

**ROLE OF TANK IRRIGATION ON AGRICULTURE DEVELOPMENT – A SPECIAL  
REFERANCE TO SHIVAMOGGA DISTRICT IN KARNATAKA**

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**Abstract**

In India irrigation is vital because it not only acts as a protective factor but also ensures stability and consistency in production. This is in the context of the fact that agriculture is big gamble in monsoon affecting productivity. With the increased application of irrigation water there is substantial increase farm output as well as income of the farmer.

Agriculture is the principal occupation of the country. In Karnataka, more than two-third of the state's population is depending directly on agriculture and allied activities and most of the industries are depending on agriculture. Nearly 40 percent of the state's national income is derived from agriculture, till the end of 19<sup>th</sup> century; agriculture was dependent mainly on vagaries of monsoon. With inception of 20<sup>th</sup> century, the eco-system was disturbed due to denudation of forests to feed the ever growing industries and population of the country, resulting increased uncertainty in monsoon and uneven of its spreading. To mitigate the uncertainly of the monsoon in agriculture protective irrigation appeared to be the solution, especially since the present century. Development of agriculture is dependent on assured and timely supply of water, which has been possible through protective irrigation. The frequent droughts resulted in the beginning of the century which caused heavy loss in agricultural production, stressed the need for protective irrigation on large scale. : Till the end of 10<sup>th</sup> century only minor irrigation works like tanks, pick-ups, wells etc., were the main sources of water to agriculture, livestock and for domestic use. But its importance was not realized till the beginning of the present century. Before the 20<sup>th</sup> century there was no major and medium irrigation projects that which were undertaken, as no need for such works was felt due to sufficient rainfall.

Water is normally supplied by the nature in the form of rain. No artificial application is required, if it is adequate to meet the requirement of crops and occurs at the times whenever it required. For example, the rain as it falls naturally in the requirements particularly of all the crops”. But it is not the case in several parts of the world. The moisture available in the soil either from the rainfall or groundwater will generally not be sufficient to meet the requirement of plants. This deficiency occurs either for the entire crop season or for only a part of the season. It becomes necessary to meet the deficiency by adding water artificially. “This artificial application of water to supplement the naturally available moisture in the Root-Zone of the soil for the purpose of agricultural production is known as irrigation.

## INTRODUCTION

In India, irrigation is vital because it not only acts as a protective factor but also ensures stability and consistency in agriculture production. Agriculture depends on the vagaries of monsoon affecting productivity. With the increased application of irrigation water there is a substantial increase in farm output as well as the income of the farmer.

Tank irrigation is an old and well established practice in the form of earthen embankments and small reservoirs across small streams, found extensively in the semi-arid regions of India. They generally have small storage capacity. These tanks have differing uses for example drinking water, water for livestock, etc., however they are mainly constructed for irrigation purpose. The rulers of India in general and Karnataka in particular Rajas, Maharajas, Palegars, Nayakas and Landlords build number of tanks. At present there are about 2 lakh of tanks spread all over the country which have been providing various benefits to farmers and accommodating to rare species. The Shivamogga district possesses 456 tanks.

In a country like India where agriculture is a perpetual gamble with the monsoon, irrigation acts as a protective and stabilizing factor as well as a productive input. Irrigation enhances the income of landowners by providing with an assured source of income from an income – guarantying asset, such as land and irrigation it helps them to build up capital gains. The value of wetland is many times, more than that of dry land investment in irrigation leads to the conversion of dry land into wetland. At micro level, it provides security against the vagaries of rainfall, prevents crop failures and enables the country to get higher yield per acre. Some time it also helps the farmer to grow a couple of crops in a year and thus increase the

productivity of land. Besides, these benefits irrigation generates employment facilities, adaption of new technology and supports many agro based industries.

In fact, water is a scarce resource, it should be utilized economically and efficiently. Investment in irrigation can maximize benefits only when it is made in the right kind of irrigation at the right time. The relative importance of various modes-canal, tanks, wells and others depends upon the pygeography and climate of a region.

The major irrigation projects require huge amount of capital investment and long gestation period to provide benefits to the farmers. Whereas the Minor Irrigation projects need, low capital and they yield quick results.

