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AN ECONOMIC ANALYSIS OF RESERVOIR IRRIGATION IMPACT ON AGRICULTURAL PRODUCTION IN HASSAN DISTRICT

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ABSTRACT

Irrigation is one of the key factors in agricultural development and has an impact on cropping pattern. The importance of water has been recognized from primitive days the largest use of water in the world is for irrigating lands, as an agricultural input especially for the production of food grains population and economic growth in developing countries posed serious challenges for humanity is simultaneously meeting food requirements and water demands competition for limited water resources increasingly occurs between different stakeholders and at different levels: between farmers within and Irrigation system in the agricultural sector and other rural activities. The importance of Irrigation may be viewed from two aspects: Protective aspects: to make up the moisture deficiency in soil, during the cropping season so as to ensure proper and sustained growth of crops grown, additional landside aspect: to enable second or third crop being on the land provided with Irrigation on which otherwise uncultivable efficiently, particularly during the post or per monsoon period. Agriculture is the mainstay of Indian economy with more than 53.75 percent of the populating depending on it for livelihood. The present study is focused on agricultural irrigation and its impact on productivity intern's enhancement of economic condition among the peasants, in this way what are the crux occurred in the proper usages of reservoir in the cultivation activities, any way the study would be analyses with simple tools and techniques to explore the information which was pooled from various sources.

INTRODUCTION

Agriculture is the main stay of Indian economy with more than 56 per cent of the population depending on it for livelihood and employment. Rain fed agriculture has become a gamble with uncertainty in rainfall and thus affecting production. Since, the arable land cannot be stretched it becomes essential to increase the production to meet the swelling demand for food due to growing population. Food production can be increased through various inputs like improved seeds, use of fertilizers, insecticides, pesticides, and provision of sufficient moisture and alike. With all the improvements in agricultural technologies and a number of revolutions like green, white, yellow or blue the country is in a position to meet the requirement of its population. In spite of increase in food production, there still exists a wide gap between foods available and required due to ever increasing population may it be due to better medical facilities, decreased death rate or increased life span.

Agricultural water use value is customarily defined through the water demand for crop production. A practical approach is the division of net crop value output with the estimated water

ISSN PRINT 2319 1775 Online 2320 7876
 UGC CARE Listed (Group -I) Journal Volume 12, Iss 01, 2023

input. Under competitive market conditions, an efficient valuation of agricultural water use should be attained through the maximization of crop productivity until profits will be diminished. The revenues from agricultural produce should allow farmers to effectively undertake the costs of Irrigation services through an efficient pricing mechanism. Namely, the labour, capital, operational and maintenance costs of the Irrigation system should be sufficiently covered while funding for reinvesting in new projects should be ensured. However, the objectives of Irrigation policy in agrarian economies are not always aligned with the theoretical background of agricultural water use value. The economic value of water use is de-linked from crop profit maximization by mostly pursuing an equitable minimum water volume for staple crops. Sound examples are spotted in agricultural dependent states of eastern India where water sufficiency in rice and wheat crops is highly prioritized for the sustenance of subsistence farmers. To this end, low water tariffs usually conveyed through a flat payment rate are introduced in most of the agricultural Indian states for the affordability of water charges However, low water tariffs often result in poor operational and maintenance funding by in turn leading to inefficient supply.

The primary benefit of reservoirs in the world is water supply which includes Irrigation for agriculture (food supply) Flood control, Hydropower Inland Navigation and Recreation, Irrigation is one of the key factors in agricultural development and its impact on cropping pattern the current study focuses to identify the impact of Irrigation and its accessibility an investigation pertaining to accessibility of reservoir Irrigation project study of Hassan District of Karnataka, keywords: Irrigation livelihood, Agriculture, cropping pattern.

Irrigation is one of the key factors in agricultural development and has an impact on cropping pattern. The importance of water has been recognized from primitive days the largest use of water in the world is for irrigating lands, as an agricultural input especially for the production of food grains population and economic growth in developing countries posed serious challenges for humanity is simultaneously meeting food requirements and water demands competition for limited water resources increasingly occurs between different stakeholders and at different levels: between farmers within and Irrigation system between Irrigation in the agricultural sector and other rural uses such as:

Fisheries, domestic water supply more usage of water is between agricultural urban industrial users' and environmental uses.

The importance of Irrigation may be viewed from two aspects: Protective aspects: to make up the moisture deficiency in soil, during the cropping season so as to ensure proper and sustained growth of crops grown, additional landside aspect: to enable second or third crop being on the land provided with Irrigation on which otherwise uncultivable efficiently, particularly during the post or per monsoon period. Agriculture is the mainstay of Indian economy with more than 53.75 percent of the populating depending on it for livelihood.

