

ORIGINAL ARTICLE



**HISTORICAL DEVELOPMENT OF IRRIGATION IN KARNATAKA
AND IS A SOURCE OF LIVELY-HOOD**

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ABSTRACT :

Irrigation network is an important indicator of the level of agricultural development. This helps in improving the productivity of agriculture, intensification of land utilization and higher employment opportunities with longer duration. This in turn will improve rural income and reduce the level of poverty. Agriculture is the main supporter of most of the people in India as well in Karnataka and water is the most important input in the process of crop production.

Irrigation has always been a central pillar of agricultural development. It is proven that the development of agricultural sector and prosperity is possible only with the help of irrigation and water availability. Irrigation projects contribute directly and indirectly in enhancing the quality of the life of the rural people.

Irrigation and other technologies are accepted as the basic of economic progress and is key driver for growth and transformation. Modernization of agricultural technology is complementary and supplementary for rural development. Irrigation and other technologies are accepted as the basic of economic progress and is key driver for growth and transformation.

KEYWORDS: agricultural development, higher employment opportunities, agricultural technology.

INTRODUCTION:

India as well Karnataka is predominantly an agriculturally based economy. Water and land are amongst the most important natural resources and the basic to agriculture. Water is essential for the sustenance of life in all its forms and integral part of the eco- system. Sustaining and being sustained by it is a basic requirement for livelihoods and necessary inputs for economic activity.

Empirical evidences shows that the amplification of better economy, health, life conditions and welfare of the farmers is directly associated with the agricultural development through irrigation. It has considerable potential in contributing to higher income, employment generation and elimination of poverty and drought conditions. Agriculture is the main supporter of most of the people in India as well in Karnataka.

Agriculture is the backbone as well as the heart of rural community and is mainstay of Indian economy and same is true to economy of Karnataka. Hence, it is not merely an occupation but a way of life. In Karnataka a significant segment of population particularly the rural depends on natural resources for subsistence and livelihood and for them agriculture is the source of livelihood and irrigation is the contributory factor for agriculture development along with modern technologies.

The success of agriculture depends upon the adequacy and timely occurrence of rainfall. But rainfall in India and Karnataka is often scanty and uneven. Rain is confined to a few months in a year and it varies from year to year and region to region which makes large parts vulnerable to drought and famine. Boosting agricultural growth is essential for inclusive growth because this sector sustains livelihood for majority of the population. Agriculture development mainly depends on prerequisite factors like soil, water, climate, and other related technologies. Thus, relationship between natural resources and development has always been recognized as an important element in economic growth.

Several revolutions in agriculture have taken place to boost the agriculture sector. These include the Green Revolution, Blue Revolution, White Revolution, Yellow Revolution, Revolution in Bio-Technology, Machine technology and ICT etc. The role of green revolution such as irrigation technology and machine technology are caused for speedy development in agriculture field.

Water for agriculture development is a basic ingredient. When irrigation is introduced into an established agricultural region the existing pattern of agriculture has greatly influenced. Thus; modernization of agricultural technology is complementary and supplementary for rural development. German economist; Schumacher said technology as a motor of development and an instrument of social change. Agriculture provides significant support for economic growth and social transformation.

Agriculture in India and Karnataka has been characterized by many revolutions and that change the very face of agricultural sector. The green revolution is an important milestone in agriculture sector and one thing is common in this revolution was the use of 'Technology'. Technology is the prime mover which helps to shape society.

Economists consider that; the four basic elements of an economy are land, labor, capital, and entrepreneurship. Sociologists and Anthropologists very often consider; technology as a fifth element. Technology is essentially a society's pool of knowledge used for production. The system of transfer of technology from research stations to farming communities; has played a crucial role in modernizing the agriculture sector. Thus, irrigation and allied technologies together contribute to change the face of land and life of the farmers.