In the most parts of the central and the southern India digging of well is highly difficult job, due to the existence of rocky layer in the earthen crust. Besides, in the most parts of this area, water table falls too deep in the summer season, therefore even with machine a farmer cannot get sources of irrigation, due to fall in the table water. Again digging well too deep is highly expensive to the poor farmers. Therefore, in these areas farmers may construct a tank with the mutual help. Besides, the water management and supply if rests in the hands of farmers. Therefore, farmers have to utilize optimally available water resource without waste. Given this basic idea the tank irrigation in India have occupied predominant role in Indian agriculture.

### **Need for Study**

The present research work is to investigate the impact of Tank irrigation on agriculture development and income of the farmers in Shivamogga District. Shivamogga district is an agricultural belt with wide-spread rural economy, with the development of huge amount of recourses and support from Government. The researcher also proposes to study and evaluate the operational efficiency of the use of the tank irrigation in increasing agricultural productivity in the district. Agriculture is the main economic activity of our people. It is also true of Karnataka. Although the income contribution of agriculture to GDP has declined considerably over the years, its importance cannot be undermined in terms of creation of employment and provision of livelihood. Against this background, it is essential to examine how use of tank irrigation has

promoted development of agriculture and allied activities in Karnataka with special reference to Shivamogga district. The researcher has selected Shivamogga district as the study area for the proposed research work. The development of this district requires the prosperity of agriculture and allied activities. Therefore, the proposed research study focuses on the significance of use of tank irrigation in the district in realizing the objectives of increased productivity and better land use. At present, there are virtually no studies on the economics of tank irrigation in Shivamogga district. The present study is an attempt to fill this research gap.

#### TANK IRRIGATION IN INDIA –AN OVERVIEW

In India Agriculture is predominant occupation till today. However, except the eastern concerns and the coastal area. Most parts of India suffer from the deficiency of moisture, due to unequal distribution of rainfall, in certain parts, although soil is fertile, but rainfall is inadequate and scanty for tropical agriculture that is practiced in the subcontinent. In certain regions with normally better rainfall, wide fluctuations from year to year have resulted in terrible famines in the history. Tanks, which are small reservoirs usually fed by runoff water is a common technique in geologically and climatic suitable portions of India's such reservoirs are built in a variety of sizes, and they command varying areas for irrigation depending upon the different possibilities which are presented by the terrain and rainfall.

Taking into account of role of tank irrigation in India, as a backdrop to over thesis, this concept explains need for tank irrigation, history of tank irrigation, growth of tank irrigation, development of irrigation through plans and development of irrigation potential and utilization though plan period.

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### IMPORTANCE OF TANK IRRIGATION

At present large part of the country in the states of Karnataka, Maharashtra, Andhra Pradesh, Rajasthan, Gujarat and parts few other states are facing a severe drought, states like Karnataka, Rajasthan and parts of few other state are worst affected due to low and unequal distribution of rainfall. In these areas the available runoff water may be stored, by constructing tanks and may be used for irrigation. Which enhance the productivity of land.

The available major irrigation projects are unable to provide irrigation benefits to whole cultivable land of the sub-continent, because of topographic variations of heights of mountains, hills, depth of valleys and flow of rivers. The flow of rivers stops, the projected canals to end their itself. Because, to pass the canal across the river. It requires huge amount to construct a tunnels over the river. Therefore, tank irrigation is convenient it may be constructed in any parts where seasonal water runoff is available on the lands.

In India, other than the rivers originated in Himalayas range, all others are rain fed rivers and seasonal in their flowing capacity Therefore, the dams constructed on these rivers may not supply the sufficient water to large parts. Besides, these projects face a problem of shortage of water in their reservoir in summer days. Therefore, they cannot cover large parts of cultivable land. Again the states cannot increase the height of the existing projects, if it does so that affects the next states. For example, The Almatti dam controversy. The Karnataka state wanted to increase the ongoing project height at 153 meters. The Tamil Nadu and Andhra Pradesh may not get sufficient water for its storage. Therefore, the major projects, which located on these rivers, cannot cover large part of cultivable land. Due to the shortage of water in these

areas, tank irrigation is suitable mode of irrigation, which requires low amount of investment for construction.

