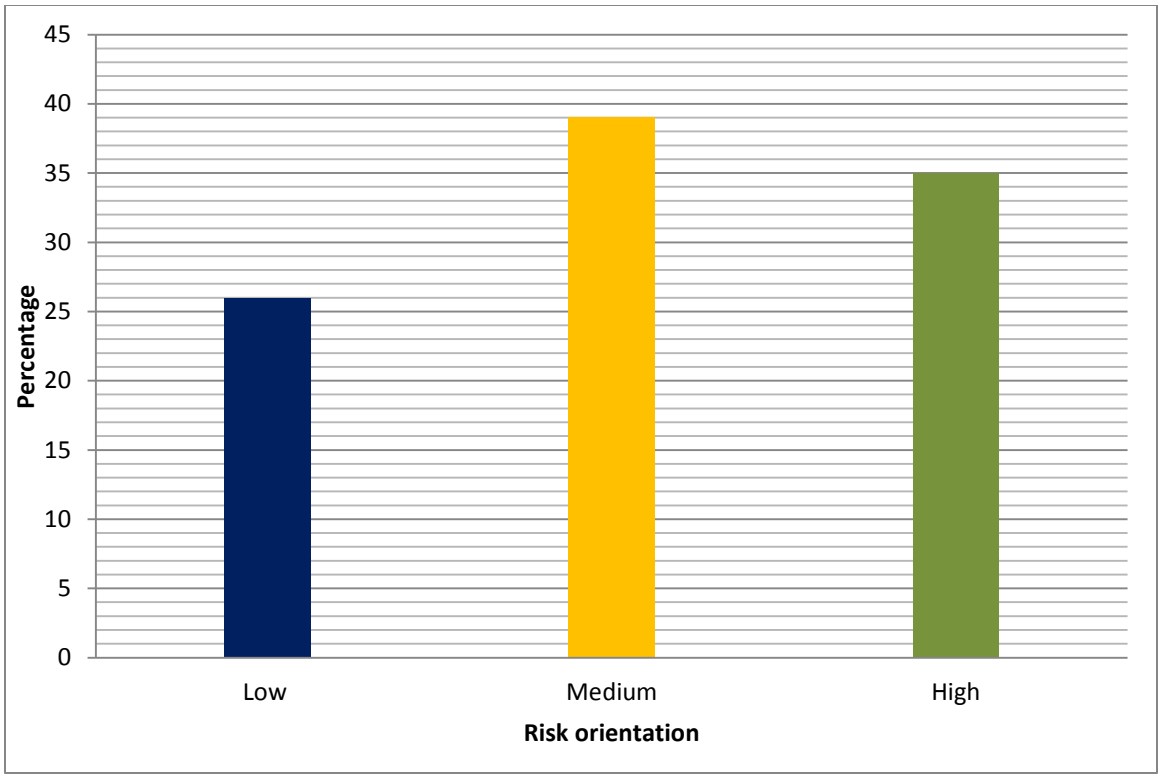
The data in the Table 4.5 revealed that specific in extension participation large majority of beneficiaries were participating krishimela (70.00%) then followed by group meeting (65.00%), wheras very less participating in the Field days and Farmer field school 15.00 and 18.00 Per cent respectively

Table 4.2: Psychological characteristics of beneficiary (n=100)

Sl. No.	Psychological characteristics	Category	Beneficiaries farmers	
			Number	Per cent
1	Risk orientation	Low	26	26.00
		Medium	39	39.00
		High	35	35.00
2	Achievement orientation	Low	31	31.00
		Medium	43	43.00
		High	26	26.00
3	innovativeness	Low	37	37.00
		Medium	25	25.00
		High	38	38.00
4	Market orientation	Low	53	53.00
		Medium	30	30.00
		High	17	17.00
5	Scientific orientation	Low	23	23.00
		Medium	57	57.00
		High	20	20.00

Table 4.3: Socio-communication characteristics of beneficiaries in overall (n=100)

Sl. No.	Socio-communication	Category	Beneficiaries farmers	
			Numbers	Per cent
1	Social participation	Low	25	25.00
		Medium	43	43.00
		High	32	32.00
2	Mass media participation	Low	24	24.00
		Medium	22	22.00
		High	54	54.00
3	Extension participation	Low	30	30.00
		Medium	39	39.00
		High	31	31.00



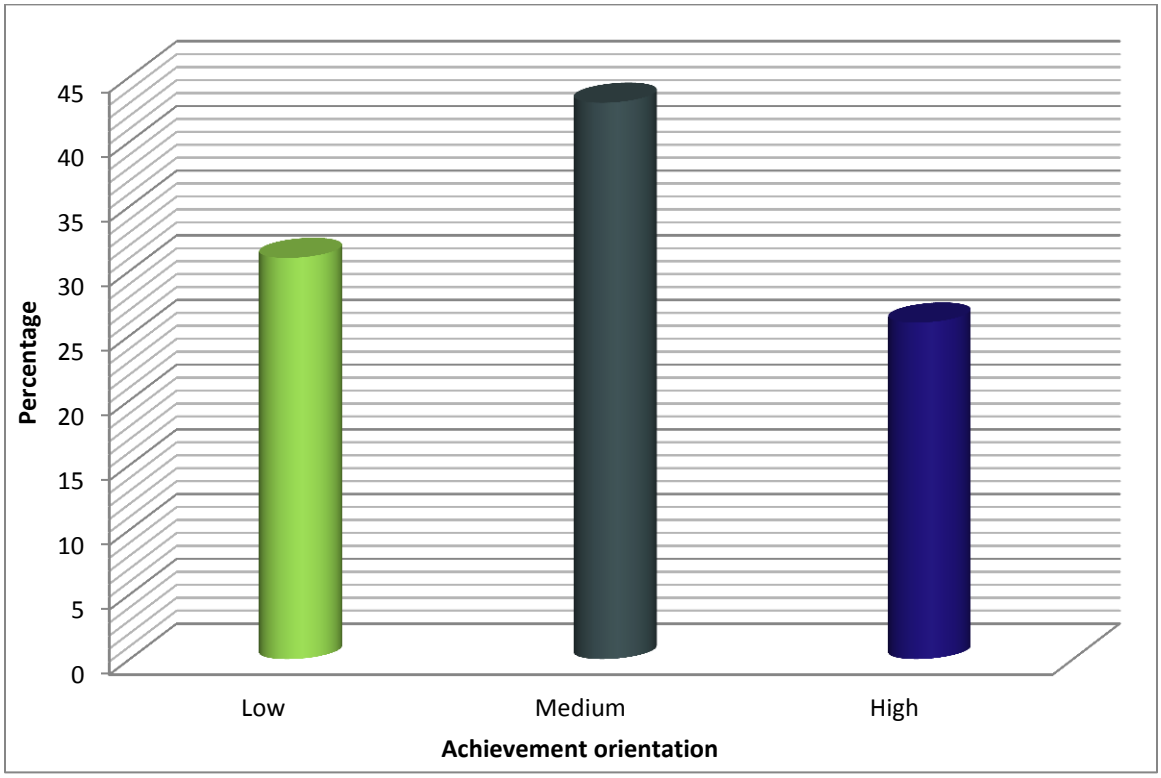
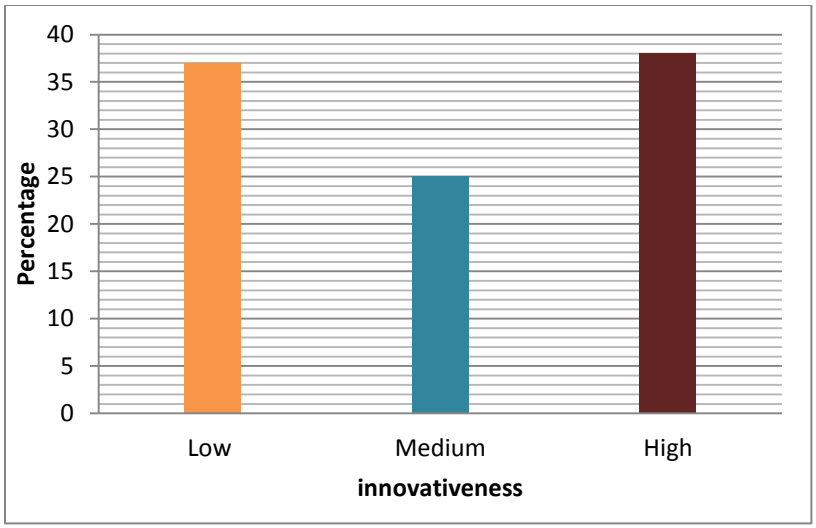
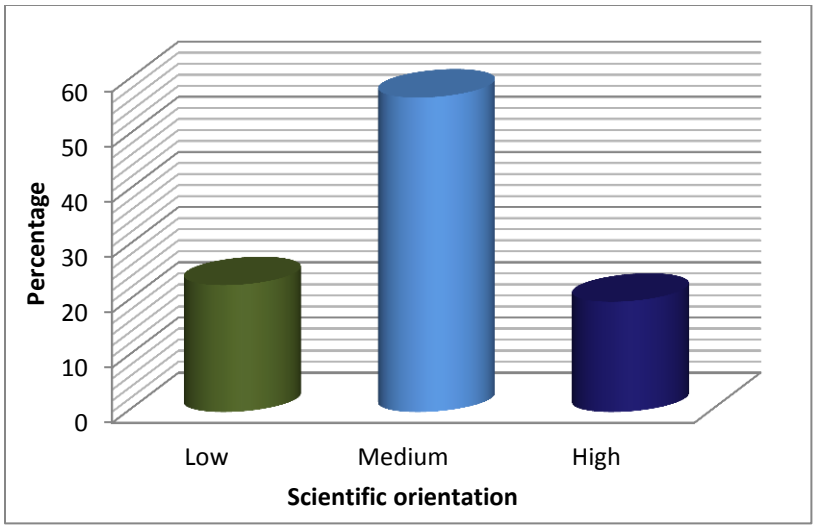