Agriculture modernization is the blend of four technologies viz. Hydro-technology, Chemical technology, Machine technology and Bio-technology. Thus, science and technology

are the basis of economic progress. This technology really empowers the people to improve the quality of life and enables rural people to become self-reliant. It contributes to improvement in socio-economic life of the people.

Water and other agricultural technologies are the magical properties of turning the desert into smiling fields. It may be considered, what education is for man, irrigation and other related technologies are for land and agriculture development. It is often said that nothing moves in the Indian society unless agriculture and it is truism to state that agriculture cannot move unless water into land. Development is essentially a 20th century concept which is emerged as an important concern in the 1950's with the beginning of the era of five-year plans. Development can be defined as all processes that bring about improvement in human life enhancing environmental and healthy living.

OBJECTIVES OF THE STUDY:

- 1) To understand the significance of Irrigation in drought prone region of Karnataka
- 2) To examine the extent & use of new Technologies in agricultural operations
- 3) To evaluate the socio-economic development of the farmers
- 4) To know the sources of development of Irrigation in Karnataka
- 5) To explore the historical development of irrigation in karnataka

HISTORICAL DEVELOPMENT OF IRRIGATION IN KARNATAKA:

Development of India largely depends upon the development of rural societies. During the struggle for India's independence Gandhiji repeatedly said that the development of the country and its prosperity depends on its villages. He advocated all through his life that all our efforts should be directed towards the development of our villages.

Since agriculture has been the backbone of rural society; Government of India and Karnataka has given top priority to the development of agriculture through the provision of irrigation and other facilities in various five-year plans. During last several decades, anthropologists and sociologists from east and west have shown that Indian villages too are changing in a positive direction steadily owing to modernization, industrialization, westernization, and globalization.

There is no doubt that green revolution transformed the country and state from 'food deficient' to 'self-sufficient'.

Karnataka is the second largest drought hit region next to Rajasthan. Water projects being presented a panacea for rural agricultural development in the Northern part of drought regions of Karnataka. Karnataka is self-sufficient in food and hunger free state at major extent.

Hence, the present study is undertaken to investigate the socio-economic changes among the rural farmers in the irrigation setup. It is an attempt to understand the improvement among the Indian farmers.

HISTORY AND DEVELOPMENT OF IRRIGATION IN KARNATAKA

Karnataka is the 8th largest state in the country, located in Deccan Plateau. The total geographical area of the state is 1, 90, 49,836 hectares accounting for 6.3 percentage of the total land area of the country. A total of 1, 23,100 km² of land is cultivated in the state constituting 64.6% of the total geographical area of Karnataka. As of 2015-16, only 37.42 lakh hectares or 31 percent of the state's cultivable land was irrigated.

According to census 2011 the population of Karnataka has 6.11 crores. The climate of Karnataka state varies from very humid rainy monsoon climate in the west coast the ghats and malnad areas to semi-arid warm dry climate on the east. There are too many variations in the rainfall with higher amounts in the Western Ghats and reducing towards the eastern plains along the coastal Dakshina kannada district and the annual normal rainfall is about 400 mm.

Historically; civilizations have been dependent on development of irrigated agriculture. In Karnataka references of various types of water harvesting structures can be found even in our ancient literature. Tanks were the main source of irrigation in olden days. Arakere the half tanks, Volagere the mini tanks were used for irrigation. Katte is other kind of water bodies which were constructed by erecting artificial bunds.

The Kolla or kunte are natural ponds where rain water was used to get collected. Halla are mainstreams while kolla are ravine areas from where rainwater was Chanalized for irrigation purpose. The 'Done' or 'Sone' are water formations in the rocks or hills (Bagchi, 1995). In ancient Karnataka during 6th century Ganga King Durvinath constructed many tanks resembling oceans. The kings belong to Gangamat had constructed tanks as large as sea. Durvinath was the predominant of all the kings of the dynasty. The Ballaray samudra, Bharamsagar and Deveraya samudra etc., have been the major historical evidences.