In most parts of the central, southern India and western India digging of well is highly difficult job. Because, of existence rocky layers in the earth. Besides, in the most part of these areas water table fall too deep in the summer season. Therefore, even with the help machine also farmer cannot get a suitable source of irrigation due to low water table. Again digging a well into too deep is highly expensive to the poor farmers. Therefore, in these areas farmer may construct a tank or rich landlords may construct a tank for the use of villagers and even sometimes the village residents may construct the tank with the co-operation of their village residents or sometimes along with their neighbor village inhabitant and they may get financial assistance for such works by the governments. Moreover, it is very convenient to the farmers to reap the benefits of such projects.

Generally, the management of tank is rest in the hands of farmers. They can manage the available water resources efficiently, by using that according to their needs. In case of major project management rest in the hands of government recruited officer but unfortunately they do not take proper interest in their assigned duties. Therefore, large amount of resources are wasted in such a way that some subordinates they open the gate of dams and water, flows continuously through the big as well as small canals, large proportion of water is wasted. Besides, a continuous flow of water in the field canal causes to the water lagging water lagging, defined by Prof. Brij Narayan “as the rise in the level of the sub soil water which renders land unfit for cultivation therefore that distort the productivity of soil”.

The Indian Irrigation Commission 1972 pointed out that the tank irrigation may successfully solve the problem of the drought areas farmers. Therefore, in India large parts of the southern states have been facing the drought problem. By constructing tanks can solve the water difficulties of farmers and provide them an opportunity to actively participate in new agricultural strategy and reap the benefits of high yielding variety seeds, use of chemical fertilizers, pesticides and modern machines for various agricultural operation, that enhances high income and makes improvements in the standard of living.

## IRRIGATION IN KARNATAKA-AN OVERVIEW

In India nothing moves unless agriculture moves and no input for agriculture is more important than water is a basic input. Agricultural output and its efficiency, to a great extent; depend upon inputs applied and the methods adopted. However, the recent attempts for modernizations in the field of agriculture have been largely restrained by the availability of inadequate water. Major portion of India's land remains thirsty for need of irrigation facilities. The natural supply through rainfall at times may not be inadequate, but it is generally unevenly distributed geographically and also over time. "The growing population and fixed land surface limit the scope for bringing more and more land under cultivation. To feed teeming population, more production is to be got out of the existing area and for that water resource are to be used at most judiciously and economically".

### Source-Wise Net Irrigated Area in Karnataka

Methods of Irrigation	Area (in Ha)	Percentage
Canals	952021	38.20
Tanks	254965	10.23
Wells	478818	19.21
Bore wells	449674	18.04
Lift Irrigation	98215	3.94
Other sources	25817	10.36
Total	2491870	100.00

Source: Government of Karnataka Directorate of Economics and Statistics, (2005-2006) Bangalore. Karnataka at a Glance. P.9

In the above table, Canals are the major source of irrigation in state. The area irrigated by canals is 952021 hectares (38.20) percent. Tanks irrigate about 254965 hectares (10.23 percent). 478818 hectares (19.21 percent) of land is irrigated by wells. The area irrigated by bore wells is about 449674 hectares

(18.04 percent). The area irrigated by the lift irrigation is 96215 (3.94 percent). From other sources it was 25817 hectares (10.36 percent) as shown in table.