Introduction to study area :

ISSN PRINT 2319 1775 Online 2320 7876
 UGC CARE Listed (Group -I) Journal Volume 12, Iss 01, 2023

Hassan district is a very famous district in Karnataka state. This district is surrounded by Chikkamagalur district to the north west, Chitradurga district to the north, Tumkur district to the east, Mandyadistric to the south east, Mysore district to the south, Kodagu district to the south west and DakshinaKannada district to the west. Lying b/w 12 degree 13 and 13 degree 33 north latitudes and 75 degree 33 and 76 degree 38 east latitude. Hassan district has area of 6826.15 k.m itdivided into 8 Taluks there in Hassan. Channarayapatna, Alur, Belur, Arsikere, Holenarasipura, Sakaleshpur and Arkalgud 38 Hoblies and 2369 Villages.

The Geography mixed with the Malnad and mountainous regions to the west and south west called Bisleghat and maidan or plains regions in the north south and east. There are some areas of degraded forest ranges in central portion of the district. The general level of Hassan district is it slopes with course of Hemavathi from the western Ghats ranges towards the bed of Cauvery river near Hampapra in the south east. Its chief tributary is yagachi from BelurTaluk which joins it near Gorur. Hemavathi passes through Holenarasipura close to the Hassan district. Hassan and Belurstands around 3.084 and 3.150 feet above the sea level respectively.

The district has a 3 major Irrigation projects.

- HemavathiIrrigation project in Gorur.
- YagachiIrrigation project in Belur.
- Vatehole (harangi) Irrigation project in Vatehole.

Hassan district is a very richest district because they have an abundance of natural resources and rivers etc. then they have somebody places be here, Halebeedu, Belur, Shravanabelagola. The district have a 485 small scale industries, 2 medium industries and large industry which are cotton, chemical industries Education is the main instrument of human life. If have a number of education institutions 2920 primary schools 501 high schools and 149 P.U colleges nearly 32 degree colleges 2 medical colleges and 5 engineering colleges 4 P.G centers literacy rate of Hassan district 75.89% Male and Female literacy rate is respectively 83.55% and 68.30% sex ratio of Hassan district 1000: 1005 according to 2011 census. The district had a population 17,76,221, density of population 255 (density) people/km Kannada is spoken by a vast majority of the people in the district and it derived by world of Simhasanapuri.

Hassan district is divided into 8 Taluks which are Hassan, Arkalagud, Channarayapatna, Alur, Belur, Arsikere, Holenarasipura, Sakaleshpura. In these Taluks Hassan Talukis are of the richest and famous Taluk in Hassan district.

The Hemavathi is an important tributary of the kaveri. It starts in the western Ghats at an elevation of about 1,219 meters near Ballalarayanadurga in the Chikkamagalur district of the state of Karnataka, in southern India, and flows through Chikkamagaluru, Hassan District and Mysore district before joining the Kaveri near Krishnarajasagara. It is approximately 245 km long and has a drainage area of about 5,410 km. A large reservoir has been built on the river at Gorur in the Hassan district.

Rain fall in the study area

ISSN PRINT 2319 1775 Online 2320 7876
 UGC CARE Listed (Group -I) Journal Volume 12, Iss 01, 2023

SI NO	Taluk	Rain gauge stations-2008		Rain fall-2019-20		Rainy days	
		Working	Non-working	Normal rain fall (1901-70) (in M.Ms)	Actual rainfall during 2019-20 (in M.Ms)	Normal (1901-70)	Actual 2019-20
01	Alur	6	-	1060	1697	72	96
02	Arakalgud	7	-	919	1043	71	73
03	Arsikere	7	-	669	827	46	55
04	Belur	6	-	1004	1219	67	77
05	Channarayapatna	6	-	712	688	47	55
06	Hassan	7	-	856	1384	56	79
07	Holenarsipura	3	-	714	825	51	58
08	sakaleshpura	14	2	2316	2342	108	110
	Total	**56**	**2**	**1031**	**1253**	**65**	**75**

Source: Secondary data

Importance of the Study

The study is conducted in a micro frame work. As it is an empirical study the quantitative and qualitative aspects of an economic analysis of reservoir irrigation impact on agricultural production in Hassan district.

Objectives :

1. To know the role and importance of reservoir irrigation in the agricultural crop.
2. To analyze the type of crops growing by farmers of this reservoir basin.
3. To study the agriculture production changes in the reservoir area.