Kadamba King Chuta Nagari of Banavasi constructed tanks at Chandravali and Talagunda. He believed that the construction of tanks and canals was a meritorious work and it should be undertaken with the same interest with which temples were constructed. The Ballanarayana Samudra, Bharam Sagar, Devaraya Samudra etc., are some of the tanks constructed by the ancient kings, which exist even today.

The Nagawarma II in his Kannada dictionary (lexicon) 'Abhidana Vastukosh' (1042 AD) mentions about two types of lands such as Devamatrika land; the land which depends on rainfall and Nadimatrika land; which depend upon irrigation. The records of Yalundar taluk of 1960 AD, explain the sluices and canals of Cauvery. Chola Empire (985-1205 AD) built a number of tanks in Karnataka like Tangunda and Chikkaballapur tanks along with other 38080 tanks that were constructed throughout the state.

Among the big ones Ramasagara, Vyasa samudra, Masur- madakere, Sulekere and Ayankere are worth mentioning. Sulekere is the largest tank having more than 64 kmts, circumferences. In the Vijaynagar kingdom ; Harihar – I in 1336 AD and Bukka-I in 1355 to 1377 AD were the great propagator of irrigation works. The most famous of these is the Ananthrajsagar or Porumamilla tank of the Luddapah district, which took many years to get completed. Shrikrishnadevraya was the most remarkable king and is well remembered for his noted works at Korragal. He constructed large dams and connecting channels in 1521 AD.

Vijayanagar channel is one of the ancient and noteworthy irrigation works constructed during 1600 AD. Kaveri Delta Scheme (1836 to 1838 AD) had 765 kmts., long course along with Deccan peninsula with 72520 sq. kmts., of total drainage area near Shrirangam. Krishna Delta Scheme (1851 AD) a big masonry dam was constructed across the Krishna river to harness more irrigation water and was 1021 meters long.

Hemawati and Laxmanteertha are the noted creations of the ancient rulers. The records of Shikaripura reveals the construction of Mahasethuve across the river Varada. Bangara Doddi canal constructed by Mysore King Kanteerava Narasimharaja is a well-known meritorious work. Thus, the several kings belonging to different dynasties had constructed several tanks during their respective periods.

Table- 1
Ponds Constructed and Renovated by the Ancient Kings

Dynasties	Constructed and renovated ponds	
	Ponds & Tanks constructed	Ponds renovated
Gangas	33	7
Kadambas	7	--
Chalukyas	27	2
Cholas	20	5
Rastrakutas	4	1
Hoysalas	215	36
Yadavas	8	1
Kings of Vijaynagar	77	19
Others	153	28
Total	634	99

Source: Govindaiah, T. "Karnataka Neeravari Arthashastra--" Samaj Viznan Samshodhana Samsthe, Banglore, 1994, P.11.

The above table; depicts the ponds constructed and renovated by the ancient kings in various parts of Karnataka. The greater number of tanks and ponds renovated and constructed during the rule of Hoyasalas i.e. about 215 ponds constructed and 36 were renovated followed by kings of Vijay nagar i.e.77 constructed and 19 were renovated. The very less number of tanks constructed and renovated are in the regime of Kadambas and Rastrakutas.

Apart from the kings who constructed and renovated a good number of tanks and ponds. There are other nemours ponds and dams which are constructed after independence. The Cauvery channels were completed by the end of 19th century. The 20th century marked a milestone in the history of irrigation development. It has witnessed the birth of several major and medium irrigation projects in India.

The Bhadra and Anjanapur two major irrigation works started in 20th century. The important projects like Vani-Vilas Sagar across the river Vedavati, Krishnaraj Sagar across river Cauvery were initiated. Sir M.Visveshwari an out-standing engineer and statesman of Mysore were responsible for the establishment of many major and medium irrigation projects.

He was an architect of Krishna Raj Sagar and Tippagondana reservoirs and also advisor to many other projects across the nation. Remarkable work in the field of irrigation development could be traced in the later middle of the 20th century, particularly during the Five-Year Plans.