### **Irrigation Development**

The Bhadra dam (1917) and the Anjanapur dam were the two major irrigation works started in the first quarter of the 20th century. The important projects like Vani Vilas Sagar across river Vedavathi, Krishna rajaSagar(1911) across river Cauvery were initiated. Krishna rajaSagar, a major irrigation project completed in 1933 was recommended by the first irrigation commission to store 1218 MCUM of water to irrigate 20,200 hectares. To begin with major Sankey was one of the first engineer of old Mysore State who devoted his attention for the systematic development of irrigation in the state. During the first half of the present century, Sir M. Visveswaraiiah, an outstanding Engineer-Statesman of Mysore state, was responsible for the establishment of many medium and major irrigation projects not only in Karnataka but also in different parts of the country. "He was an Architect of Krishna rajaSagar (KRS) and TippagondanaHalli reservoir and was also an architect and adviser to many other projects of the country. Government of India established Central Board of Irrigation for the systematic development of irrigation in the country in the year 1927. In 1949 the Central Board of irrigation was renamed as Central Board of Irrigation and Power. The progress of irrigation development was steady due to economic depressions of 1930 and the second war. In 1934 a hydraulic research station was set up at Krishna rajsagar. The research studies of this station were useful in the construction of the world's biggest valuable siphons at Hirebhaskar Dam across the river Sharavathi for power generation. The station was renamed as Mysore Engineering Research station after its extension of different fields. Subsequently, its name was changed as Karnataka Engineering Research station in 1974. The Research station is involved in the fields of design of structure based on physical tests on Hydraulic models of dams, weirs, sluices, lining of canals, soil analysis for engineering properties etc. In the post-war era much importance was given to irrigation development and several major and medium irrigation projects were initiated for the reconstruction of the economy and to augment agricultural production to meet the demand for food from ever growing population. During pre-Independence period about 10 major and medium irrigation projects such as Anjanapura, Bhadra, Kanva,

Marconahalli, Nugu, Ambigol, Tunga, Byramangala, Kolchi, Raoli, Bunda, Tungabhadra and Ghataprabha were started. “The area irrigated during the pre-independence period was only (6.71 lakh ha) 6 percent of the net area cultivated in the state. There were 25000 tanks in the southern part of the State but the number of tanks was very meager in Hyderabad and Bombay Karnataka.

### SIGNIFICANCE OF TANK IRRIGATION IN KARNATAKA

Tank irrigation service is a low, earthen bund constructed across a shallow valley to hold the rainfall runoff from its catchment area. Tanks may be either isolated or in cascades. “In a cascade, when the upper tank gets filled, the spill over the surplus weir is led into the tanks lower down, one below the other as a cascade until the last tank spills into a drain or a river. Tanks are the main source of irrigation in many parts of India from time immemorial. India experiences extremes of climate within its 329 million hectares of geographical area. Rainfall pattern is neither predictable nor uniform over space and time. The incidence of rainfall is also seasonal, occurring mainly during the south west monsoon (June to September) in most part of the country except the rain shadow areas of the Western Ghats (Steep mountainous range), notably Tamil Nadu. Being confined to a few monsoon months, rainfall behavior is highly erratic. This hydrological characteristic of Indian monsoon necessitated the creation of storage facilities to hold the rain water of the monsoon and utilize the same at a later date. With extraordinary engineering, managerial, and social skills, an extensive system of rain water harvesting structures comprising tanks and ponds had been built and maintained by the people for centuries.

#### **Statement of the Problem**

Irrigation holds the key role in agricultural development. It is one of the important factors for assured crop production. It permits better utilization of all other productive factors and thus, leads not only to increase yields per unit of land but also to stabilize the economic conditions of the farmers. It may be defined as “the application of water by human agency, to assist the growth of crops and grass. Adequate and timely supply of irrigation water to crops is a pre-requisite in the agricultural production process, particularly in the area where the rainfall is scanty and irregular. It is an instrument with which rural transformation and agricultural development is possible.

Tank irrigation is an old and well established earthen embanked from practice machinery and all small reservoirs across small streams, found extensively in the semi-arid regions of Karnataka. They generally have small storage capacity. These tanks have differing in uses for example drinking water, water for livestock's, etc.; however, they are mainly constructed for irrigation purpose. At present there are about two lakhs of tanks which re sores all over the country which have been providing various benefits to farmers and accommodating to rare species. In our study area Shivamogga district the tank irrigation is a leading one which is situated in outral part of Karnataka state (6217 tanks, with net irrigated area of 62,362 hectares).

In fact, water is a scare resource, it should be utilized economically and efficiently. Investment in irrigation can maximize benefits only when it is made in the right kind of irrigation at the right time. The relative importance of various modes canals, tanks, wells and others depends upon the phygeograpy and climate of region. The major irrigation projects require huge amount of capital investment and long gestation period to provide benefit to the farmers. Whereas the minor irrigation projects need, low capital and they yield quick results. Taking into consideration of this fact, the present study "Tank irrigation and Agricultural Development in Karnataka.