Fig. 4.2: Psychological characteristics of beneficiary





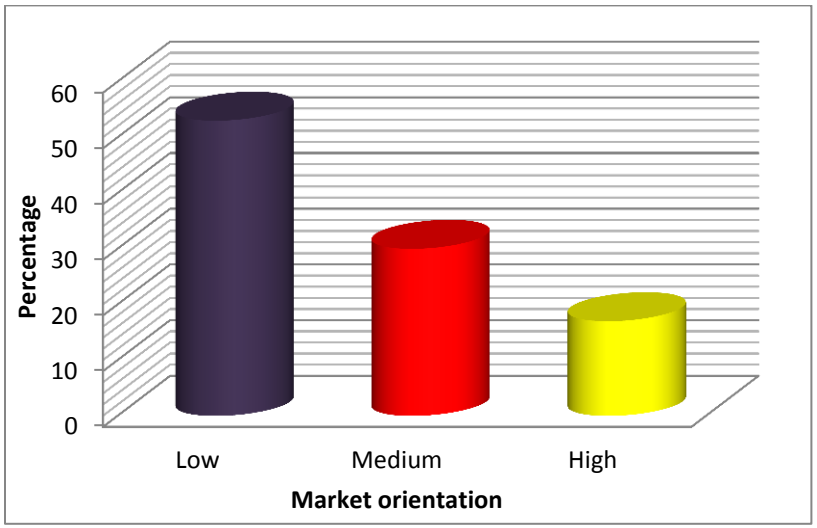
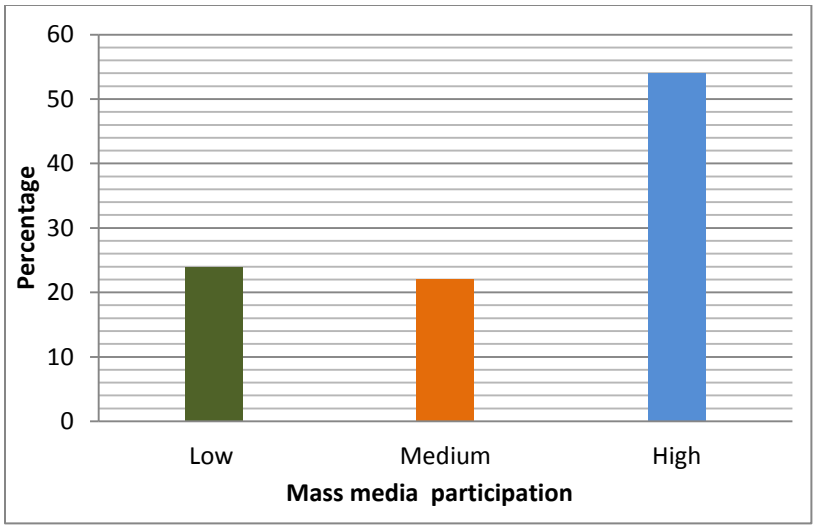
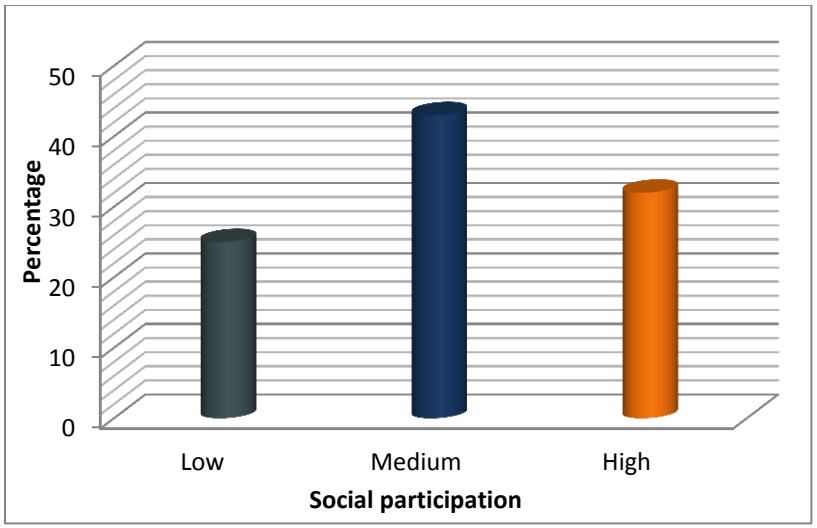


Fig. 4.2: Psychological characteristics of beneficiary





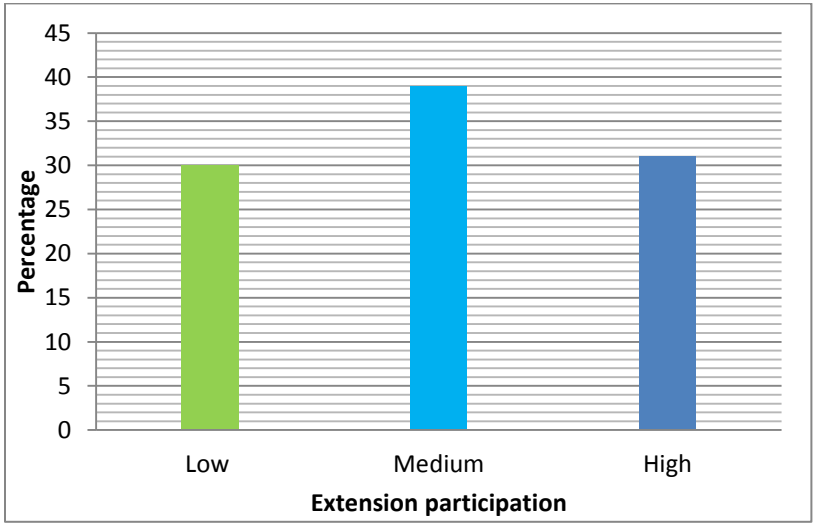


Fig. 4.3: Socio-communication characteristics of beneficiaries (overall)

4.3.2 Mass Media Participation

The data in the Table 4.3 revealed that considerable revealed that (54.00%) belonged to high mass media participation category, followed by low (24.00%) and followed by medium participation (22.00%) categories respectively.

The data in the Table 4.4 revealed that specific in mass media participation large majority of beneficiaries were viewing television subscription (93.00%), then followed by news papers (75.00%) wheras very less subscription were radio and farm magazine 42.00 and 38.00 Per cent respectively.

4.3.3 Social participation

The data in Table 4.3 shows that overall social participation nearly half 43.00 Per cent of the respondents had medium social participation, followed by 32.00 and 25.00 per cent had high and low level of social participation respectively.

The data in the Table 4.6 revealed that specific in social participation large majority of beneficiaries were going Grama sabha (86.00%) then followed by self help group (73.00%), wheras very less nu mber of respondents going to farmer union and Zilla panchayat 10.00 and 18.00 Per cent respectively

4.4 Overall adoption of soil and water conservation practice by beneficiaries

The data revealed in the Table 4.7 indicated that a majority (43.00%) of the beneficiaries belonged to high adoption level category. whereas 39.00 and 18.00 per cent of the respondents belonged low and medium adoption level categories. respectively

4.5 Adoption of specific soil and water conservation practices by beneficaries

The large majority of beneficiaries adopted the practices like ploughing across the slope (81.00%), improved agricultural implements (73.00%), land smoothening (70.00%). The practice like strengthening of existing bunds, contour bunds was practiced by 66.00 and 58.00 per cent of beneficiaries respectively. Whereas, very less per cent of beneficiaries (39.00%, 28.00%, 26.00% and 26.00%) adopted vegetative bunds, construction small section bunds, opening of furrows and waterways respectively.

4.6 Impact of watershed development programme on crop productivity and livestock

The results presented in Table 4.9 gives better idea about difference in the production of major crops. Around sixteen per cent increase in the yield level was noticed in by Groundnut (15.67%) closely followed by Ragi (13.88%) Whereas, 24.71 per cent increase in the yield level was observed in Pomegranate, 17.51 per cent increase in the yield level was observed in Sapota and drastic increase in Diary farming is (14.32%) by virtue of implementation of Sujala Watershed project

Table 4.4: Mass media participation of watershed practices by farmers in specific

(n=100)

Sl. No.	Mass media	Possession/Subscription		Regular	Occasional	Never
		Yes	No			
1	Newspaper	88	12	75.00	21.00	08.00
2	Farm magazine	38	62	18.00	71.00	11.00
3	Radio	42	58	23.00	45.00	32.00
4	Television	92	8	94.00	5.00	1.00

Table 4.5: Extension participation of watershed practices beneficiaries by farmers in specific

(n=100)

Sl. No.	EXTENSION ACTIVITY	EXTENT OF PARTICIPATION		
		Regularly	Occasionally	Never
1	Group meeting	26.00	65.00	09.00
2	Demonstrations	39.00	35.00	26.00
3	Field days	15.00	23.00	62.00
4	Training programmes	26.00	46.00	28.00
5	Agricultural exhibitions	15.00	34.00	51.00
6	Krishimela	70.00	30.00	0.00
7	Agricultural campaign	25.00	23.00	52.00
8	Farmer field school	18.00	32.00	50.00

Table 4.6: Social participation of watershed practices beneficiaries by farmers in specific

(n=100)

Sl. No.	ORGANISATION	EXTENT OF PARTICIPATION		
		Regular	Occasionally	Never
1	Grama sabha	86.00	14.00	0.00
2	Taluk panchayat	35.00	45.00	20.00
3	Zilla panchayat	18.00	27.00	55.00
4	Farmer union	10.00	23.00	67.00
5	Youth club	28.00	32.00	40.00
6	Watershed sanghas	43.00	26.00	31.00
7	Co operatives	58.00	24.00	18.00
8	Self help group	73.00	18.00	9.00

Table 4.7: Overall adoption of soil and water conservation practices by beneficiary

(n=100)

Sl. No.	ADOPTION CATEGORY	BENIFICIARIES	
		FREQUENCY	PER CENT
1	Low (<12.199)	39	39.00
2	Medium(12.199-15.740)	18	18.00
3	High (>15.740)	43	43.00

Table 4.8: Specific adoption of soil and water conservation practices by beneficiary

(n=100)

Sl. No.	CHARACTERTICES	BENIFICIARIES		
		FA	PA	NA
1	Ploughing across the slope	81	18	1
2	Land smoothening	70	30	-
3	Contour bunds	58	39	3
4	Strengthening exiting bunds	66	32	2
5	Vegetative bunds	39	31	30
6	Waterways	26	48	26
7	Construction small section bunds	28	27	45
8	Opening of furrows	26	55	19
9	Use of improved agricultural implements	73	22	5
10	Farm ponds	59	32	9

Table 4.9: Impact of Sujala watershed project on crop productivity and livestock

(n=100)

Sl. No.	CROPS/ LIVESTOCKS	PRODUCTIVITY		
		Before	After	% increase in yield
1	Groundnut (Q/Ha)	21.18	24.12	13.88
2	Ragi (Q/Ha)	8.74	10.11	15.67
3	Pomegranate(Q/Ha)	98.9	123.34	24.71
4	Sapota(Q/Ha)	339.45	398.9	17.51
5	Diary farming(lit/day)	19.83	22.67	14.32

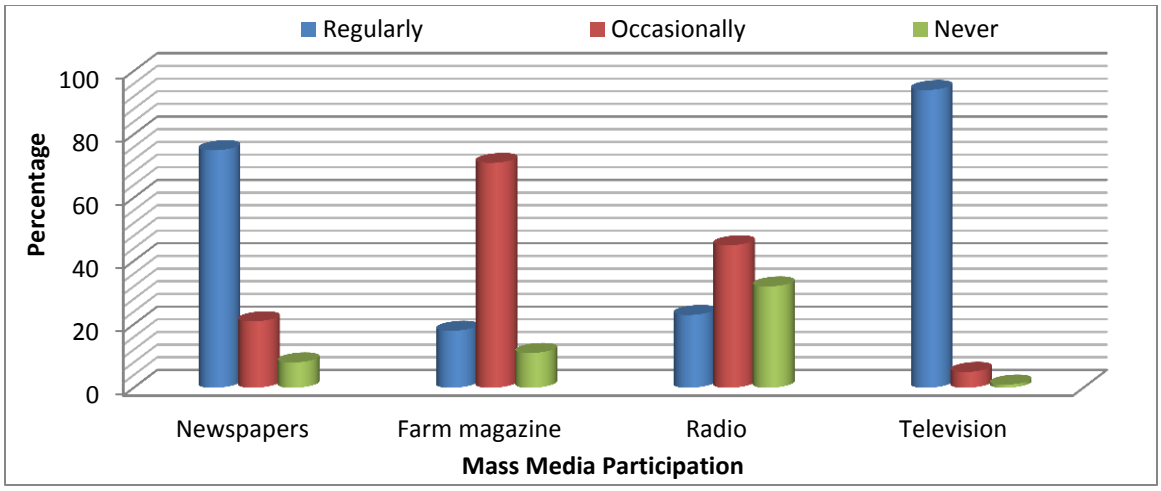


Fig. 4.4: Mass Media Participation of watershed practices by beneficiary(Specific)

