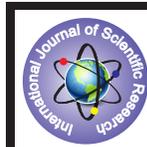


## The Study of Impacts of Irrigation on Socio-Economical Status Around Krs Dam, India



### Environmental Science

**KEYWORDS :** Agriculture, Irrigation land, Socio-Economic status, KRS, Cauvery river

**Appaji Gowda**

Department of Studies in Anthropology, University of Mysore, Manasagangothri, Mysuru-570 006, India

**S.Srikantaswamy**

Department of Studies in Environmental Science, University of Mysore, Manasagangothri, Mysuru-570 006, India

**Rajashekar Reddy**

Department of Studies in Anthropology, University of Mysore, Manasagangothri, Mysuru-570 006, India

**D.Shiva Kumar**

Department of Studies in Environmental Science, University of Mysore, Manasagangothri, Mysuru-570 006, India

### ABSTRACT

*India has made impressive strides on the agricultural front during the last three decades. Much of the credit for this success should go to the several million small farming families that form the backbone of Indian agriculture and economy. Increased agricultural productivity and rapid industrial growth in the recent years have contributed to a significant reduction in poverty level, from 55 percent in 1973 to 26 percent in 1998. Despite the impressive growth and development, India is still home to the largest number of poor people of the world. India will be required to produce more and more from less and less land and water resources. Alarming rates of ground water depletion and serious environmental and social problems of some of the major irrigation projects on one hand. In fact irrigation has proved a catalyst of improved agriculture in certain large areas of the country, especially where cash crops are grown. Investment on irrigation leads to multiple benefits both at the micro and at the macro levels. In the present study aim has been made to study socio economic impact of the irrigated area with that of the unirrigated area. There is a large difference in the socio economic status between the two said situations, where in one place, due to irrigation there is economic progress and in other it is static or with little change. However, with this economic change we expect to see a gradual change in the social, cultural and traditional front.*

### INTRODUCTION

India has made impressive strides on the agricultural front during the last three decades. Much of the credit for this success should go to the several million small farming families that form the backbone of Indian agriculture and economy. Policy support, production strategies, public investment in infrastructure, research and extension for crop, livestock and fisheries have significantly helped to increase food production and its availability. Increased agricultural productivity and rapid industrial growth in the recent years have contributed to a significant reduction in poverty level, from 55 percent in 1973 to 26 percent in 1998.

In India, as elsewhere in the world, freshwater and freshwater-dependent ecosystems provide a wide range of services for humans, including fish, flood protection, wildlife, etc. (Postel and Carpenter 1997; Revenga *et al.* 2000). To maintain these services, water needs to be allocated to ecosystems, as it is allocated to other users like agriculture, power generation, domestic use and industry. Balancing the requirements of the aquatic environment and other uses is becoming critical in many of the world's river basins as population and associated water demands increase. India is no exception, on the other hand, the assessment of water requirements of freshwater-dependent ecosystems represents a major challenge due to the complexity of physical processes and interactions between the components of the ecosystems.

Rajapurohit and Mabel Koilpillai (1981), looks critically into the two studies by Scarlet Epstein, a Social Anthropologist, on impact of irrigation on rural communities in South India. At the meso-regional level, they set hypothesis, which they hope to test in their future investigation. The main item they set to find solution is first, large scale migration of labors from dry village to nearby town. Secondly, labor migrated from dry to wet village within the region. Thirdly, large scale migration of the labor from outside the region to the wet village. Fourthly, the scheduled cast population always said to be at a disadvantage in the case of the three courses of labour migration Water for Sustainable Food Security.

India will be required to produce more and more from less and less land and water resources. Alarming rates of groundwater depletion and serious environmental and social problems of some of the major irrigation projects on one hand, and the multiple benefits of irrigation water in enhancing production and productivity, food security, poverty alleviation, as mentioned earlier, are well known to be further elaborated here; In India, water availability per capita was over 5000 cubic metres (m<sup>3</sup>) per annum in 1950. It now stands at around 2000 m<sup>3</sup> and is projected to decline to 1500 m<sup>3</sup> by 2025. Further, the quality of available water is deteriorating. Also, there are gross inequalities between basins and geographic regions.