Hypotheses :

1. Reservoir irrigation plays a vital role in the crop pattern on the base of available water for agricultural activities.
2. In the reservoir basin variety of crops will grow, it shows that agricultural diversification in cropping.
3. Make use the reservoir irrigation agricultural production would be increased significantly.

ISSN PRINT 2319 1775 Online 2320 7876
 UGC CARE Listed (Group -I) Journal Volume 12, Iss 01, 2023

Methodology:

Keeping in view of the specific set of an objective as listed above, an in depth study as made an attempt to achieve the above objectives mentioned and the methodology would be focus on simple statistical tools like average method have been used to state the issue in the view of understand. The study is based on collection of data from both primary and secondary sources, that is data would have collected from 100 respondents who were selected randomly in the study area of Hassan.

Sampling Design:

The sampling design is formulated for the purpose of the collection of primary data. Simple random sampling method is adopted for collecting primary data by assigning the sample from the population.

Collection of Data:

- Secondary data relating to the different aspect. That is books, articles, journals and also internet.
- Primary data was collected from sample house by adopting the method of direct personal interviews with head of family to elicit the required information; a well-structured information schedule was designed with probing question.

Limitation of the study:

- It considers only the beneficiaries of the reservoir irrigation farmers.
- It concentrated only on changes in agricultural production in hassan district.
- This study has focused on 100 respondents who were farmers in the study area, and computed as well as obtained result based on the data pooled from the respective respondents.

Review of literature

Narayanamurthy (2006) : Assessed the state wise tank irrigated area in India from 1962 -63 to 2002-03. Results revealed that during period –I (1962-63) area under tank Irrigation system in India was 4.65 million hectare, which dropped to 3.14 million hectares during period – II (1982-83). Further, during period-III (2002-03) area under tank Irrigation declined to 2.261 million hectares. Study revealed that tank Irrigation system has registered a declining trend in almost all the states. On the contrary Maharashtra registered an increasing trend in tank Irrigation system. Area under tank Irrigation system in the state during Period-I was 0.193 million hectares which rose to 0.27 million hectares during period –II and to 0.36 million hectares during period – III.

Nagaraj and chandrakanth :(1995) evaluated the economic feasibility of investment on bore-well Irrigation using standard discounting cash flow techniques in different ground water zones. The IRR varied among different ground water zones from 39 per cent in grey zones to 50 per

ISSN PRINT 2319 1775 Online 2320 7876
 UGC CARE Listed (Group -I) Journal Volume 12, Iss 01, 2023

cent discount rate was 1.23, 1.26 and 1.28 in dark, grey and white ground water zones respectively.

Reddy and Mohamma :(1992) delineated the Irrigation potential of canals, tanks and tube wells in Andhra Pradesh and Telangana. Regional analyses of irrigated area indicated that coastal Andrapradesh recorded an increase in all sources of Irrigation, but, royalseema recorded a marginal fall in irrigated area. An index value was derived to show the concentration of Irrigation types in the region. This showed that canal and well based Irrigation increased and there has been a marked shrinkage in the extent of tank-based Irrigation for the period 1972-1983.

An attempt was made by **Prasad** (1980) to study the impact of well Irrigation scheme financed by Girijan Development Agency, Srikakulamon the cropping pattern. For the study 25 beneficiaries with loans sanctioned wells, sunk and in use were selected at random with 25 non-beneficiaries serving as control. The beneficiaries raised a large number of crops in both the seasons as against only kharif crop by the non-beneficiaries. Beneficiaries reported diversified cropping pattern including commercial crops like vegetables, gingili, groundnut and sugarcane. In addition, they adopted modern farming methods, plant protection measures and high yielding varieties, compared to non-irrigated counterparts.

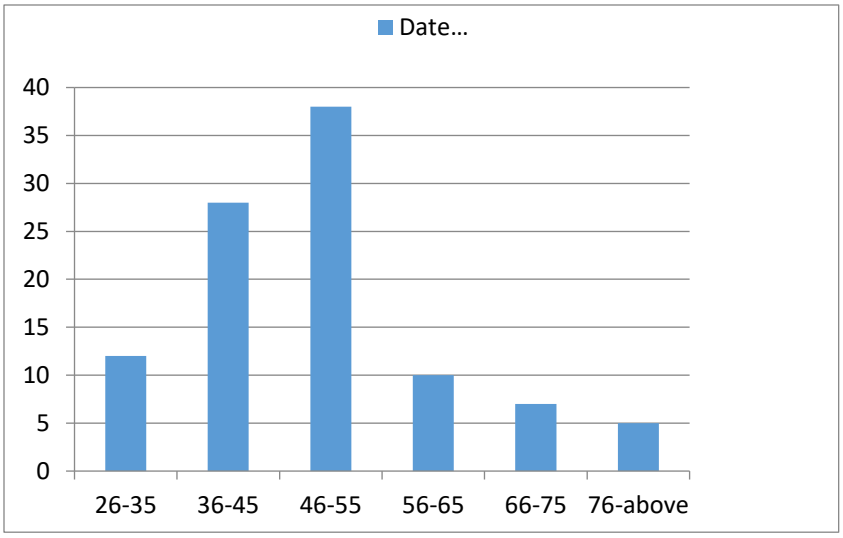
Data analysis The data would have pooled from primary source that is through the structured questionnaire has been prepared and fetch the information from 100 respondents in the study area, collected information have computed and tabulated used by in simple statistical tools.