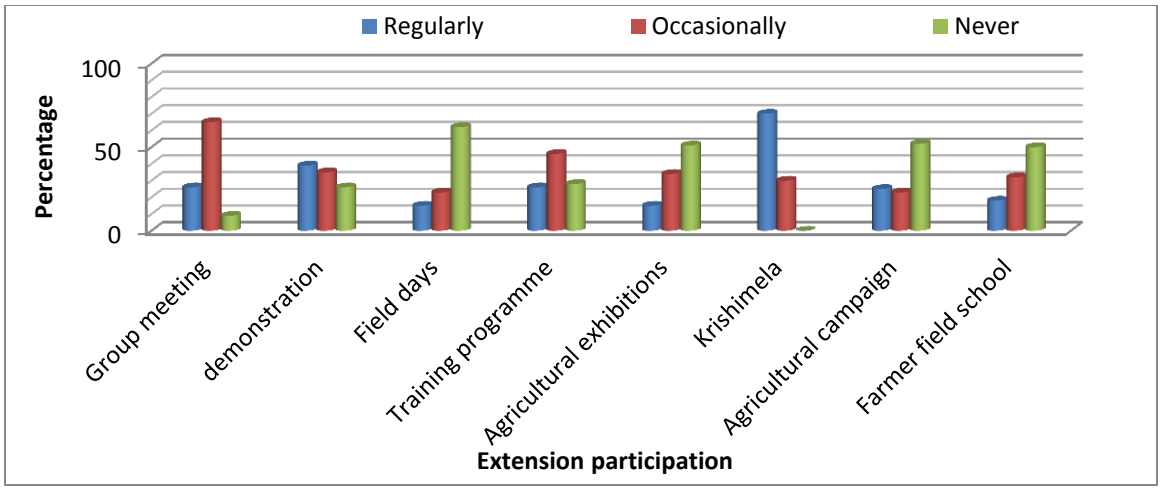


Fig. 4.5: Extension participation of watershed practices beneficiary (Specific)

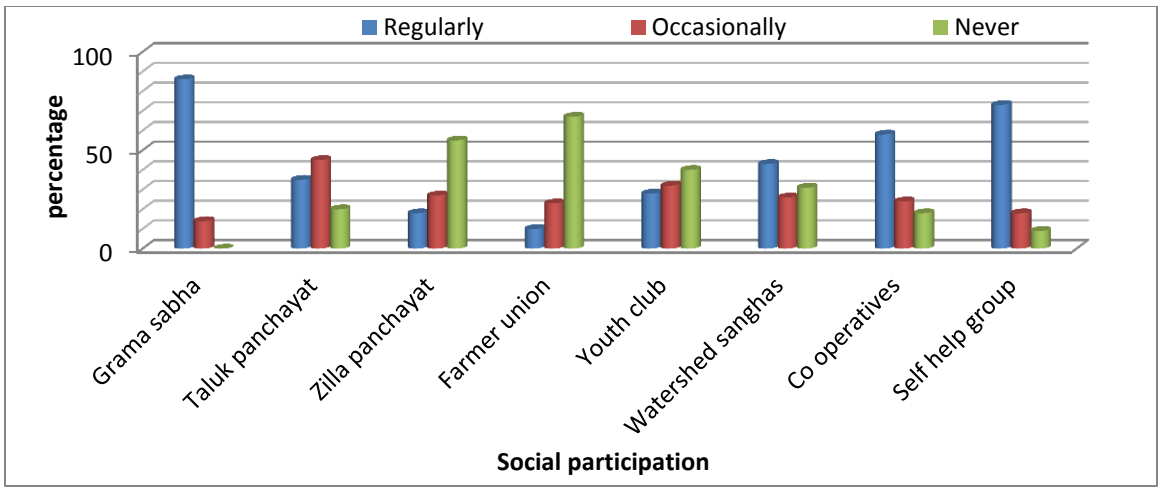


Fig. 4.6: Social participation of watershed practices beneficiary (Specific)

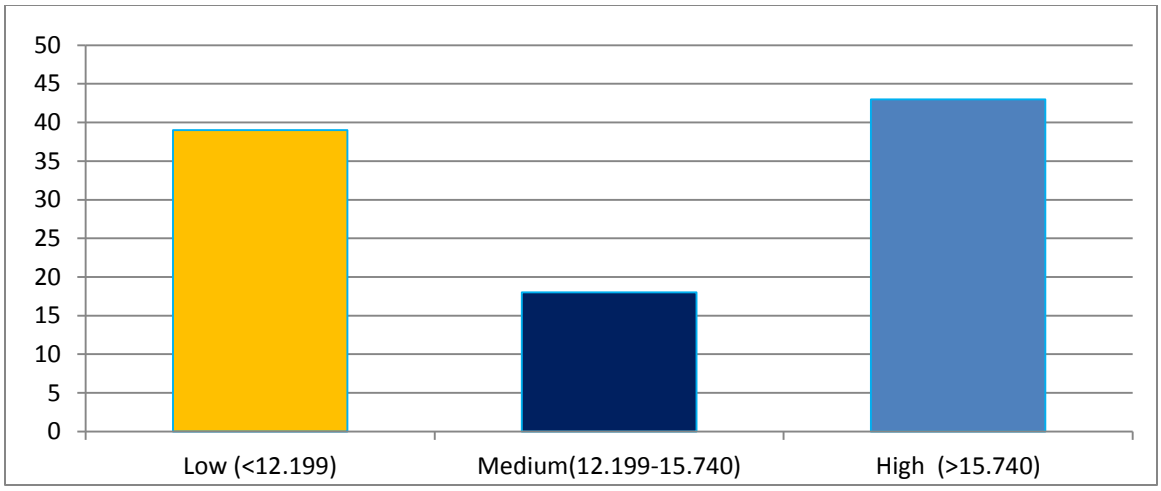


Fig. 4.7: Overall adoption of soil and water conservation practices beneficiary

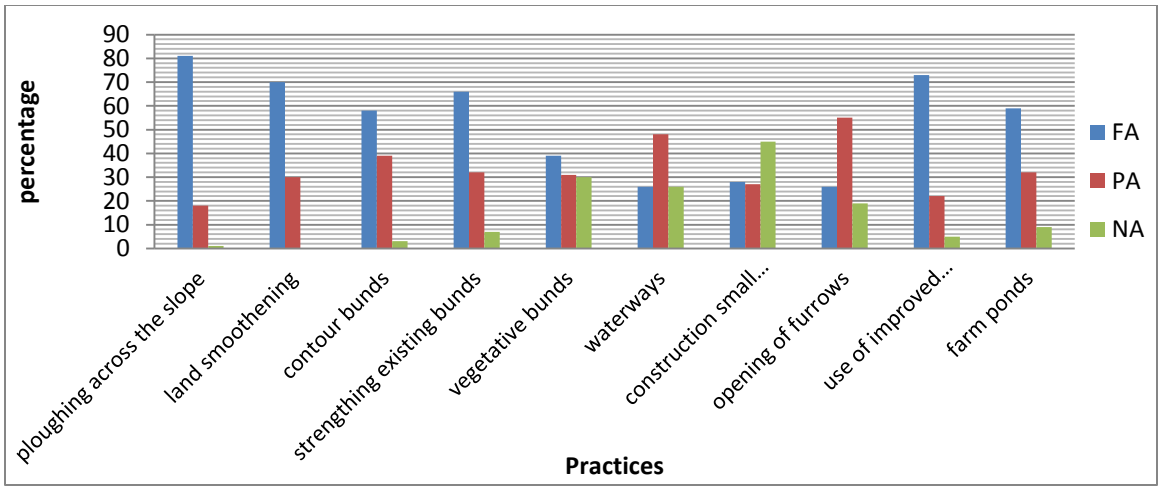


Fig. 4.8: Specific adoption of of soil and water conservation practices beneficiary

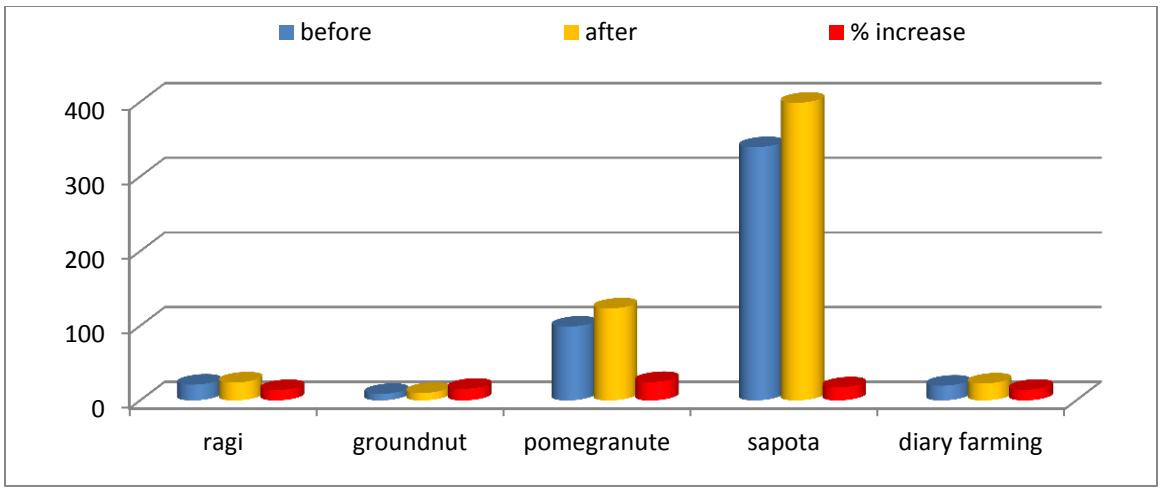


Fig. 4.9: Impact on Sujala watershed project on crop productivity and livestock

4.7 Relationship between adoption of watershed practices of Personal Psychological and socio-communication characteristics of beneficiary farmers

In order to find out the relationship between adoption of recommended watershed practices with independent variables, the data subjected for analysis by of correlation coefficient (r) which is Presented in Table 4.10.

The correlation coefficient (r) values presented in the Table 5 revealed that extension participation, achievement motivation, risk orientation, innovativeness, scientific orientation and education had positive and significant relationship with adoption. Whereas, age, land holding, family type mass media utilization market orientation and social participation were not having significant relationship with the adoption of the watershed practices by the farmers.

4.8 Extent of contribution of independent variables to the adoption of watershed practices

In order to find out the extent of contribution of independent variables to their adoption of recommended watershed practices with independent variables, the data has analysed by multiple regressions (t) which was presented in Table 4.11.

The multiple regression (t) values presented in the Table 6 revealed that extension participation, achievement motivation, risk orientation, innovativeness, scientific orientation and education were having positive and significant relationship with adoption. Whereas, age, land holding, family type mass media utilization market orientation and social participation were not having significant relationship with the adoption of the watershed practices by the farmers.

4.9 Constraints encountered by beneficiaries in adoption of watershed practices

4.9.1 Constraints faced by beneficiary farmers in the adoption of watershed practices in soil and water conservation practices

The constraints experienced by the beneficiary farmers in adoption of soil and water conservation practices are presented in Table 12

Majority of the beneficiary farmers expressed that water stagnation near bunded area (90.00%) followed by Obstructions for cultural operations (70.00%), Lack of co-operation by neighbours (65.00%), and whereas, sixty three per cent of beneficiary farmers expressed that financial constraints(63.00%),loss cultivable area (62.00%) wheras less percent fragmentation of land into unconventional shape and size (61.00%) Belief that putting bunds serve no purpose (55.00%). were the constraints in adoption of soil and water conservation practices.