Agriculture is the biggest user of water, accounting for about 80 percent of the water withdrawals. There are pressures for diverting water from agriculture to other sectors. A study has warned that reallocation of water out of agriculture can have a dramatic impact on global food markets. It is projected that availability of water for agricultural use in India may be reduced by 21 percent by 2020, resulting in drop of yields of irrigated crops, especially rice, thus price rise and withdrawal of food from poor masses. Policy reforms are needed from now to avoid the negative developments in the years to come. These reforms may include the establishment of secure water rights to users, the decentralization and privatization of water management functions to appropriate levels, pricing reforms, markets in tradable property rights, and the introduction of appropriate water saving technologies.

Scarlet Epstein T. (1973) explained that, "Impact of irrigation on the economic and social organization of two villages within a regional economy". Further, irrigation on the rural hinterland results in increased productivity, which in-turn encouraged in faster rate of urban expansion offering more and more commercial and employment opportunity. Another most important for villagers in the area was the improved schooling facility provided.

The needs of other sectors for water cannot be ignored. Therefore it is necessary that an integrated water use policy is for-

mulated and judiciously implemented. Several international initiatives on this aspect have been taken in recent years. India should critically examine these initiatives and develop its country specific system for judicious and integrated use and management of water.

In India 70 percent of its population are depending on agricultural sector for livelihood. Agriculture, which began as a source of livelihood in our country became a tradition and a culture and became an inseparable part of our folklore. Once considered as a very sacred work, agriculture was counted the foremost of all work in the society.

In fact irrigation has proved a catalyst of improved agriculture in certain large areas of the country, especially where cash crops are grown. Investment on irrigation leads to multiple benefits both at the micro and at the macro levels. The value of wetlands is considerably more than that of dry land. Investment on irrigation leads to conversion of dry land. At macro level, irrigation provides security against the vagaries of rainfall and prevents crop failures enabling the country to get higher yield. Sometimes it also helps to take two crops from the same field each year and thus increase the productivity of land. Besides these, irrigation helps generating employment, adoption of new technology and also supports many agro-based industries.

Ian Stone (1972) opines that various historical studies on the impact of irrigation on Indian agriculture have pointed out that the availability of water crucially determines the nature of agricultural production. Backwardness in a region may be due to differences in terrain, climate, rainfall and similar other factors. Irrigation in such cases helps a great deal in reducing the disparity. Irrigation is a tool by which land is made useful in both cases; in the drought-prone areas by providing water for the land, and in waterlogged areas by draining water out of the land.

In Socio-economic investigation, reliability of results depends upon an appropriate methodology adopted. It consists of sampling technique used for selecting a representative sample, designing of schedules, collection of information, analysis of data and finally presentation and interpretation of analytical results.

Ramakrishna Reddy (1995) explained that, significance of Indian agricultural economy is not debatable. Here different strategies were adopted from time to time like Co-operative Farming, Intensive Agricultural District Programme (IADP), Green revolution and Integrated Rural Development Programme. Irrigation is said to have direct bearing on agricultural strategies in India. An assured water supply helps increase farm yield and income and facilitates increased capital formation. Irrigation in India performs protective and productive functions where protective irrigation makes the moisture deficiency in soil to ensure the healthy growth of crops and the productive irrigation helps to raise the second and third crop. Irrigation also creates employment in predominant agricultural economy.

In the present study an attempt has been made to study socio economic impact of the irrigated area with that of the un-irrigated area. There is a large difference in the socio economic status between the two said situations, where in one place, due to irrigation there is economic progress and in other it is static or with little change. However, with this economic change we expect to see a gradual change in the social, cultural and traditional front.

Savare (1966) study depicts that the irrigated farm could thus employ almost 5 1/2 times more than human labour and 2 1/2 times more of bullock labour as compared to similar size of dry farm. The growth of employment due to adoption of new technology is considerably higher in unirrigated area. Increase in ir-

rigated area and technology inputs like high yielding variety and fertilizers have lead to increase agricultural output and increase labour utilization. The author mansions that even a successful agricultural production development strategy, however, can only partially absorb the growing agricultural labour force.

Adinarayana (1984) study shows that the increase in the employment of human labour on the irrigated farms is more than one hundred per cent. The increase is not only due to irrigation but also due to inclusion of high proportions of labour intensive non-food grains crops in the cropping pattern of the irrigated farms.