Respondents age group:

Age	**Percentage**
26-35	12
36-45	28
46-55	38
56-65	10
66-75	7
76-above	5
Total	**100**

Source: Primary data

ISSN PRINT 2319 1775 Online 2320 7876
 UGC CARE Listed (Group -I) Journal Volume 12, Iss 01, 2023

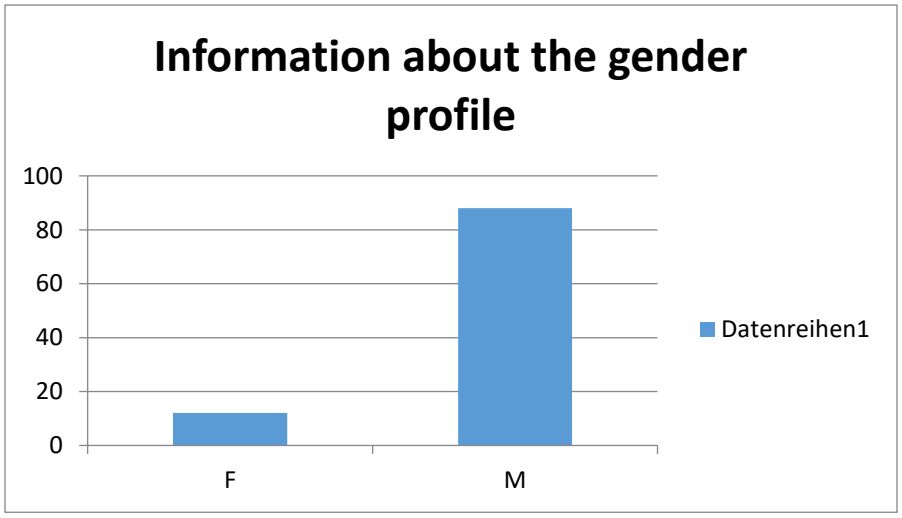


In the above table stated that the respondents age group in percentage, 12% of the respondents are belongs at 26-35 age group, then 28% of the respondents are belongs to the 36-45 age group, then 38% of the respondents are belongs to the 46-55 age group, then 10% of the respondents are belongs to the 56-65 age group, then 7% of the respondents are belongs to the 66-75 age group, then 5% of the members are belongs to the 76 and above age groups.

Information about the gender profile:

Sex	**Percentage**
Female	12
Male	88
Total	**100**

Source: Primary data



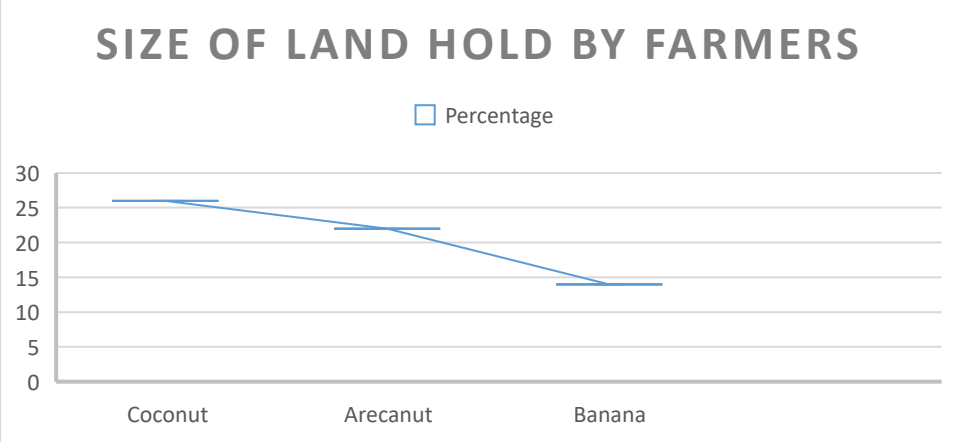
As stated in above table and diagram male farmers are more than the female participation in agricultural activities that is 88% male and 12% of the female are found in this study.