Table 4.10: Relationship between adoption of watershed practices of and personal psychological and socio-communication characteristics of beneficiary farmers

(n=100)

Sl. No.	CATEGORY	Correlation values (r)
1	Age	0.0092^{NS}
2	Education	2.1526*
3	Family type	0.1961^{NS}
4	Land holding	0.1620^{NS}
5	Risk orientation	0.2610**
6	Mass media utilization	0.0121^{NS}
7	Achievement motivation	0.3867**
8	Innovativeness	0.2548**
9	Market orientation	0.0692^{NS}
10	Scientific orientation	0.2162*
11	Extension participation	0.4120**
12	Social participation	0.1567^{NS}

Note * :significant at 5% ** :significant 1% NS: Not significant

Table 4.11: Extent of contribution independent variables to there adoption of watershed practices

(n=100)

Sl. No.	Category	Multiple regression	Standard error	t values
1	Age	2.691	0.571	0.212NS
2	Education	0.347	0.699	2.010*
3	Family type	0.375	0.417	1.110NS
4	Land holding	0.155	0.297	1.910NS
5	Risk orientation	0.347	0.699	2.010*
6	Mass media utilization	0.341	0.312	0.911NS
7	Achievement motivation	0.291	0.818	2.810**
8	Innovativeness	0.274	0.799	2.910**
9	Market orientation	0.154	0.111	0.717NS
10	Scientific orientation	0.268	0.916	3.416**
11	Extension participation	0.240	0.816	3.391**
12	Social participation	0.103	0.92	0.1169NS

Note : * significant at 5% ** : significant 1% NS: Not significant R^2 =0.6120

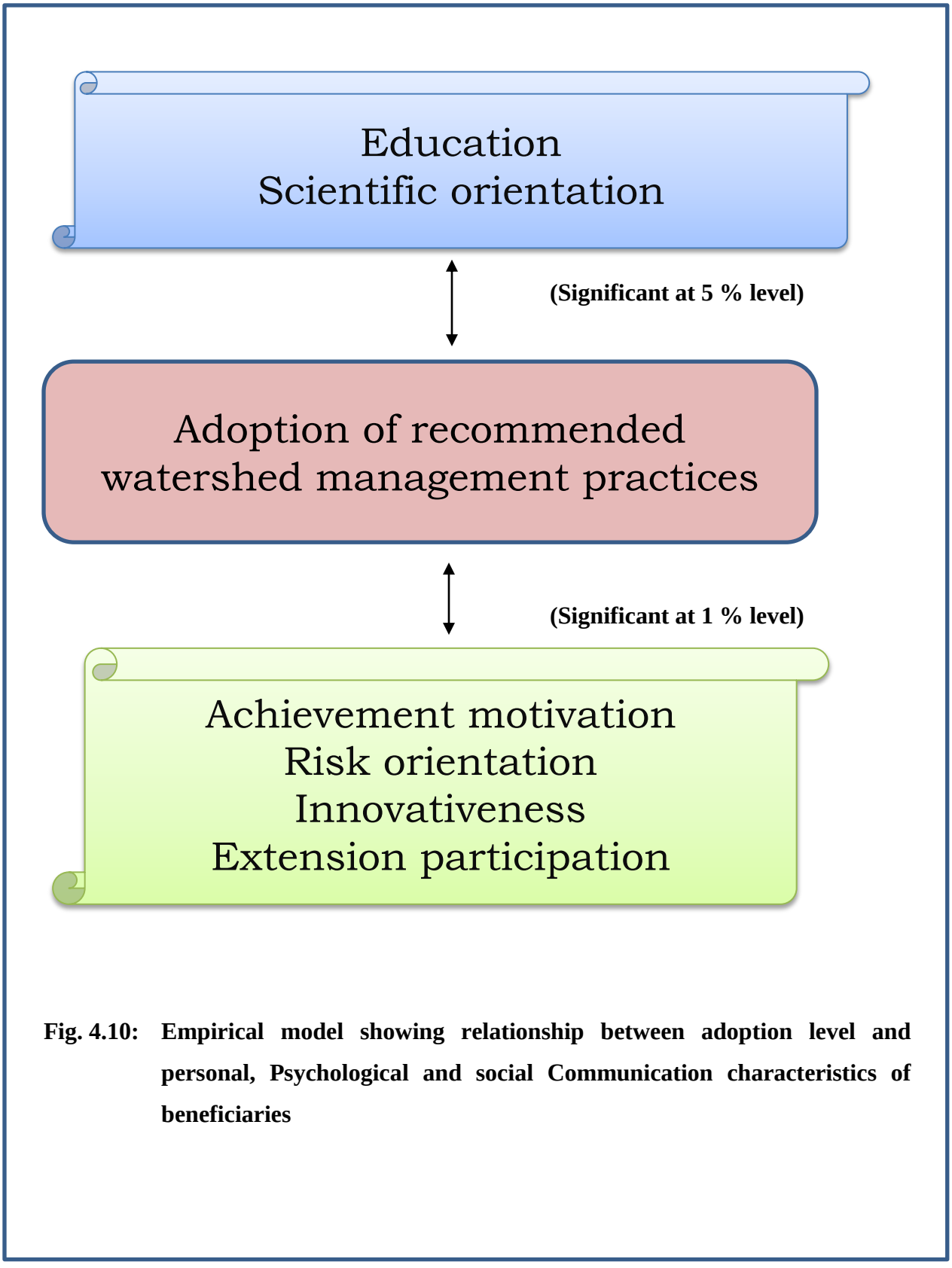


Fig. 4.10: **Empirical model showing relationship between adoption level and personal, Psychological and social Communication characteristics of beneficiaries**

Table 4.12: Constraints in adoption of watershed practices beneficiary by the farmers

(n=100)

Sl. No.	Constraints	Frequency	Per cent	Rank
a)	**Soil and water conservation**			
1	Water stagnation near bunded area	90	90.00	1
2	Fragmentation of land into unconventional shape and size	61	61.00	6
3	Obstructions for cultural operations	65	65.00	3
4	Belief that putting bunds serve no purpose	55	55.00	7
5	Loss of cultivable area	64	62.00	5
6	Lack of co-operation by neighbours	70	70.00	2
7	Financial constraint	63	63.00	4
b)	**Crop production management**			
1	Non-availability of inputs in time	84	84.00	9
2	Heavy risk due to failure of monsoon	92	92.00	2
3	Non-availability of drought tolerant crop varieties	85	85.00	8
4	Cost of fertilizer is high	83	83.00	10
5	Non-availability of labours	93	93.00	1
6	Lack of finance	90	90.00	4
7	Expensive chemicals	91	91.00	3
8	Low returns from dryland crop	87	87.00	6
9	Lack of market facility	86	86.00	7
10	Difficulty in identification of contour key lines	82	82.00	11
11	Improved agril. implements are heavy for local drought animals	88	88.00	5
c)	**Livestock management**			
1	Non availability of fodders	85	85.00	4
2	Improper management of livestock due to less income	91	91.00	1
3	Disease in the milk yield	63	63.00	5
4	Problem in maintaining the livestock due less water availability	88	88.00	3
5	Absence of diary sector in the village	89	89.00	2

4.9.2 Constraints faced by beneficiary farmers in the adoption of watershed practices in crop production management practices

The constraints experienced by the beneficiary farmers in adoption of crop production management practices are presented in Table 12

Majority of the beneficiary farmers expressed that non availability of labour (93.00%) followed by Heavy risk due to failure of monsoon (92.00%) Expensive chemicals (91.00%), and wheras less percent Non-availability of drought tolerant crop varieties, Non-availability of inputs in time, Cost of fertilizer is high (85.00%), (84.00%), (83.00%) and Difficulty in identification of contour key lines (82.00%) were the constraints in adoption of crop production management practices.

4.9.3 Constraints faced by beneficiary farmers in the adoption of watershed practices in livestock management practices

The constraints experienced by the beneficiary farmers in adoption of Livestock management practices are presented in Table 12

Majority of the beneficiary farmers expressed that Improper management of livestock due to less income (91.00%) followed by Absence of diary sector in the village (89.00%) Problem in maintaining the livestock due less water availability 88.00%), and wheras less percent Non availability of fodders and Disease in the milk yield (63.00%) were the constraints in adoption of livestock management practices

4.10 Suggestions encountered by beneficiaries in adoption of watershed practices

4.10.1 Suggestion of beneficiary farmers to overcome the problems in adoption of watershed practices in soil and water conservation practices.

The problems experienced in adopting the soil and water conservation practices were as follows. However, beneficiary farmers expressed that it is a Bunds across the slope which prevent soil erosion (97.00%) While, least per cent of beneficiary farmers expressed lack of co-operation by the neighbour farmers (94.00%) were the suggestions in adoption of soil and water conservation practices

4.10.2 Suggestion of beneficiary farmers to overcome the problems in adoption of watershed practices in crop production management practices.

The problems experienced in adopting the crop production management practices. However beneficiary farmers expressed that Use of mechanization in the agriculture (91.00%) While, least per cent of beneficiary farmers expressed Development of drought tolerant with high yielding varieties (85.00%) were the suggestions in adoption of crop production management practices.

Table 4.13: Suggestion of beneficiary farmers to overcome the problems in adoption of watershed practices

(n=100)

Sl. No.	SUGGESTIONS	Frequency	Per cent	Rank
a) Soil water conservation				
1	Bunds construct across the slope which prevent soil erosion	97	97.00	1
2	Catchment area should be more	96	96.00	2
3	Co-Operation by neighbours	94	94.00	4
4	Time of operation	95	95.00	3
b) Crop production management				
1	Development of drought tolerant with high yielding varieties	85	85.00	4
2	Use of mechanization in the agriculture	91	91.00	1
3	Growing of short duration crops	89	89.00	2
4	Growing of mulch crops	86	86.00	3
c) Livestock management				
1	By having diary in the village we can promote animal husbandry	85	85.00	3
2	Promoting the farmers to take up livestock by conducting the sensitization programmes in the village	91	91.00	1
3	Providing the good animals which gives more milk yield	63	63.00	4
4	Increase the price of milk	88	88.00	2

4.10.3 Suggestions of beneficiary farmers to overcome the problems in adoption of watershed practices in livestock management

The problems experienced in adopting the Livestock management practices. However beneficiary promoting the farmers to take up livestock by conducting the sensitization programmes in the village (91.00%) While, least per cent of beneficiary farmers expressed providing the good animals which gives more milk yield (63.00%) were the suggestions in adoption of livestock management practices