Here are seven river systems in Karnataka with their tributaries drain in the state. They are given in Table 1.2.

Table 1.2
River Systems of Karnataka

Sr. No.	River systems	Drainage (000' Sq. Kmts)	Area (%)
1	Godavari	4.43	2.33
2	Krishna	111.74	58.66
3	Cauvery	34.27	17.99
4	North pennar	6.94	3.64
5	South pennar	3.76	1.97
6	Palar	2.97	1.56
7	West flowing rivers	26.39	13.85
	Total	190.50	100.00

Source: "Irrigation in Karnataka"- National Information Center. (NIC). Secretary, Dept. of irrigation Bangalore.

Table-1.3
LAND USE AND IRRIGATION IN KARNATAKA

Table 1.3 depicts the land use pattern and irrigation in Karnataka (Area in lakh ha)

Sl.No	Classification	Years				
		2010-2011	2011-2012	2012-2013	2013-2014	2014-2015
1	Total Geographical Area	90.50				
2	Net Area Sown	105.23	99.41	97.93	99.23	101.34
3	Area sown more than once	25.40	21.18	19.55	23.44	21.13
4	Total cropped area	130.62	120.59	117.48	122.57	122.47
5	Area under Agricultural Crops	111.62	101.23	98.74	103.94	102.26
6	Cropping Intensity (%)	124	121	120	124	121
7	Net Irrigated Area	34.90	34.40	34.21	35.56	36.59
8	Net Irrigated Area in %	33	35	35	36	36
9	Gross Irrigated Area	42.79	31.37	40.07	41.12	41.86
10	Gross Irrigated Area in %	33	34	34	34	34
11	Cropping Intensity in Irrigated Areas	123	120	117	116	114

Source: Karnataka state Dept. of Agriculture Bangalore ASCR Of DE & S 2014-15

About 2/3rd of the state receives less than 700 mm. of annual rainfall. Therefore, state and central Govt. has giving mounting importance for irrigation to take-up projects to ensure stuffiest water to the land. Development and prosperity of the state is intricately and inseparably related to the management of scarce water resource; it's adequate use in quantity at right place and regular intervals. The important sources of irrigation in Karnataka are wells, tanks, bore-wells, tube-wells and canals.

Table -1.4
SOURCE WISE IRRIGATION AREA IN KARNATAKA

(In lakh ha.)

Sources	Gross	Percentage	Net	Percentage
Canals	14,73,177 ha.	14.73%	11,78,232 ha.	11.78%
Tanks	1,96,220 ha.	1.96%	1,77,762 ha.	1.78%
Wells	4,74,951 ha.	4.75%	4,23,411 ha.	4.23%
Tube /bore wells	15,39,833 ha.	15.40%	12,77,637 ha	12.78%
Lift irrigation	1,16,596 ha.	1.17%	90,325 ha	0.90%
Other sources	3,36,087 ha.	3.36%	2,93,058 ha	2.93%
Total	41,36,864 ha.	41.37%	34,4,0425 ha	34.40%

Source: Annual season and crop statistics report 2011-12 of DE & S Bangalore.

Table: 1.4 reveals that, accordingly the year 2011-12 the different sources of irrigation in Karnataka by gross and net to the total is given in the above table. The major sources of irrigation in Karnataka is tube and bore wells. It occupies first place i.e. it irrigates 15,39,833 lakh ha. gross and 12,7.7637 lakh ha. net (15.40 % gross and 12.78% net), followed by canals irrigation i.e.14,73,177 lakh ha. gross and 11,78,232 lakh ha. net (14.73% gross and 11.73% net) irrigated area. The share of wells in the irrigation is third place i.e. 4,74,951 lakh ha. in gross and 4,23,411 is net (7.45% gross and 4.23% net) irrigation. It shows that major sources of irrigation are tube wells, canals and wells.