Size of land hold by farmers:

ISSN PRINT 2319 1775 Online 2320 7876
 UGC CARE Listed (Group -I) Journal Volume 12, Iss 01, 2023

Size of land holdings(hectare)	**Percentage**
>2	66
2 – 5	26
5 – 10	8
Total	**100**

Source: Primary data



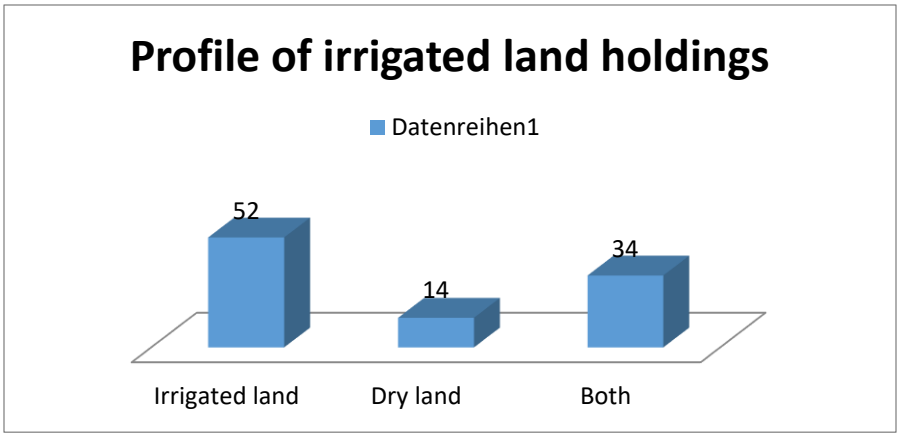
This table reveals that, 66% of farmers have small land holding about >2 hectares, 26% of farmers hold about 2 – 5 hectares and only 8% of the farmers hold between 5–10 hectares land.

Profile of irrigated land holdings:

Types land	**Percentage**
Irrigated land	52
Dry land	14
Both	34
Total	**100**

Source: Primary data

ISSN PRINT 2319 1775 Online 2320 7876
 UGC CARE Listed (Group -I) Journal Volume 12, Iss 01, 2023

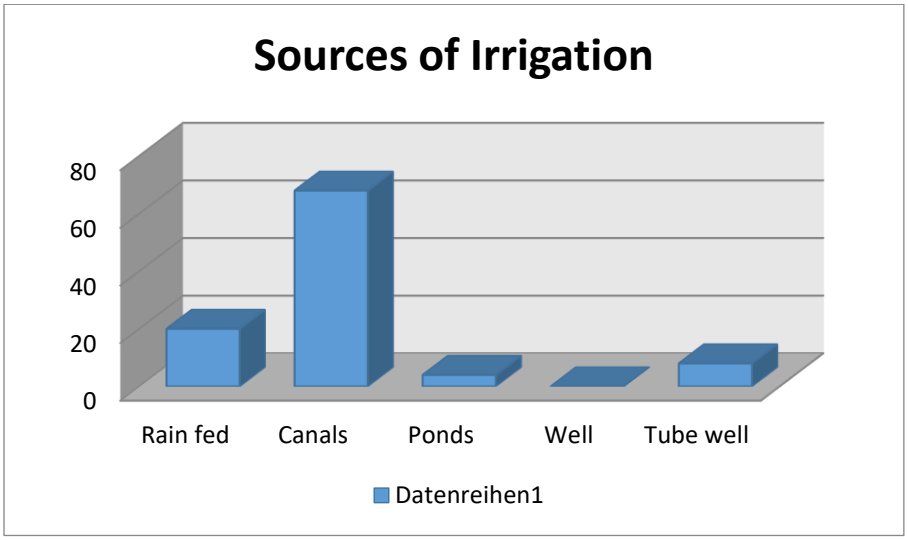


The profile of irrigated land state that farmers have irrigation facility and dry land. But some of them have both irrigated and dry land. Above table explains that 52% of farmers have irrigated land for cultivation. 14% of farmers have dry land and also 34% of farmers are having the both irrigated and rain fed land.