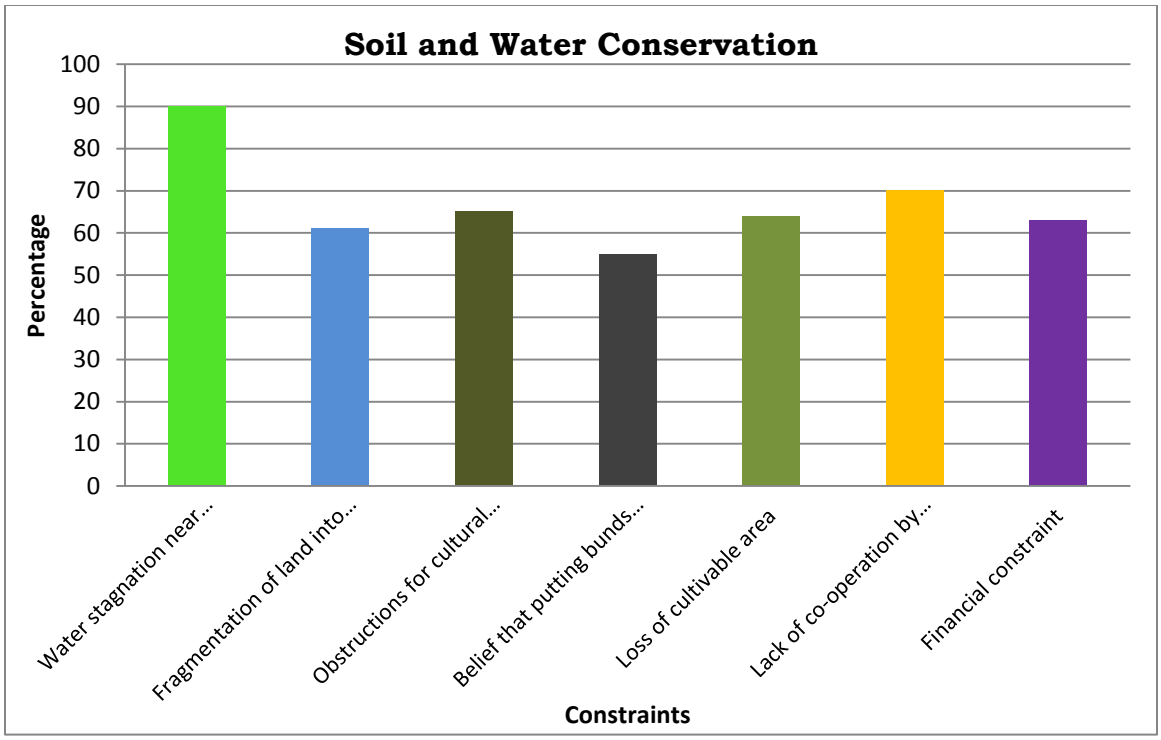


Fig. 4.11: Constraints in adoption of watershed practices by the beneficiary in Soil and water conservation

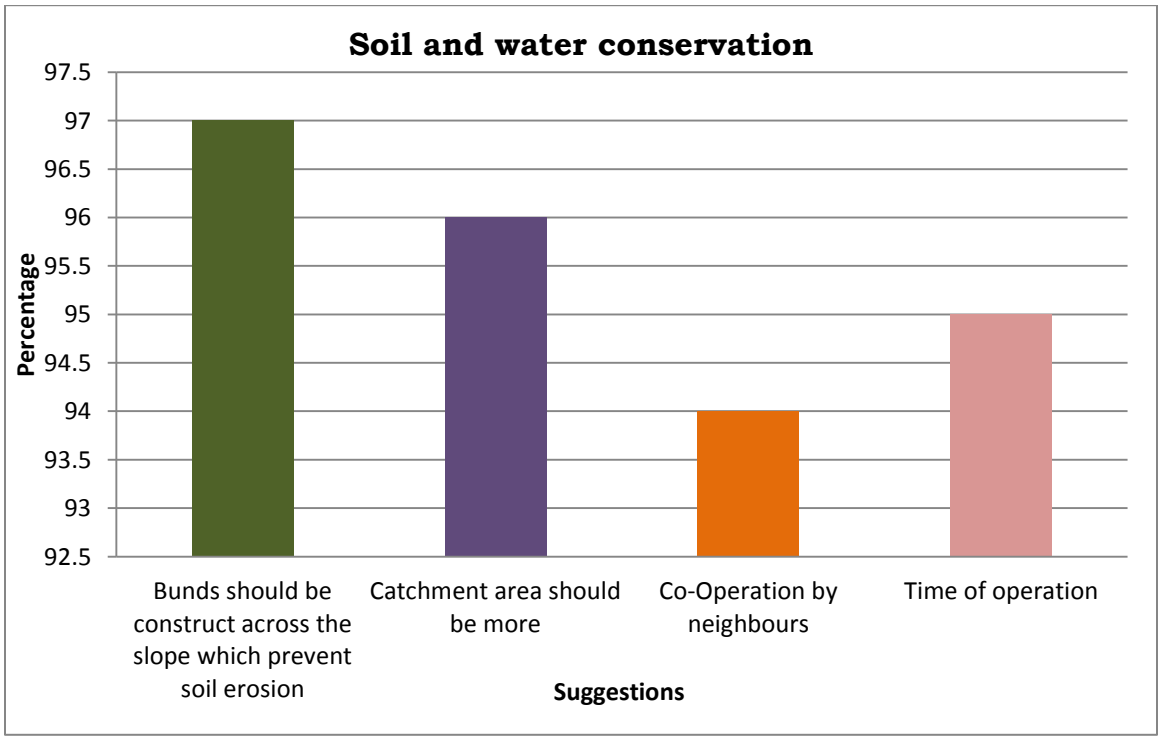


Fig. 4.12: Suggestions in adoption of watershed practices by the beneficiary in Soil and water conservation

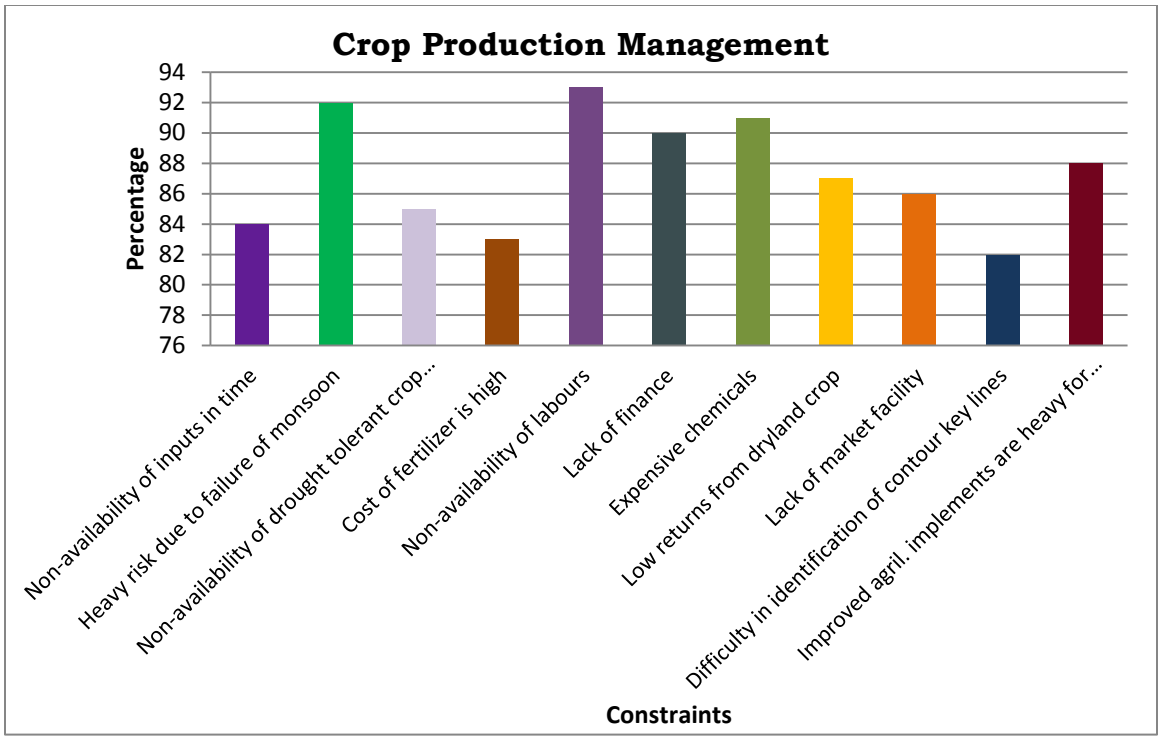


Fig. 4.13: Constraints in adoption of watershed practices by the beneficiary in crop production management

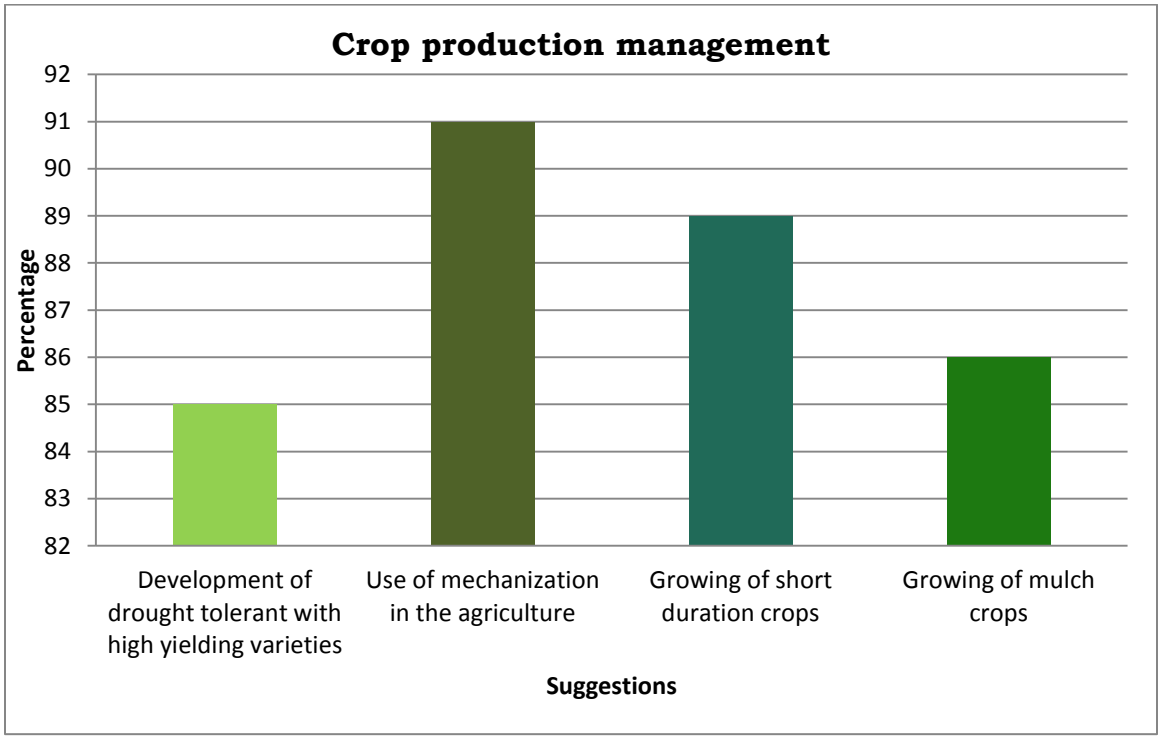


Fig. 4.14: Suggestions in adoption of watershed practices by the beneficiary in crop production management

