Chapter-1

INTRODUCTION
CHAPTER-I

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1.1 BACKGROUND OF THE STUDY:

"One of the important features of Indian Soil is that they are in most parts dry and will not yield much and in several parts of the country, will yield almost, nothing unless they are provided with water".

India has been a compatible position with regard to the availability of food grains over the last Twenty years due to the availability of water resources hence irrigation is every thing in India, water is even more valuable than land. The impressive growth in food grains output is ascribed to three interrelated factors.

A) The relentless expansion in irrigation facilities both in the public and private sectors.

B) The allocative decisions taken by Indian farmers with regard to irrigated acreage being tilted in favour of cercal crops.

C) The increasing availability of irrigation facilities and chemical fertilizers.

An assured water supply will create property, create employment potential, enhance and increase capital formation. The circular causation will have a cumulative effect.

In this background an in-depth study is made in this thesis with regard to "minor irrigation in Karnataka and Agriculture development with special reference to Tumkur District."
Not long ago irrigation was referred to as artificial irrigation. This historical allusion emphasizes the fact that irrigation is human beings efforts to substitute for any deficiency in natural rainfall with the objective of steady expansion in crop output. At one end it becomes must for crop husbandry in the rain deficient tracts of the globe.

In the regions endowed with favourable rainfalls for a good part of year access to irrigation during the rest crop season can act as an insurance against failure in rainfall at the crucial stages of plant growth.

It has been estimated that in a season of unfavourable rainfall, there may be a drop of 10-12 million tonnes in Agriculture production. It has also estimated that uncultured Acre brought under irrigation will give an additional yield of even 5 quintals of rice the actual yield depending on the seed variety agriculture practices and quality of the soil.

The Indian agriculture continues to be gamble with the monsoons. Beside rainfall in an evenly distributed through the season most of the rainfall is between June and October, the rest of the years is very dry. Even where the overall annuals participation is high the available moisture in the winter and summer months is not adequate to support multiple cropping. Further rainfall is sometimes different and is liable at failure of country's cropped area depend exclusively on rainfall.

The rainfall is about 70% of the crop area is too low and undependable to permit intensive cultivation even during the main crop season. The development of irrigation has thus has important role in
the growth of Indian agricultural to meet the rising demand for food and fibre of a rapidly growing population.

Water Potential:

So far we have utilized only a fraction of our water resources. The total water potential of India by way of average annual river flows is estimated as varying from 167.300 crore c.u. (cubic unit) metres of which approximately 87.000 crore c.u. metre utilized for irrigation. But only 9500 crore c.u. metres representing 5.6% of total and about 17% of the utilisable water were actually utilized up to 1951 by the irrigation project enabled the utilization of nearly 34.300 crore c.u. metres or 39% of the utilisable water resources in India.

The possibilities of diverging normal flow rivers into irrigation canals have been almost exhausts the plans for the future development of irrigation. In area's unsuitable for major irrigation were such as tanks and well the installation of water lifting devices have been planned.

Water is a precious and finite resources. Although it covers three quarters of the earth, only a small fraction is accessible as fresh water of the total amount of water with drown, almost 70 percent is needed to produce the food that fuels human activity. Looking 30 years into the future F.A.O. estimates that feeding the world's population will require 60 percent more food. Most of that increase will come from intensified agriculture supported by irrigation. But water is already scare in many countries and the competition for water from industrial

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and domestic users continues to grow. So where will we find the water to feed the world? F.A.O. is convinced the answer lies in improving agricultural productivity and water efficiency. By using better seeds, boosting soil fertility and implementing other agricultural techniques. Farmers produce higher yields, obtaining the greatest gains from precious water supplies through more efficient irrigation methods, and enhanced water harvesting, water is used to its best advantages.

We believe it is possible to generate the additional food with only 14 percent more water. Efforts will also need to be made to provide users with fair and equitable access to water. At the same time, environmental concerns must be addressed. Irrigated agricultural yields two or three times as much as rainfed lands, but can also cause salt buildup in soil and ground water. And the over use of water in one area can deprive people of access in another which should be tackled carefully.