Sources of Irrigation:

Sources of Irrigation	**Percentage**
Rain fed	20
Canals	68
Ponds	4
Well	0
Tube well	8
Total	**100**

Source: Primary data



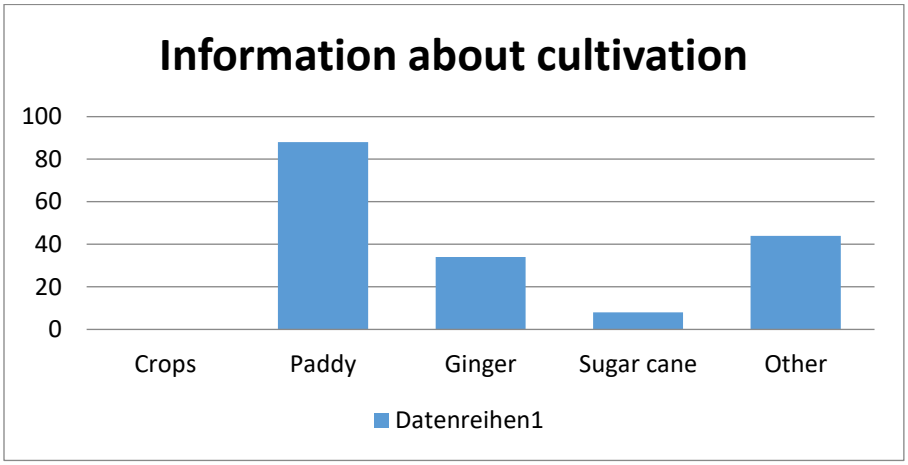
ISSN PRINT 2319 1775 Online 2320 7876
 UGC CARE Listed (Group -I) Journal Volume 12, Iss 01, 2023

From the above table, we can understand that 20% of farmers depend on the rain, 68% of farmers depend on the canals. Canals are very important for agriculture. Only 4% depends on the ponds and 8% depends on the tube well. This table shows that majority of them depend on canals for irrigation.

Information about cultivation:

Crops	Percentage
Paddy	88
Ginger	34
Sugar cane	8
Other	44

Source: Primary data



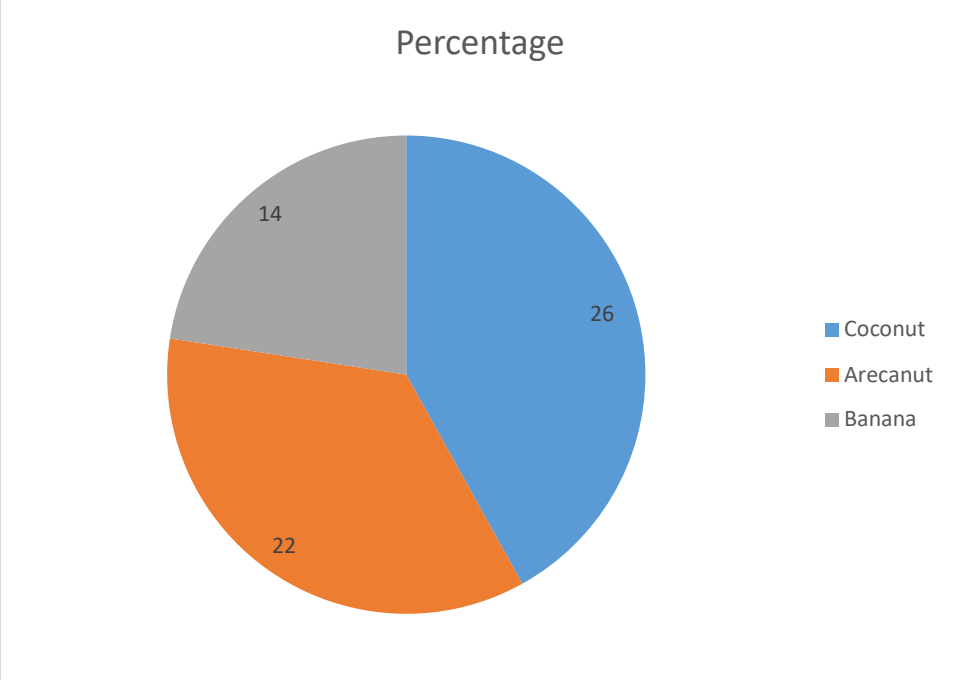
As per the above table it is revealed that majority of the respondents cultivating paddy are nearly 88% of farmers because this study area is known for paddy land and 34% of farmers are cultivating ginger, 8% of farmers are cultivating sugar cane and 44% of farmers are cultivating various crops.