However the more number of canals in district wise are - Mysore and Mandya consists 33 and 22 in number respectively, more number of dams and reservoirs are in Belgaum district. Hasan, Ramanagar and Shivamoga are each 5 in number and number of tanks are more in tumakur district i.e. 1,642, Shivamoga 5,962, Haveri 1,904, Hasan 6,066, Uttar kannada 2,357. Tube wells and bore wells are more in Tumakuru 1,18,750, Kolar 81,837, Chikkamagaluru 49,727, Hasan 40,920, Ramanagar 38,059 in number. In related to wells; Belgaum occupies first place and the number of wells are 62,462, Bijapur 42,266, Dakshina kannada 40,057 and Tumakuru district 39,556 in numbers. So far lift irrigation is concerned 6,504 in Belgaum district, 4,470 in Raichur district, shivamoga 4,134 and Bellary district only 3,597 in number.

Table-1.5
TRENDS OF IRRIGATION AREA IN KARNATAKA

(In lakh ha.)				
Year	Net area sown	Gross cropped area	Gross area irrigated	Net cropped Area
1960-61	10228	10588	NA	NA
1970-71	10248	10887	1355	12.45
1980-81	9899	10660	1676	15.72
1990-91	10381	11759	2598	22.09
2000-01	10410	12284	3271	26.63
2011-12	10404	12873	4096	31.82
2012-13	10523	13062	4278	32.75

Source: Karnataka at glance, Directorate of economics and statistics-2013-14

The above table 1.7 reveals that there has been a gradual increase in the gross irrigated area in the state. The gross irrigated area has increased slowly from 1980-91 onwards that is 15.72 percent to 32.75 percent in the year 2012-13.

Table 1.5 depicts the district wise sources of irrigation in Karnataka. Source wise irrigation from four districts; Belgaum stands first and its gross irrigated area is 5,89,508 and net irrigated area 5,30,758 hectares with all the sources followed by Bagalkot i.e. gross area is 2,98,398 and net irrigated area is 2,81,220 hectares. Gadag and Dharwad occupies 3rd and 4th place viz., 1,00,004 ha. and 43,113 ha., respectively.

CONCLUSION

Since, agriculture in Karnataka has been characterized by many revolutions. But one thing is common in this revolution that; it was the use of 'technology'. Technology is the prime mover, which helps to shape society. The green revolution is an important milestone in this sector. To bring changes in agricultural sector many irrigation projects are working. Irrigation projects being presented a panacea for rural agricultural development.

The prospects of agriculture and agricultural production depend on inputs like water improved seeds, pesticides, and fertilizers. Despite the availability of these inputs sometimes the yield may be low. It is due to lack of knowledge about watering, agricultural operations, and mismanagement of agriculture related activities.

Though there are the problems connected with irrigation technology it means there is no need to stop irrigating the lands. We need irrigation, we need fertilizers, we need new technology and we need better production. There are some mistakes with way in these schemes are implemented and technology is using. Therefore, attitudes of the farmers, irrigation authorities and government that should be set right and ecofriendly, technologies are the best ways and means to overcome from the problems.

We should treat water and land as Gold. Its judicious and proper use is strongly recommended in all sectors. And therefore, micro irrigation and biotechnology are the latest and efficient method of water utilization and protection of environment. Then only there may be the hopes to conserve water and protect the environment and ultimately help usher in better socio-economic future.

In this direction prospects of irrigation project is analyzed keeping in view of farmers' opinion and suggestions. Though; irrigation has acted as a prime mover in the agriculture development by way of enhancing and sustainability of crop production. Government has also made huge investment for the development of irrigation projects. However, there are number of issues that are the cause of concern.

The United Nations message is loud and clear "Water and land is scarce resource to be managed and protected". Therefore, it is moral responsibility of each one to protect our natural resources for ourselves and for future generations and to see that the benefits of irrigation should reach to all the classes. Water belongs to whole mankind; therefore, joint social efforts should be needed. Water is the gift given by the nature. We need to use it judiciously and sensibly for our own sake and for the generation to come.

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