For the year 2001 world food day theme points to the essential role water plays in F.A.O's efforts to help build a world without hunger. People are food secure when they have regular access to enough high-quality food to lead active, healthy lives. We can harness enough water to feed the world but we must introduce fair and equitable access to water and urge decision-makers to develop policies that encourage sustainable water use.

Agriculture is by far the largest user of water claiming almost 70 percent of the total amount with drawn from the earth. It takes a remarkable amount of water to produce crops for example one to three cubic metres to yield just on kilo of rice and as population grows, water
need for agriculture will increase, but supplies are limited. An F.A.O study of 93 developing countries indicates that a number of water-source nations are already withdrawing water supplies faster than they can be renewed. Ten countries are in a critical state meaning that satisfying the needs of agriculture requires them to withdraw more than 40 percent of their total renewable water resources. Another eight countries are water stressed satisfying the need of agriculture requires them to withdraw more than 20 percent of that total.

At the same time, there is growing competitions for water in municipalities and industry. Currently, industry claims about 20 percent of total water withdrawals, and municipal users the remaining 10 percent. But of the amount they claim, only 10-20 percent that is wasted, further before it is re-used or returned to rivers and aquifers, water must be treated to remove pollutants.

Water used for agriculture must be managed wisely. As agriculture intensities, attention must be paid to the environment. Improper fertilizer use can contaminate surface water and ground water. People participation and water management boosts crop in Equador, with in the Manabi province on equator's central coast is a community of 530 small holder farming families. Soil degradation, poor management of natural resources and out dated farming methods had kept families trapped in poverty. When the EL NINO a weather phenomenon hit in 1998, the situation deteriorated further. Irrigation canals were either filled with silt, or seriously damaged, from 1999 to 2001. A project of F.A.O's special programme for food security turned things around by enhancing existing irrigation schemes, introducing new crops and training farmers in improved growing methods. At the
close of the project irrigation had reached 2,200 hectares of land, ten times the amount following, EL NINO and crop output grew because farmers received training in soil improvement, new crop varieties and better post-harvest techniques, yields per hectare increased by 30 to 35 percent for maize and rice.

Out of the total geographical area of 329 million hectare of India the net sown area is about 142.6 million hectares, to meet to food security income and nutritional needs of the projected population in 2010 the additional requirement of food grains (including pulses) will be to the tune of 280 million tonnes.

**Drip/Micro Irrigation**:

Drip irrigation involves frequent application of water in and around the root zone of the plants through a network of pipes along with a suitable emitting device.

A typical micro-irrigation system has the following components –

- Dripper/micro sprinkler/sprayer.
- Distribution lines and fittings.
- Control head system
- Fertilizer Tank.
- Fittings.

**Impact of Drip Irrigation**:

The drip irrigation component of the scheme was evaluated through agricultural finance corporation ltd. during 1997-98. The study covered about 3900 farmers spread over 26 districts in the states.
of Andhra Pradesh, Haryana, Karnataka, Maharashtra, Orissa and Tamil Nadu.

**Future Programme for Promoting Micro Irrigation:**

The tempo generated during the 8th plan in covering large areas under drip irrigation was continued during the 9th plan also. However, in comparison to the available potential of 27 million hectares and the increasing pressure on water resources, the coverage under drip irrigation is only about 0.4 million hectares. The working group on horticulture for 10th plan has recommended the need to bring one million hectares under macro irrigation during the 10th plan.

1.2 **STATEMENT OF THE PROBLEM:**

In the absence of watershed the soil and climate conditions of any agriculture land permits the production of a single crop in the whole agriculture year from most of arable and resources.

Agriculture Development and irrigation are correlated, the economic development in Karnataka is slow due to inadequate irrigation facilities. Watershed programmes, tank irrigation if directed properly can boost up the development activities in Karnataka.

Hence, this study is focusing attention on the watershed programme and agriculture development in Karnataka with special reference to Tumkur District.