Information about horticulture crops:

Horticulture crops	Percentage
Coconut	26
Arecanut	22
Banana	14

ISSN PRINT 2319 1775 Online 2320 7876
 UGC CARE Listed (Group -I) Journal Volume 12, Iss 01, 2023

Source: Primary data



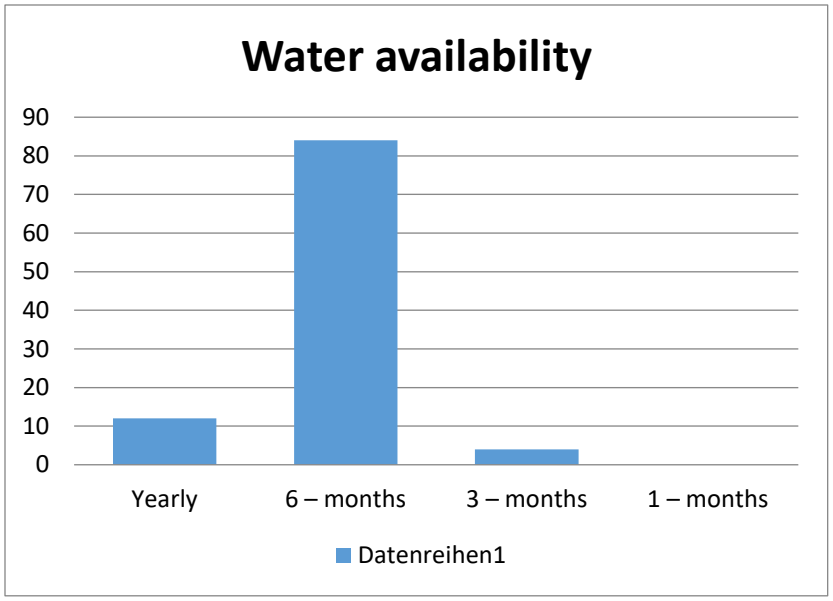
As revealed in the above table and diagram, 26% of coconut is grown, 22% of farmers are growing arecanut and 14% of banana is grown. It shows that the crop pattern is shifted from the short term crops to long term crops as these kind of crops require less amount of water even in the summer season. Hence, farmers are interested to grow horticultural crops which in turn provides income in the long period.

Information about availability of water:

Availability	**Percentage**
Yearly	12
6 – months	84
3 – months	4
1 – month	0
Total	**100**

Source: Primary data

ISSN PRINT 2319 1775 Online 2320 7876
 UGC CARE Listed (Group -I) Journal Volume 12, Iss 01, 2023



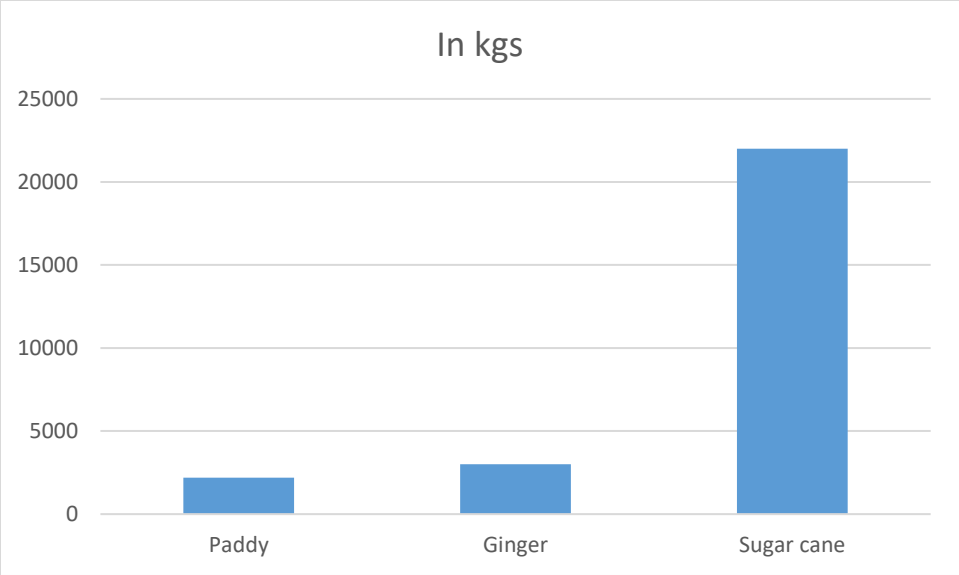
The table shows that 12% of farmers have discussed their opinion about water facility in their locality, throughout the year. 84% of farmers also discussed about the availability of water only in six months, 2% of farmers stated that they are getting only one month of water facility. Based on the sources of water, like lake, pond and streams, these do not have enough storage capacity and proper plan which leads to drain the water out within the short span of time. But reservoir irrigation is well planned and has enough storage capacity that can be poured into the cultivated land throughout the year by canals.