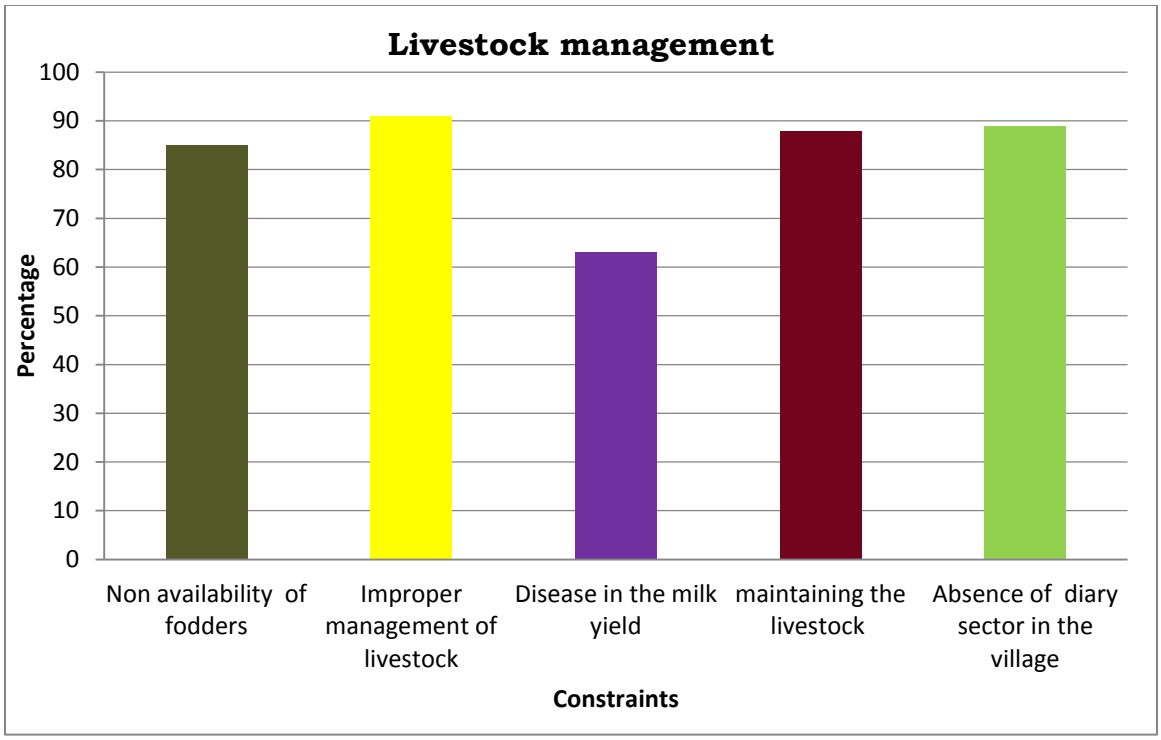


Fig. 4.15: Constraints in adoption of watershed practices by the beneficiary in livestock management

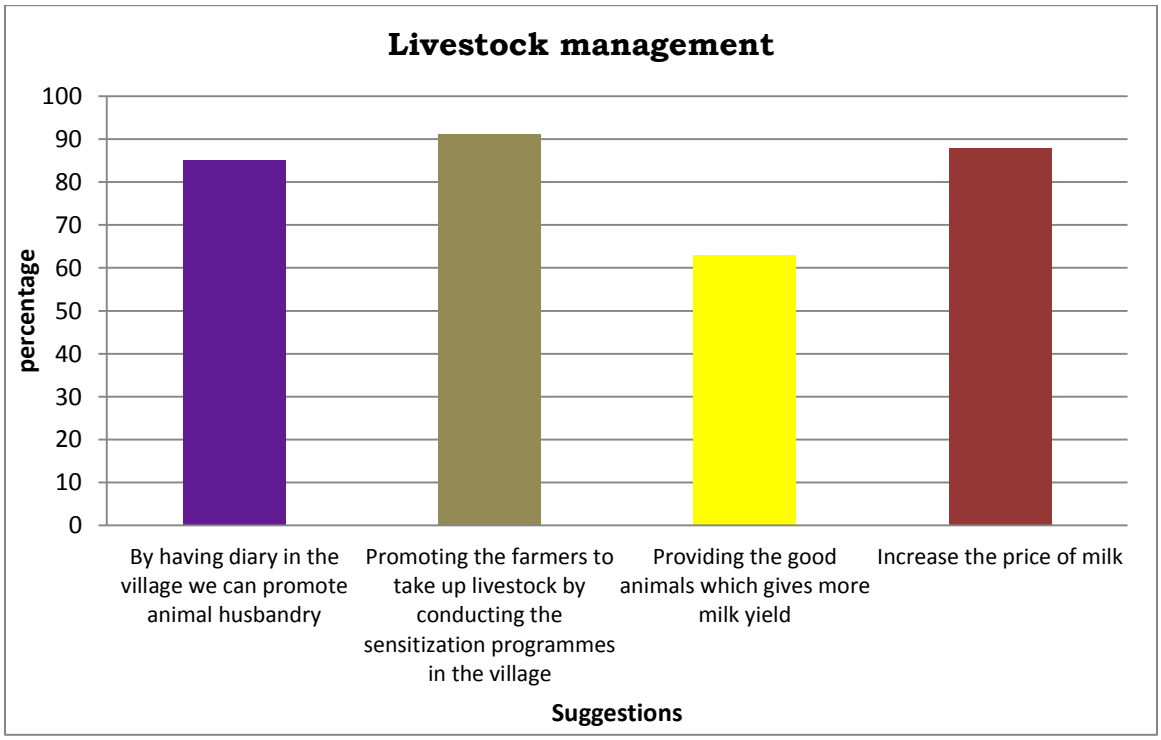


Fig. 4.16: Suggestions in adoption of watershed practices by the beneficiary in livestock management

CHAPTER V

DISCUSSION

The results presented in the previous chapter are discussed with probable reasons and explanations with the support of previous studies. The discussion of the results of the study is made under the following headings.

- Personal, psychological and socio-communication characteristics of the farmers
- Overall adoption of watershed practices by beneficiary farmers
- Adoption of specific watershed practices by beneficiary farmers
- Impact of watershed development programme on productivity of major crops
- Relationship between adoption dependent and independent variables
- Extent of contribution of independent variables to the adoption of watershed practices.
- Constraints and suggestions faced by beneficiaries in adoption of watershed practices

5.1 Personal Psychological and socio-communication characteristics of the farmers

The profile of beneficiary farmers is presented in Tables.

5.1.1 Age

It was revealed from Table 1 that majority of the beneficiaries (40.00%) were middle aged. Usually farmers of middle aged are more enthusiastic and have more work efficiency. Further, it can be discussed that middle aged persons have more physical vigour and feel more family responsibility than the young and old respondents. This might be the reason to find majority of farmers in middle age group. These results are in agreement with the findings observed by Madhavareddy (2001), Sridhar (2002), Raghunandan (2004) and Ningareddy (2005).

5.1.2 Education

Considerable per cent of beneficiary farmers were educated upto graduate level (34.00% and 28.00%, respectively) followed by high school and middle school In general, nowadays people are educated and farmers are no exception to this. This could be the result of common social environment. In the present scenario, almost all want to be literate because of awareness about the importance of the education by the various Government programmes. Similar results were also reported by Gupta (1999), Raghunandan (2004) and Ningareddy (2005).

5.1.3 Family type

The results revealed that 61.00 per cent of the respondents were from joint family and 39.00 per cent respondents from nuclear family. This might be due to the changing

values of family system. The result is in line with the findings reported by Sakharkar (1995).

5.1.4 Land holding

More per cent of beneficiary farmers were found in small land holding category (56.00%) followed by marginal land holding category (28.00%). Less than 9.00 per cent of farmers were found in medium farmers and where as very less per cent (4.00%) belonged to big land holding category. This might be due to the fragmentation of ancestral land from generation to generation that might have led to smaller size of land holdings. The present findings are in line with the results of Nagaraj (1996), Madhavareddy (2001) and Ningareddy (2005).

5.1.5 Risk orientation

The data indicated that 39.00 per cent of the respondents had medium risk taking ability, while 35.00 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).

5.1.6 Mass media participation.

The data indicated that majority of the respondent 54.00% were found to have high mass media participation, while followed by low (24.00%) and (22.00) followed by medium participation categories respectively.

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 present findings with the results Ningareddy (2005).

5.1.7 Achievement motivation.

It has clear that 43.00 per cent of the respondents belonged to medium achievement motivation category. The reasons for the medium and low achievement motivation of respondents may be due to medium level of education, medium level of scientific orientation and risk orientation capacity.

The results are not in conformity with the findings of Gopala (2010) and Sunitha (2012).

5.1.8 Innovativeness

The data indicated that nearly equal majority of the respondents 38.00% and 37.00 Per cent were found to have high and low innovativeness, while only 25.00 per cent of them had medium 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).

5.1.9 Market orientation

Majority of the beneficiaries (53.00%) have low market orientation While, 30.00 per cent of beneficiaries belongs to medium market orientation and high market orientation (17.00%) respectively. The reason attributed for low market orientation were medium social participation and extension contact as well as comparatively less exposure to the training programmes Similar results were reported by Chikhale *et al.* (1996) and Chaudhari *et al.* (1999).

5.1.10 Scientific orientation

A slightly more than half of the respondents (57.00 %) belonged to medium scientific orientation category. knowing the things scientifically with moderate interest and medium knowledge level may be attributed to the findings of present study.

The results are in conformity with the findings of Gour (2002). But the findings of Chauhan and Patel (2003) are not in line with the findings of present study.

5.1.11 Extension participation

The data indicates that 39.00 per cent of the respondents belonged to medium level of extension participation category. The medium level of extension participation of education to foresee the importance of participation of them in extension programmes.

The results of this study go with the conclusion of Nagaraj (2012).

5.1.12 Social participation.

The data revealed that nearly half (43.00 %) of the respondents had medium social participation, followed by 32.00 per cent and 25.00 per cent had high and low level of social participation, 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 Hanumanaikar (1995) who found that majority of the farmers had low level of social participation.

5.2 Overall adoption of watershed practices by beneficiaries farmers

The data was revealed the overall adoption level of watershed practices by the farmers. A higher per cent of beneficiary farmers were found in high adoption category (43.00%) and 37.00 per cent farmers belonged to low adoption category. Beneficiary farmers were benefited by Sujala Watershed Project and they had good extension participation and Achievement motivation. They are exposed to other transfer of

technology programmes like study tour, demonstrations etc. These results are in line with Boite and Girase (1991), Padmaiah *et al.* (1992), Deshmukh *et al.* (1995), Meti and Hanchinal (1995), Khade *et al.* (1998) and Kulshreshta *et al.* (2010).

5.3 Adoption of specific soil and water conservation practices by beneficiaries farmers

The results indicated that majority of beneficiary farmers adopted practices like ploughing across the slope, use of improved in agricultural implements and land smoothening. The reason attributed was, these are commonly followed practices, further no high cost and technical guidance is required for adopting these practices However, least per cent of beneficiaries adopted waterways, opening furrows, construction small section bunds, vegetative bunds, and farm ponds The reasons attributed for above findings are requirement of strong technical guidance, willingness of farmer to loose some portion of field and these practices requires heavy investment. The results are in line with the findings of Farooque (1997), Narayanagowda and Jayaramaiah (1997) and Kadam *et al.* (2001).

5.4 Impact of watershed development programme on crop productivity

The results presented in the table gives better idea about difference in the production of major crops. Highest and more than fifty per cent increase in the yield level was noticed in ragi (13.88%) closely followed by groundnut (15.67%). While, more than 24.71 per cent increase in the yield level was observed in Pomegranate,17.71 per cent increase in the yield level was observed in Sapota and drastic increase in Diary farming is (14.32%) by virtue of implementation of Sujala Watershed project. It could be inferred that productivity of crops and also livestock of the beneficiary farmers field was considerably increases The possible reasons that could be attributed to this phenomenon is that majority of beneficiary farmers have adopted important watershed practices like strengthening of existing bund, field bund, ploughing across the slope, use of improved agricultural implements. This is mainly because of the treatments imposed by the department of watershed in the beneficiary farmers' field. When beneficiary farmers were interviewed by probing into productivity of crops, they revealed that increase in productivity directly depends on the conservation of soil moisture and productive top soil. As a result of watershed treatment, there was additional storage of moisture in the soil profile due to increase in groundwater recharge and reduction in soil and water erosion. Due to this, productivity of the crops has increased considerably in the beneficiary farmers field. These results are in line with the findings of Singh (1990), Singh *et al.* (1995), Kannan (2006) and Jain (2007).