However, the warning about adverse effects of irrigation is timely in the wake of expansion of major irrigation in the country; "irrigation is known to produce water logging and damage to soils by salinization, if not properly handled". The pointed reference to ground water rise in the canal commands underlines the importance of drainage and conjunctive use of canal and ground water. The results are, however, more philosophical in nature opening up several issues for further research, especially adverse effects on soil and its impact on environment.

### Materials and Methods

In this study, socio-economic changes around KRS Dam, Mandya district, Karnataka state, India have been studied. Cauvery is an east flowing river of the Peninsular India that runs across the southern Indian states of Karnataka, Tamil Nadu, Kerala and a Union Territory of Puducherry. Cauvery is fourth largest river of southern region, with its long journey of 800 km from the Western Ghats; traverses through plateau and finally forms a delta on the eastern coastline of the subcontinent before falling into the Bay of Bengal. The width of the basin ranges from 65 to 250 km. The total length of the river from its source to its outfall in Bay of Bengal is about 800 km of which 320 km is in Karnataka. The point of origin of Cauvery, Talakaveri is in the Brahmagiri ranges of the Western Ghats at an elevation of 1341m. Geologically, the basin forms a part of the South Indian Shield. The eastern deltaic area is the most fertile areas in the basin and the soil type is alluvial in this region. The basin is characterized with a unique riparian forest with some of very distinct fauna and flora and is home to many sanctuaries and National Parks. An average annual surface water potential of 21.4 km<sup>3</sup> has been assessed in this basin. Out of this, 19.0 km<sup>3</sup> is utilizable water. Cultivable area in the basin is about 5.8 Million hector, which is 3.0% of the total cultivable area of the country. Present use of surface water in the basin is 18.0 km<sup>3</sup>. The hydropower potential of the basin has been assessed as 1359 MW at 60% load factor. Across Cauvery an dam was constructed at Kannambadi and known as Krishna Raja Sagara (KRS) Dam.

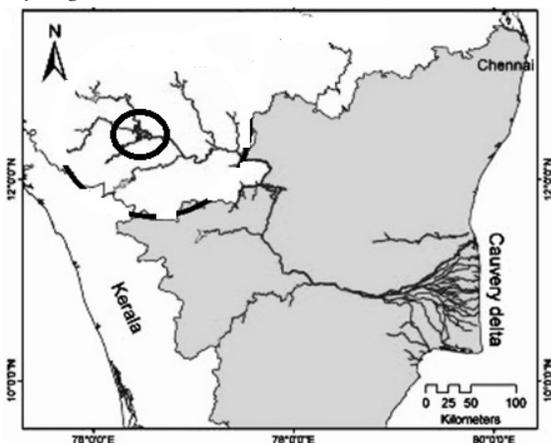


Figure 1: STUDY AREA

The selection of sample units for benchmark survey was based on multi-stage sampling, the stages being the districts, taluks, villages and households in the study area. Since the thrust of the study was on the Impact of irrigation around KRS dam of Cauvery river. The hobbles in Srirangapatna and Pandavapura are selected for the study purpose.

**Ecological Assessment:** By identifying particular elements of the aquatic ecosystem we want to protect. The change of river flow pattern, seasonal variation and their impacts on biotic factors of the ecosystem will be studied in accordance with the objective.

## 2. Socio-economical Assessment:

Studies will be carried out along the course of river by analysis the dependence of the people for their livelihood and river related health profiles of these people and their livestock. These resources are evaluated economically and deduce by comparing their social standards. The studies will be linked to environmental flow, with the objective of being able to predict how any part of the ecosystem will change in response to specified flow change.

## AGRICULTURE

Agriculture is the main activity of the district. The total geographical area of the district according to the Survey of India figures is 498244 hectares, out of which a total area of 24765 hectares is covered with forests mostly shrub jungles. The area sown with different crops is proportionately more in Mandya, Maddur, Malavalli, Krishnarajapet and Nagamangala taluk, whereas the proportion of cultivable waste is more in Nagamangala, Maddur and Malavalli taluks.

The seasonal rainfall begins with the pre-monsoon showers from about the last week of March to the middle of May. This period provides 55-110 mm. of rain. By about the middle of June the South-West monsoon begins with high winds causing a lowering of the temperature; and gives 250 to 300 mm of rain upto August. Then the North-East monsoon breaks in with the average rain during this period upto middle of November being 375-625 mm.