2 Water is an abundant natural resource as ⅔ of the earth’s surface is covered with it, but only 2.7 percent of the global water available is fresh water and of this only 30 percent is available to meet

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2 Agriculture Research Institute, Project Director, Water Technology Centre, New Delhi-110012.
the water demands of the human and livestock population both of which are increasing in an alarming manner. The rest of the fresh water is locked up in glaciers and snow cover. Realising the importance of these resources and the role it would play in enhancing the agricultural production in a sustainable manner, the government has wisely invested huge sums in developing the irrigation resources. In addition to the high yielding varieties it has been the availability of inputs like fertilizers and development of irrigation resources that have imparted stability and residence to the agricultural production in the country. The yield levels in irrigated areas are just over 2 tonnes/hectares, which could easily be raised to around 3.5 tonnes/hectare. Even the yield in rainfed areas can be easily doubled with proper management of inputs, especially soil and water.

**Land Levelling:**

Proper land levelling is one of the management options that is generally ignored. It increases the water application efficiency which lead to higher yields as well as increase in water use efficiency can easily be obtained by levelling the field. Latest levelling equipments are now available in the country. It also has a direct impact on the nutrient use efficiency.

**Pressurized Irrigation Systems:**

To encourage adoption of water efficient technologies, the government has provided subsidy to popularize pressurized system of irrigation like sprinklers and drip (Trinkle) which both together now occupy an area of almost one million hectares.
Due to intense competition with domestic, industrial and power sector's agriculture will also have to depend more and on the use of marginal/poor quality of water as it projected that the share of water allocated to agriculture is likely to decrease by 10 to 15 percent in the next 20-30 years. Sprinkler and drip irrigation methods of water application are techniques in which such water can be used effectively. However, the long-term impact of prolonged use of such water has to be always kept in mind. India is one of the few countries which is richly endowed with water resources with an average annual rainfall of 1170 millimeter but it is not fully exploited as it is confined to a few months only and is very unevenly distributed. It is estimated that 70 to 80 percent of the entire precipitation falls in about 100 hrs. It is extremely variable and highly unpredictable in both time and space. Less than 30 percent is utilized, the rest being last as run off. Losses in terms of nutrients and crop yield are colossal. In view of this government has launched a massive programme on watershed development. Soil and water conservation strategies have demonstrated their effectiveness in improving not only the water resources but also the economic status of the community residing in these watersheds in several locations of the country eg. Sukho Magri near Chandigarh, Ralegaon Siddi in Maharashtra, Tej pura Watershed near Jhansi.

1.3 **OBJECTIVES OF THE STUDY:**

The main objectives of the proposed study are:

1. To analyze the progress and development of irrigation in Karnataka.

2. To know the impact of the irrigation on yield and output.
3. To find out the impact of minor irrigation on employment.

4. To estimates the impact of minor irrigation on Income.

5. To find out the impact of minor irrigation on social conditions.

6. To examines the role of irrigation in boasting crop yield and percapita income.

   Irrigated area have bumper crop which has resulted in increasing not only per capita income but also employment opportunity.

7. To highlight the dependability of the irrigation source during drought times.

   With these objectives in mind a primary investigation is conducted and data is collected to establish the fact that irrigation and agricultural development go hand-to-hand.

   Various measures have been adopted by Government to meet these requirements.

3Estimation of growth rate of agriculture sector any period is a complicated problem involving various methodological issues. According to estimate of the Directorate of Economics and Statistics Department of Agriculture and co-operation, Government of India, Neela Kanta Rath’s study for period 1955-1978 based on fitting of exponential trend functions to Index members of production of the major crops in India.

   T.N. Srinivasan however, finds that out put and yield of Food grains and all crops grew more or less uniformly over the entire period

1949-50 to 1977-78 with no evidence of either acceleration or declaration since 1967-68.

Studies such as those of S.D. Sawant and Desai and Namboodiri, examining traces of any possible declaration in the growth of agricultural production since the late 1960's do not come up with any significant positive evidence in support of the declaration hypothesis.

The impact of the strategy was however less spectacular on the production of rice, India's number one food crop. According to Dharam Narain is the impact of new technology on productivity of rice has been obscured to some extent by "clouding effects" of "Locational Shift in Rice acreage".

For example C.H. Hanumantharao found that interstate variation in the output of food grains as a whole had increased some what during the period 1964-65 to 1970-71.

S.M. Dev's study reveals that inter regional variations of output per area, which had earlier increased 1970-73 as compared to 1962-65 decline in 1975-78 to the level of 1962-65.

**Review of Literature:**

Many studies have been undertaken with regard to irrigation and Economic Development.