5.5 Relationship between adoption of watershed practices and independent variables

For finding the relationship of the adoption with the independent variables correlation coefficient (r) was worked out. The data illustrated that education, risk orientation achievement motivation, innovativeness, scientific orientation and extension participation were positively and significantly related with adoption. While, other variables such as age, land holding, family type, mass media utilization market

orientation and social participation did not show any significant relationship with adoption of watershed practices by beneficiary farmers.

5.5.1 Education and adoption

A significant positive relationship was found between education and adoption by the beneficiaries. The data also revealed that majority of the beneficiary farmers were better educated. It implied that formal education played an important role in acquisition and understanding concepts of the watershed practices. It widens the horizons of an individual to gain which results in better adoption.

5.5.2 Risk orientation and adoption

The relationship between risk orientation and adoption was found to be positive and significant. It means risk orientation provide an excellent platform to acquire, interact and develop more information. The scope of knowing more about the watershed practices are directly related with risk orientation, which increases adoption among the farmers. It was also found during investigation that most of the beneficiary farmers. this resulted in better adoption of watershed practices by the farmers, who possessed more risk orientation.

5.5.3 Achievement motivation and adoption

The relationship between achievement motivation and adoption by the beneficiaries was found to be positive and significant. It means achievement motivation provide an excellent platform to acquire, interact and develop more information. The scope of knowing more about the watershed practices are directly related with achievement motivation, which increases adoption among the farmers. It was also found during investigation that most of the beneficiary farmers extension participation level was high, further the watershed department organized SHGs and watershed sanghas for the benefit of the beneficiaries, which enabled them to achievement more.

5.5.4 Innovativeness and adoption

The relationship between innovativeness and adoption was found to be positive and significant. It means innovativeness provide an excellent platform to acquire, interact and develop more information. The scope of knowing more about the watershed practices were directly related with innovativeness, which increases adoption among the farmers. It was also found during investigation that most of the beneficiary farmers. this resulted in better adoption of watershed practices by the farmers, who possessed more innovativeness.

5.5.5 Scientific orientation and adoption

A significant positive relationship was found between scientific orientation and adoption by the beneficiaries. The data also revealed that majority of the beneficiary farmers were better thoughts of scientific orientation. It plays an important role in acquisition and understanding concepts of the watershed practices. It widens the horizons of an individual to gain which results in better adoption.

5.5.6 Extension participation and adoption

The relationship between extension participation and adoption was found to be positive and significant. Basically, the beneficiaries had more regular contact with extension personnel as the officials from the department of watershed are having one or the other programmes for the beneficiaries. The watershed participation are also meeting the beneficiaries regularly even otherwise also for one or the other reason. It is obvious that farmers who are in constant participation with extension personnel are likely to get more attention and guidance from them regarding the watershed practices and other improved agriculture technology, which would further increase the technical know-how and adoption of watershed practice by the farmers. This implies that beneficiaries who are in contact with extension personnel would have better adoption under the guidance and supervision of extension personnel.

5.6 Extent of contribution of independent variables to their adoption of watershed practices

The zero order correlation coefficients were computed for the examination of the Extent of contribution of independent variables obtained by the beneficiaries. It was observed from Table that out of 10 independent variables studied education, risk orientation achievement motivation, innovativeness, scientific orientation and extension participation had shown positive and significant relationship is obtained by the beneficiaries.

5.6.1 Education and adoption of beneficiaries

Education showed positive and significant relationship with adoption of beneficiaries. Education has a vital role in acquisition and understanding of the information disseminated by the project authorities, when stated in other words; higher formal education might have helped nto a greater extent in absorption and understanding of the very purpose of the programme, which might have enabled to develop favourable adoption towards Sujala watershed project.

Sinha *et al.* (1983), Zotwana (1987), who studied farmers adoption towards T & V system, high yielding varieties of paddy respectively in relation to their education also justified the present findings.

5.6.2 Risk orientation and adoption of beneficiaries

The results indicated a positive and significant relationship between risk orientation and adoption of farmers. The possible reasons for this could be that the farmers who are capable to take risk for managing the planning, production and marketing of their farms are having favourable adoption towards the project and thus could participate early in the activities of Sujala watershed project.

The findings were in line with Prasad (1995).

5.6.3 Achievement motivation and adoption of beneficiaries

Achievement motivation showed positive and significant relationship with adoption of beneficiaries towards Sujala watershed project. The positive correlation might be due to the fact that more achievement might have created general awareness and helped them to acquire knowledge through social interaction. More so, persons equipped with good knowledge will get better social recognition which in turn enhance their participation in such organizations leading to favourable adoption towards Sujala watershed project. The findings were in line with Prasad (1995).

5.6.4 Innovativeness and adoption of beneficiaries

The results indicated a positive and significant relationship between innovativeness and adoption of farmers. It is in accordance with the general notion that educated farmers with more exposure to innovativeness will develop a favourable adoption through innovativeness

5.6.5 Scientific orientation and adoption of beneficiaries

The results indicated a positive and significant relationship between scientific orientation and adoption of farmers. It is in accordance with the general notion that educated farmers with more exposure to scientific orientation will develop a favourable adoption through scientific orientation.

5.6.6 Extension participation and adoption of beneficiaries

Extension participation showed positive and significant relationship with adoption of farmers towards Sujala watershed project. Regarding extension participation, the plausible reason for positive and significant relationship with adoption of beneficiaries towards Sujala watershed project. might be that beneficiaries who have learned more about the technologies and also through their participation in different extension activities like krishimela, exposure visits, demonstrations, farmers training and field days, which provide opportunity for contrived experience and interaction with extension personnel and progressive farmers lead to more favourable adoption towards Sujala watershed project

5.7 Constraints and suggestions given by beneficiary farmers in adoption of watershed practices

5.7.1.1 Constraints experienced by the beneficiary farmers in adoption of soil and water conservation practices

Constraints experienced by the beneficiary farmers in adoption of soil and water conservation practices are presented in Table 12 Majority of the beneficiary farmers expressed that Water stagnation near bunded area (90.00%) followed by Obstructions for cultural operations (70.00%) Lack of co-operation by neighbours (65.00%), and whereas, sixty three per cent of beneficiary farmers expressed that financial constraints (63.00%), loss cultivable area (62.00%) wheras less percent Fragmentation of land into unconventional shape and size (61.00%) Belief that putting bunds serve no purpose (55.00%). The reason might be because of inadequate conviction of the technologies and

utility of these practices, which are not observable immediately. The results are in consonance with the findings of Shivaprasad (1990), Padmaiah *et al.* (1992), Trivedi and Patel (1996), Jhariya *et al.* (1999), and Kulshreshta *et al.* (2010).

5.7.1.2 Suggestion faced by the beneficiary farmers in adoption of soil and water conservation practices

The problems experienced in adopting the soil and water conservation practices. However, beneficiary farmers expressed that it is a Bunds should be construct across the slope to prevent soil erosion (97.00%) While, least per cent of beneficiary farmers expressed lack of co-operation by the neighbour farmers (94.00%) were the suggestions in adoption of soil and water conservation practices.

5.7.2.1 Constraints experienced by the beneficiary farmers in adoption of Crop production management practices

The constraints experienced by the beneficiary farmers in adoption of crop production management practices are presented in Table 12

Majority of the beneficiary farmers expressed that non availability of labour (93.00%) was the major problem hindering adoption of the improved crop production practices. The reason is that labourers are attracted by higher wages offered by the industries around the city which is resulting in scarcity of skilled labour in villages. The labour wages are also very high, which results in the farmers expressing this problem followed by Heavy risk due to failure of monsoon (92.00%) In the study area, ragi and groundnut is grown in rainfed conditions. Hence monsoon plays a major role in successful ragi and groundnut cultivation. Expensive chemicals and lack of finances (91.00%), and (90.00%)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. where as less percent Non-availability of drought tolerant crop varieties, (85.00%) 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. Non-availability of inputs in time, Cost of fertilizer is high (85.00%),(84.00%),(83.00%) and Difficulty in identification of contour key lines(82.00%) This might be due to non-availability of seeds, fertilizers because of heavy demand as compared to other inputs supply in appropriate seasons.

The findings are in consonance with the findings of Iqbal (1991), Jagadale and Nimbalkar (1993) and Ranganathan (1995).

5.7.2.2 Suggestions given by the beneficiary farmers in adoption of crop production management practices

The problems experienced in adopting the crop production management practices. However beneficiary farmers expressed that (91.00%) While, least per cent of beneficiary

farmers expressed Development of drought tolerant with high yielding varieties (85.00%) were the suggestions in adoption of crop production management practices

5.7.3.1 Constraints faced by the beneficiary farmers in adoption of Livestock management practices

The constraints experienced by the beneficiary farmers in adoption of Livestock management practices are presented in Table 12

Majority of the beneficiary farmers expressed that Improper management of livestock due to less income (91.00%) because mainly The labour wages are also very high, which results in the farmers expressing this problem followed by absence of diary sector in the village (89.00%) lot of co operation is in the village Problem in maintaining the livestock due less water availability (88.00%), mainly agriculture gambling with farmers and wheras less percent Non availability of fodders and Disease in the milk yield (63.00%) mainly due to finances were the constraints in adoption of livestock management practices

5.7.3.2 Suggestions given by the beneficiary farmers in adoption of Livestock management practices

The problems experienced in adopting the Livestock management practices. However beneficiary Promoting the farmers to take up livestock by conducting the sensitization programmes in the village (91.00%) While, least per cent of beneficiary farmers expressed Providing the good animals which gives more milk yield (63.00%) were the suggestions in adoption of livestock management practices

CHAPTER VI

SUMMARY

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 (65%). Rainfed agriculture contributes about 42 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 prospects of contributing substantially to country's food production and unless the production from these areas increases, the real breakthrough 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 above ground and below 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 deficiency 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

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 water management. Hence the present investigation was carried out with the following objectives.

1. To study extent of adoption of soil, water conservation and crop production techniques by the beneficiaries.
2. To study crop productivity and livestock among beneficiaries
3. To ascertain the relationship between personal psychological and socio - communication characteristics of beneficiaries with adoption level.
4. To enlist the constraints and suggestions of Sujala watershed beneficiaries.
5. The study was conducted in purposively selected Sujala watershed project in

Hiriyur taluk of Chitradurga district in Karnataka. This watershed project was started during the year,(2001-2006) the project was implemented in an area of 4.29 Lakh

ha covering five districts (Chikkabalapur, Tumkur, Chitradurga, Haveri and Dharwad) with the financial assistance of World Bank. During the second phase (2007-2011) 1.56 Lakh ha was treated in six districts (Belgaum Madikeri, Hassan, Chitradurga, Chikmagulur and Shimoga) with the financial assistance of NABARD. In the third phase (2013-2018) the project is proposed to treat 2.53 lakh ha in seven Districts (Bidar, Gulbarga, Yadgir, Gadag, Koppal, Davanagere, Chamarajanagr and untreated areas of Chitradurga and Tumkur) with the financial assistance of World bank. 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. Easy accessibility and convenience of the student researcher was taken into account for selection of watershed. In Chitradurga district Sujala watershed was implemented in 9 sub watersheds spread over 108 villages. But for the purpose of study, 10 villages spread in 2 sub watersheds were purposively selected based on maximum area covered and implementation of watershed project during II Phase. 100 beneficiaries were selected from Hiriyur taluk by following simple random sampling techinque. Thus the total sample size for the study was 100 respondents. The data was collected by using pre tested structured interview schedule. The collected data was analysed by using frequency, percentage, mean, standard deviation and correlation. The major findings of the study are as follows.