The agricultural seasons in the district are broadly classified into Kar and Hain seasons. The Kar or the early monsoon season beginning in the month of April or May. The Hain season begins from July. The post monsoon season commencing in September or October. These monsoon and post monsoon are referred to kharif and Rabi respectively in modern agricultural system.

Agricultural production depends to a great extent on the development of irrigation. Out of 116901 hectares of net area irrigated by all sources, 97869 hectares are irrigated by canals, 7930 hectares are irrigated by tanks, 7358 hectares are irrigated by wells, and 977 hectares are irrigated by other sources.

## Social life in Mandya District

A special mention of the general condition of life during the period of Ancient Kings and Emperors, is necessary when we take into account their valor, generosity and administration and the political history then. The caste system has come a long way since the ancient times in Mandya region and is still going strong here. The caste system which is based on the four 'Varnas' has clearly distinct areas of activity for each one of them.

The social setup in this region, probably upto the 18<sup>th</sup> century, included bonded labour system along with cultivation and other trades. Though a person's occupation was mainly decided upon by his caste and family tradition, the social life was solely dependent on interaction and interdependency. However, due to the industrial revolution during the 19<sup>th</sup> and 20<sup>th</sup> centuries,

and also due to literacy among the common man, a large scale Socio-economic change could be witnessed in the district. The age-old customs and traditions and also old fashioned methods though still prevalent in this region, there have been a continuous but gradual improvements in the social life and society here.

Farming has been the most important occupation here since time-immemorial and even today the economy of the district is so dependent on farming. Till recently due to undependable rains, farmers faced severe drought conditions in the district. After the KRS dam began providing its waters to Mandya district, it was a different story altogether. Today there is rapid progress in the farmer's life. Many industries have come up as auxiliary to agriculture. The chemical fertilizer factory of Belagola (presently not functioning), the Sugar factories of Mandya, Pandavapura and Bharatinagara (Kala Muddana Doddi) and hundreds of commercial factories have come up and functioning as auxiliaries of the primary occupation i.e., farming. Apart from these factories, there are about 25 Grammeena Banks, one Co-operative Banks of the town area, 45 other Co-operative Banks, 7 Primary land development Banks, 592 Milk producers Co-operatives, 3 Regulated markets and 7 sub-regulated markets all of which have combinedly worked for the economic progress of the district. The banks throughout the district have loaned a sum of rupees 132 crores to different sectors including the agriculturists. The co-operative banks have given 384.64 lac rupees loans and the primary land development banks have given rupees 340 lacs as loans to farmers.

The co-operative movement being in the forefront, in the district, there are 1274 co-operative societies, 686 Fair price shops, 364 Post offices and 14 Government Hospitals in the district. 1365 inhabited villages have been provided with electric power supply in the district. All these have contributed to the uplift of the Socio-economic life of people in Mandya district.

The district is 4983.5 square kilometer in area and occupies the eighteenth place in the state. (Recent divisions of districts are not taken into account due to lack of availability of source) The 1971 Census reveals the steady growth of population of Mandya district. The population during 1991 was 1644374, which is more than the double of what it was in 1901. The density of population was 331 persons per square kilometer and was more than the State average which was 234 persons per square kilometer i.e., it occupies the fourth place in density of the State. The density is not homogenous in all the taluks of the district it varies from 171 persons per square kilometer in Nagamangala to 534 persons per square kilometer in Mandya taluk.

**Table 1: Density of population in various taluks of Mandya district ( per square km.)**

Taluks	Density of Population
Krishnarajapet	244
Maddur	457
Malavalli	326
Mandya	534
Nagamangala	171
Pandavapura	296
Srirangapatna	432
<b>District Total</b>	<b>331</b>

Source: Mandya district at a glance, 1999-2000, Zilla panchayat Mandya.

## Data Analysis:

The primary data was collected through field study with the help of questionnaire methods. A through survey will be conducted among the selected villages which have direct impact of the Socio-economical and ecosystem across river basin. Interview and discussion will be conducted with the environmental institutions and officials who are working in the field. Local pan-

chayats, river protection forums, NGO's, and benefactors will be taken into consideration to focus on the condition of the river, ecosystem, socio-economic conditions, impacts and benefits.