#### SIGNIFICANCE OF THE TANK IRRIGATION IN SHIVAMOGGA DISTRICT

Irrigation is a vital life line to stabilize the crop production, especially after introduction of photosensitive, high yielding and short duration crops varieties open up a new vista in the field of agricultural production paving way to multiple cropping through increased cropping intensity. This type of technology requires huge capital investment from farmer's side, unless the facilities are provided to the farmer he can't take a risk to invest in agriculture. Therefore, irrigation is an indispensable input in the agricultural production. It is essential to study the irrigation.

Although, in the recent past decade the Government has been investing a spectacular amount on the multipurpose projects. As for as the minor irrigation projects are concerned the government of Karnataka has been given top priority and therefore, it needs further study.

The tank irrigation which is cheaper and convenient source of irrigation. The percentage of area irrigated by the source has been showing declining trend in the recent past.

Shivamogga district is predominantly a Malnad district and it was noted for heavy rainfall. The rainfall as it comedown to nearly normal level in the past few years. The district having more tanks and as well as spreading more area under tank irrigation. Therefore, it induced to the researcher to conduct and in-depth study on this theme that is tank irrigation and agricultural development by limiting it's study to one district that is Shivamogga.

### **Objectives of the Study**

Keeping these issues in mind the present study is undertaken with the following specific objectives.

1. To examine the role of tank irrigation in agricultural development in Karnataka.
2. To analyze the impact of tank irrigation on socio-economic condition of the farmers in the study area.

### **Hypothesis**

The following hypothesis has been inferred based on the objectives ad tested them in the present study.

1. Tank irrigation has been increasing the income of the farmers.
2. Tank irrigation has influencing on irrigated and un-irrigated households in increasing employment in all the seasons.

### **Methodology:**

The study is based on both the primary and the secondary data sources. The secondary data has been collected from the reports of department of irrigation Government of India; the department of Minor irrigation, Government of Karnataka, Collected and tabulated, normal statistical tools has been applied to draw inferences. A detailed questionnaire has been adopted for the purpose of data collection.

The micro level field investigation has been conducted to collect the primary data. The selected sample respondents; various important entries have been made in the questioner to collect the information regarding the socio-economic condition of the farmers.

### **Limitations of the study**

The present research work is confined to the utilization of tank irrigation during the period from 2010 to 2016 (for secondary source). The study is confined to Shivamogga district alone. The research study is based on the analysis of primary and secondary data in support of the research work. Farmers do not maintain farm management records. The information given by the respondents may suffer from exaggeration or under-statement. Besides, data on input, output, employment and income are subject to errors of recall. Intact, some respondents were not able to furnish all details of cropping pattern, employment pattern and cost of cultivation, these, however, did not seriously affect the analysis of the impact of tank irrigation on agricultural development. Primary data has been used only to limited extent wherever it is found absolutely essential for want of time and resources at the disposal of the researcher, limited statistical tools are used to analyze data

### **CONCLUSION**

The importance of Tank irrigation in the economic development has been well recognized by various empirical studies. Impact of Tank irrigation, of agriculture was instrumental in enhancing food security and mitigating poverty in developing countries. Tank irrigation provided opportunities to increase net irrigated area leading to increase in cropping intensity and productivity. These studies have shown that there have been considerable changes in the cropping pattern, cropping intensity and income of the farmers on account of irrigation. In addition, to this, irrigation has also helped in increasing productivity of land, employment of labor and gross returns. Irrigation has resulted in an increase in level of input: has resulted in higher per hectare yield on the tank irrigation of agriculture farms as compared with the dry farms.

Before, the independence the tank irrigation as considers to be best system. If we read the history of tank irrigation in India, it is clear that the tank where the only sources of irrigation. These aspects may be examined in the context of almost all states in the country.

Manmade reservoirs, popularly known as tanks have formed the backbone of agriculture in the dry reason of our country, especially in south India and part of Rajasthan, Gujarat, Madhya Pradesh and Maharashtra, most of the tanks are multipurpose tank irrigation, drinking water and others. It is evident on the explanation given above that over the years it is the dependence of forming community on Tank water irrigation system. Since water is a scarce factor it has to be utilize with greatest economy and maximum output as the goal of widening the base of ground under water irrigation system.

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