Information about crop yield per acre:

Crops	**In kilograms**
Paddy	2200
Ginger	3000
Sugar cane	22000

Source: Primary data

ISSN PRINT 2319 1775 Online 2320 7876
 UGC CARE Listed (Group -I) Journal Volume 12, Iss 01, 2023



The study says that the yield of various crops per acre differ among each other like, paddy would yield 2200 kilograms per acre, ginger yields 3000 kilograms and sugar cane results in the production of 22000 per acre. These crops will grow in different tenures for example, 90 – 120 days are enough for the growth of paddy, 240-300 days are necessary for the ginger to grow and around one year is needed for sugar cane crop. As well as these crops require more water to give better yield. Therefore, the other sources of water are not enough to feed except reservoir irrigation.

Findings:

- The Construction of this dam reduces dependences of rain in the study area.
- Multiple crops are growing from irrigation facility.
- Ground water source increases around the area.
- Productivity of cultivable land per hectare and per farmer increase due to this providing of this dam.
- Farmers are using high variety seeds which require much water.
- From this more and more wasteland brought under cultivation.
- Farmers are able to get two to three crops per year. Which leads to increase their income and standard of living.
- This dam providing water facility only for six months especially in rainy seasons.
- Three is no availability of water in summer due to lack storage water in the dam.
- Most of farmers have good housing facilities; therefore, their economic condition is good.
- Fertility of cultivable land is declining around dam due to salinity.
- Majority of farmers growing only paddy, and sugar cane.
- Most farmers have small size of land holdings; therefore, agriculture is not profitable.
- In this area of study 98% former have the irrigation facility.
- Some of families grow the horticulture crops.

ISSN PRINT 2319 1775 Online 2320 7876
 UGC CARE Listed (Group -I) Journal Volume 12, Iss 01, 2023

- In this study 90% farmers expressed satisfaction about the yield of crop, income and savings from cultivation.
- This reservoir leads to cool environment in the study area.

Suggestions:

- ✓ To provide irrigational facilities in summer days.
- ✓ To avoid soil erosive by the irrigation.
- ✓ The government to avoid acquire of agricultural land.
- ✓ Farmers should grow varieties of crop in order to maintain the fertility of soil.
- ✓ There should be proper water management.
- ✓ Farmers should actively participate in proper utilization of water facilities.
- ✓ There should proper management of sedimentation of reservoir.
- ✓ There should be construction of check dams to store excess dam water in rainy seasons.
- ✓ Maintenance of cleanliness of reservoir water in order to prevent water pollution, to promote the health of the people, who consume dam water.
- ✓ Proper programmers should implement for effective control or soil erosion.
- ✓ Implementation of certain schemes to control salinity and cold environment in cultivable land around dam area like construction of drains. For proper flows of extra water etc.
- ✓ Irrigation and proper utilization of water level increase in the study area.

CONCLUSION

Water is an essential ingredient for the existence of human beings. Initially, natural rains provided water supply to agriculture in forest areas. There was no conscious effort to tap water resources. As the population increased, civilizations came up on the banks of rivers, rain water is available only on the day of rain, but river water is available for a longer duration. Hence dependability increase with river water. In the case of perennial rivers, one can say that production is assured. Further increase in population led to the growth of communities away from river side also. Then we have the situation of one set of communities depending on rain water only for its agriculture and another on rivers. The first one had an unpredictable situation-if rains were delayed or rainfall was poor in a particular year, the resultant Droughts caused major short falls in production and occasional famines.

Even today majority of peoples depends upon agriculture nearly 58% this shows that back bone of Indian economy and agriculture sector is main contribution to GDP. Agriculture depends on rainfall but to increase the agricultural productivity rainfall and monsoon must be helpful to it, in case if it is adverse it would be effect on the production and productivity, in that time irrigation facility is very much helpful to reduce the gambling and uncertainty in agricultural production. Reservoir irrigation is one of the important irrigation projects in the

ISSN PRINT 2319 1775 Online 2320 7876
 UGC CARE Listed (Group -I) Journal Volume 12, Iss 01, 2023

Hassan district this dam providing irrigation facility through canals about 52% of the agriculture land in Hassan. After the construction of this dam farmer are leading good living condition and also helpful for cool environment in study area. If irrigation facility can be extended to 100% then only purpose of construction of dam will be fulfilled.

After the independent so many dams and irrigation projects are completed. In that situation net irrigated area also increased, when this dams constructed to provide irrigation facility to expansion of agricultural activity and also provide the one of important inputs in the agriculture. Any how irrigation is very essential for all farmers, because increasing agriculture outputs, food production, poverty alleviation, increasing the export, create the more employment opportunity, increasing income and saving, increasing production, multiple crops growing, increasing standard of living and increasing fertility of soil. When the irrigation facility is providing to improve agriculture production and productivity and also grow the multiple crop yearly and highly involved in agricultural activities.

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