**RESULTS AND DISCUSSION**

**Intensive Agricultural Development Programme**

Mandya district has been selected under Intensive Agricultural Development Programme because of its high irrigation potential, existence of efficient co-operatives and other institutions and progressive outlook of the farmers. It is known as the package programme set-up on 1<sup>st</sup> January 1962, with a view to grow more food grains by employing modern methods of farming. This programme aims at maximization of production by providing facilities such as supplies of improved seeds, fertilizers, agricultural credit and technical know-how and marketing to all the participating farmers and also to providing opportunities to the officers concerned to get training and experience. Under this scheme about 75 percent of the total budget spent on development items. The development funds available per scheme per functioning and per 1000 population are roughly of the order of slightly above a lakh, 15000 and 17000 of rupees respectively. The development staff studied directly the development programme and include agriculture, animal husbandry, fisheries, community development, forests, co-operatives, industries, panchayat, education, family planning etc.

**Socio-economic status of communities**

**Fishing and Livelihoods**

Dependency level on fisheries is decreasing compared to earlier days as most of the fishermen feel that fishing is less remunerative. Fishermen opine that tender system has increased their investment costs and their dependency on middlemen. As income derived from fisheries is found to be meager and uncertain, diversification into other occupations seems common

Fishing plays an important role in supporting livelihoods worldwide and also forms an important source of diet for over one billion people. Further, inland fisheries is of particular importance to the rural poor accounting to about 15 % of total global employment (FAO, 2000). In the Southern lowlands of Laos, 80-90 % of households involved in fishing contribute 30 %.

Similarly, fisheries sector plays an important role in the Indian economy by way of contributing to the national income, employment and foreign exchange. It has a vast potential for fish resources both from inland and marine environment. India has about 1.6 million hectares of freshwater lakes, ponds, and swamps and nearly 64,000 kilometers of rivers and streams.

**Fishing Communities**

Fishing communities, located throughout the basin, are either restricted to a few households spread out in a village or living in a locality together in groups or camps and range between 4 to 200 households. Difference in economic status across fishermen is found to be evident. A few households are found to be totally dependent on fishing and others have supplementary income from other sources.

**Table 2: Activity-wise diversification**

Activity-wise diversification across households Details	Number of families
Agriculture	10
Agricultural labour	35
Baby sitting, garage, and construction labour. Petty shop	5
Working as fishing labour	10
Other occupation	40
Total	100

**CONCLUSION**

Indian agriculture has been exposed to the vagaries of the monsoons which have been predominantly an agricultural economy for centuries. Scarcity of agricultural land and increasing population is responsible for an imbalance in the demand and supply of agricultural products which calls for alternatives to increase the supply of food. The development of our national economy and the achievement of the targeted rate of planned growth would be possible only with the development of agriculture on a sound and sustained basis. These Figures illustrate that fishing can be closely integrated in the livelihood strategies of rural households. During the past three decades, the number of fishers and aqua culturists has grown faster than the world's population, and even faster than employment in traditional agriculture.

In this study socio - economic change in areas around KRS dam have been studied.. However, the other areas which are not included under irrigation facilities have a very less or no change in respect of social and economic improvement. Thereby, it becomes necessary to find the cause for the improvement in living standards of the people in the wet land and thereby suggest few tips for a balanced growth of the region which may reduce regional disparities.

The study shows that fisheries in KRS dam support the livelihoods of a significant proportion of the population. The main focus in KRS dam is on agriculture and managing water to meet the needs of irrigation and domestic drinking water. Development initiatives by the Department of Fisheries are not integrated with the water management plans or other development activities of the Water Resources department or the agriculture department. Special efforts have been made to promote extensive and intensive inland fish farming, besides modernizing coastal fisheries and encouraging deep-sea fishing through joint ventures.

There are no definite methods followed in selling fish, rather, it is a combination of traditional practices, networking and mutual understanding. However, there is no federation as such. Small-scale fishermen are economically poor and most vulnerable as fish catch depends on external factors beyond their control and hence, migration becomes inevitable to sustain livelihoods.

The increase or decrease in the flows by discharging reservoir will have an impact on the water quality, agricultural and ecological factors. Local impacts of reservoir flooding are immediate and subsequent ecological impacts on downstream can be extensive

An extensive impact of water pollution on the flora and fauna can change the ecological condition of riverine ecosystem. But impact of dam in this river due to store water and regulation outflow has a main role in water quality. Water flow will bring by runoff more material and maximum impact of pollution will come to reservoir but outflow is in low layer and then quality is different in KRS dam

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