1. Majority (61.00%) beneficiary farmers were belonged to middle aged.
2. Majority (34.00%) of the beneficiaries were educated upto high school.
3. It was observed that (61%) of the respondents belonged to joint family while, 39 per cent of the respondents were belonging to nuclear family.
4. Majority of beneficiaries farmers were found in small land holding category (56%) followed by marginal land holding category (28.00%). Less than 9.00 per cent of farmers were found in medium and where as less per cent of big land holding category (7.00%).
5. It was observed that (39.00%) belonged to medium risk orientation category, followed by high (35.00%) and low (26.00%) risk orientation
6. It was observed that (54.00%) belonged to high mass media participation category, followed by low (24.00%) and (22.00%) followed by medium participation
7. It was observed that 43 per cent of the beneficiaries belonged to medium achievement motivation category. While, low (31.00%) Achievement motivation and high achievement motivation categories had percentage (26.00 %).
8. It was observed that 38 per cent of the beneficiaries belonged to high innovativeness category. While, low (37.00%) innovativeness and medium innovativeness categories had percentage (25.00 %).
9. It was observed that (53.00%) belonged to low market orientation whereas 30.00 and 17.00 percent of them fall under medium and high level of market orientation

10. It was observed that (57.00 %) belonged to medium scientific orientation category. While, 23.00 per cent of the respondents fall under low scientific orientation and 20.00 per cent fall under high scientific orientation

11. It was observed that (39.00 %) of the respondents had medium extension participation, followed by 31.00 per cent and 30.00 per cent had high and low level of extension social participation

12. It was observed that (43.00 %) of the respondents had medium social participation, followed by 32.00 per cent and 25.00 per cent had high and low level of social participation

13. Majority (43.00%) of the beneficiaries belonged to high adoption level category. Only 39.00 and 18.00 per cent of the respondents belonged low and medium adoption level categories.

14. Ploughing across the slope (81.00%), improved agricultural implements (73.00%), land smoothening (70.00%). The practice like strengthening of existing bunds, contour bunds was practiced by 66.00 and 58.00 per cent of beneficiaries respectively

15. Majority more than fifty per cent increase in the yield level was noticed in Ragi (13.88%) closely followed by Groundnut (15.67%). While, more than 24.71 per cent increase in the yield level was observed in Pomegranate, 17.51 per cent increase in the yield level was observed in Sapota and drastic increase in Diary farming is (14.32%).

16. It was observed that extension participation, achievement motivation, risk orientation, innovativeness, scientific orientation and education were having positive and significant relationship with adoption.

17. Majority of the beneficiary farmers expressed that Water stagnation near bunded area (90.00%) followed by Obstructions for cultural operations (70.00%) Lack of co-operation by neighbours (65.00%), and whereas, sixty three per cent of beneficiary farmers expressed that financial constraints (63.00%), loss cultivable area (62.00%) the major constraints expressed by beneficiary farmers in adoption of soil and water conservation practices.

18. Majority of the beneficiary farmers expressed that it is a Bunds should be construct across the slope which prevent soil erosion (97.00%) While, least per cent of beneficiary farmers expressed lack of co-operation by the neighbour farmers (94.00%) were the suggestions in adoption of soil and water conservation practices

19. Majority of the beneficiary farmers expressed that non availability of labour (93.00%) followed by Heavy risk due to failure of monsoon (92.00%) Expensive chemicals (91.00%). were the constraints in adoption of crop production management practices

20. Majority of the beneficiary farmers expressed that (91.00%) While, least per cent of beneficiary farmers expressed Development of drought tolerant with high yielding

varieties (85.00%) were the suggestions in adoption of crop production management practices

21. Majority of the beneficiary farmers expressed that Improper management of livestock due to less income (91.00%) followed by Absence of diary sector in the village (89.00%) Problem in maintaining the livestock due less water availability (88.00%) were the constraints in adoption of livestock management practices.

22. Majority of the beneficiary promoting the farmers to take up livestock by conducting the sensitization programmes in the village (91.00%) While, least per cent of beneficiary farmers expressed providing the good animals which gives more milk yield (63.00%) were the suggestions in adoption of livestock management practices

Implications of the study

In the light of findings of the study and based on experience gained by the researcher during interviewing respondents, following implications were made for the effective implementation of soil and water conservation practices to the concerned watershed department.

1. Majority of the farmers have not adopted important watershed practices like farm pond contour bunding. Hence, awareness has to be created among farming community through various extension methods like training, field trips and demonstration.

2. There is substantial increase in productivity of different major crops in the treated area. Hence, maximize participatory demonstrations and training programmes to make the farmers to reap benefits of improved practices.

3. The sustainability of watershed development depends on capacity building through training at various levels. Hence, there is a need to undertake up awareness building, development of technical skills and re-orientating motivational activities for officials and developmental functionaries at all levels for the cause of empowering the farmers.

4. The findings of the study have clearly emphasized the importance of education, extension contact, social participation, awareness about the programme and personal benefits obtained by the beneficiaries in ensuring people's participation. This implies that these variables have significant contribution for the participation of beneficiaries in Watershed Development Programme. Hence, the concerned individuals and institutions should wisely make use of the same for designing and implementing appropriate strategies for the development of farmers.

5. The main stakeholders in the watershed development process include Government agencies, NGOs, private banking sectors, local institutions and communities. Partnership between the concerned agencies needs to be strengthened with each other for playing the role effectively. So as to achieve greater success.

6. Majority of the beneficiaries perceived obstruction for cultural operations, water stagnation near bunded area as major constraints for adoption of watershed practices.

This calls the attention of watershed development researchers to develop/improve practices which overcome these problems, so as to encourage the farmers to adopt the improved watershed development practices.

Suggestions for future research

The present study is an attempt to analyze the impact of watershed development programme on the farmers in comprehensive way. However, it is suggested that further investigations may be taken up in different regions of the state 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.

CHAPTER VII

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ADOPTION OF WATERSHED MANAGEMENT PRACTICES BY FARMERS IN SUJALA WATERSHED PROJECT : A STUDY IN CHITRADURGA DISTRICT OF KARNATAKA

INTERVIEW SCHEDULE

Respondent No : ..... **Date :.....**

PART - I

I. General information

1. Name of the farmer : _____
2. Father name : _____
3. Village : _____
4. Hobli : _____
5. Taluk : _____

PART- 11

PERSONAL, PSYCHOLOGICAL SOCIO COMMUNICATION CHARACTERISTICS

1. Age :..... years

2. Education : Illiterate/Can read and write

Primary school	
Middle school	
High school	
PUC	
Diploma	
Graduate	

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

4. Land Holding

Dryland(acres)	Irrigated/Garden land(acres)	Total(acres)

5. Risk orientation

Sl. No.	Statements	Agree	Undecided	Disagree
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			

6. Mass media utilization

Sl. No	Mass media	Possession/Subscription (Yes/No)	Regular	Occasional	Never
1	Newspaper				
2	Farm magazine				
3	Radio				
A	General programme				
B	Agril. Programmes				
4	Television				
A	General programme				
B	Agril. Programmes				

7. Achievement motivation

Sl. No	Statements	SA	A	UD	DA	SDA
1	Any farmer with ability and willingness to work hard has a good chance of success					
2	One should feel that he can achieve the things that he wishes					
3	A farmer should utilise the available resources to boost his level of production					
4	One should have to keep learning new skills for better management of watershed					
5	One should provide good education to all his children					

SA= Strongly Agree; A=Agree; D=Undecided; DA=Disagree; SDA= Strongly disagree

8. Innovativeness

Sl No	Statements	SA	A	UD	UA	SDA
1	I am very much interested in adopting whatever new practices thatare 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					

9. Market orientation

Sl No	Statements	Agree	Undecided	Disagreee
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			

10. Scientific orientation

Sl No	Statements	SA	A	UD	UA	SDA
1	New methods of farming gives better results to a farmer than the old methods					
2	The way of fore fathers farming is still the best way to farm today					
3	Even a farmer with lot of experience should use new methods of farming					
4	Though it takes time for a farmer to learn new methods in farming it is worth the efforts					
5	A good farmer experiments with new ideas in farming					
6	Traditional methods of farming have to be encouraged in order to raise the level of living of a farmer					

11. Extension participation

Sl No	Extension activity	Regularly	Occasionally	Never
1	Group meeting			
2	Demonstrations			
3	Field days			
4	Training programmes			
5	Agricultural exhibitions			
6	Krishimela			
7	Agricultural campaign			
8	Farmer field school			
9	Any others specify			
10				

12. Social participation

Sl.No	ORGANISATION	EXTENT OF PARTICIPATION		
		Regular	Occasionally	Never
1	Grama sabha			
2	Taluk panchayat			
3	Zilla panchayat			
4	Farmer union			
5	Youth club			
6	Watershed sanghas			
7	Co operatives			
8	Self help group			
9	Any other specify			
10				

PART – III

ADOPTION OF THE WATERSHED PRACTICES BY BENEFICIARY FARMERS

A) Soil and water conservation practices

Sl.No	Description	Full Adoption	Partial Adoption	Non adoption
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			
11	Any other specify			
12				

B) Crop production technologies (Other than SWC)

Sl. No	CROP PRODUCTION TECHNLOGIES	Technologies Adopted before	% change	Technologies adopted after	% change.
1	Crops and cropping system a)..... b)..... c)..... d).....				
2	Horticulture a)..... b..... c)..... d).....				
3	Forestry a)..... b)..... c)..... d).....				
4	Forage/ silvipasture a)..... b)..... c)..... d).....				

C) Production and productivity levels of crops

Sl. No	Crops	Area (acres)	Before watershed		After watershed	
			Production	Productitvity	Production	Productitvity
1						
2						
3						
4						
5						
6						
7						

D) Livestock management practices

Sl. No	Livestock management practices	Before watershed		After watershed	
		No.	Yield	No.	Yield
1	Poultry				
2	Sheep				
3	Goat				
4	Diary farming				
5	Others				
6					
7					

E) Constraints in adoption of Soil and water management practices

Sl.No	Items	Yes/No
A)	**Problems**	
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	Lack of co-operation by neighbours	
7	Financial constraint	
8	Any other (specify)	
9		
10		
B)	**Suggestions**	
1	Bunds should be construct across the slope which prevent soil erosion	
2	Catchment area should be more	
3	Co-Operation by neighbours	
4	Time of operation	
5		

F) Constraints in adoption of improved crop production practices (Other than SWC)

Sl.No	Items	Yes/No
A)	**Problems**	
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	
12		
13		
B)	**Suggestions**	
1	Development of drought tolerant with high yielding varietes	
2	Use of mechanization in the agriculture	
3	Growing of short duration crops	
4	Growing of mulch crops	
5		
6		

G) Constraints in the following livestock management practices

Sl.No	Items	Yes/No
A)	**Problems**	
1	Non availability of fodders	
2	Improper management of livestock due to less income	
3	Disease in the milk yield	
4	Problem in maintaining the livestock due less water availability	
5	Absence of diary sector in the village	
6		
7		
B)	**Suggestions**	
1	By having diary in the village we can promote animal husbandry	
2	Promoting the farmers to take up livestock by conducting the sensitization programmes inthe village	
3	Providing the good animals which gives more milk yield	
4	Increase the price of milk	
5		
6		