Mr. J.S. Sarma and Dr. C. Gopinath on concepts of irrigation and problems of measurement. Mr. Vohra emphasis that, as the demand for water is already in excess of its supply.

Mr. R. Ghosh and Mr. Y.K.Murthy have both dealt with the utilization and potential of irrigation projects, Mr. Y.K. Murthy has
drawn attention to the definitions adopted by the planning commission in defining 'Irrigation Potential Created' and 'Irrigation Potential Utilized.' Both contributors refer to factor responsible for the utilization or irrigation potential and remedial measures that could lead to a more efficient use of irrigation facilities.

Dr. Kahlon and Dr. Grewal and of Dr. Venkataraman Dr. Narayana and Dr. Shenoy deal with the relation between the gross area irrigated and crop intensity and productivity in Punjab and Karnataka respectively.

Mr. V.K. Srinivasan's paper is on the return from investment in irrigation projects. He has referred to the twin sources of concern, viz., steep rise in construction costs and progressive deterioration in the financial return from irrigation project. He finds that from an analysis of the state wise financial return of irrigation works during 1967-68 that out of 18 states only Madhya Pradesh and Punjab had a net profit while other states suffered a net loss.

Dr. Hanumanthappa Rao refers to the fact that during the 23 years from 1950-51 to 1973-74 both irrigated area and agricultural output have doubled in India.

Estimated that demand for agricultural output would increase by nearly 100 percent by 2000 A.D. he, suggest that meeting this demand would require a doubling of acreage under irrigation.

In this thesis attempt is made to study irrigation and economic development in Karnataka with special reference to Tumkur district.

1.4 **SCOPE OF THE STUDY:**

The study is confined to establish agricultural productivity by sources of irrigation, the main sources of irrigation for the study are canals-Tanks, well and Tube well and sprinkler irrigation. The study will be conducted in Karnataka and specially in Tumkur district which can very well be adopted to other districts and similar studies can be made in other states also.

In these days of globalization under W.T.O. Agreements (A.O.A.) and G.M.O i.e., genetically modified organisms and AMS i.e., aggregate measure of support are much concern. Out Canca and Hong Kong summit have made lot of discussion on agriculture improvements, agricultural improvements, can solve the problem of traders in agriculture under WTO with special reference to India.

1.5 **HYPOTHESES:**

1. Irrigation facility and Economic Development are co-related.

2. Minor irrigation plays significant role in the development of Agriculture.

3. Minor irrigation helps to enhance the yield of the crop and output.

4. Tank irrigation in Karnataka will generate employment and income specially in Tumkur District.

5. Minor Irrigation will change the socio-economic aspects of the region.
1.6 METHODOLOGY:

The following method will be used in the thesis.

Database:

Both the primary and the secondary data are to be used for the study. The primary data will be generated through survey methods and enquiries according to the objectives of the study.

The sources of secondary data are routine publication of articles, agencies of agriculture department, journals and periodicals, newspapers, dry land development board, wasteland development board, soil conservation development etc.

Sampling:

The random sampling technique will be adapted for the study. The study is carried at the district level i.e., Tumkur district of Karnataka. Around 150 farmers based on random sampling has been selected and primary data has been collected with the help of the thoroughly prepared questionnaire, around 25 agricultural officials were contacted for authentication of information.

Tools of Analysis and Interpretation of Study:

The descriptive and the conventional regression techniques will be applied to estimate productivity by irrigation on crop yield and overall land productivity under two or more types of irrigation in a given tract to district to judge the economic development and where ever necessary maps, tables and diagrams are used to interpret the study.
1.7 LIMITATIONS OF THE STUDY:

1. The study is limited to Tumkur District in Karnataka due to lack of time and resources, but broad generalization will be made on other districts also on the basis of the inferences.

2. As minor irrigation is a part of Economic Development, the thesis does not spell about other measurements of Economic Development. Hence, the thesis rests mainly of minor irrigation and Economic Development.

3. The present study mainly depend on case studies since macro level data required for the study is not available on its entity. Hence, the constraints caused in the regard has been mentioned.

1.8 CHAPTER SCHEME:

The following chapter scheme is followed in the thesis, and the study is organized under seven chapters.

Chapter-I

Introduction, statement of problem, objectives, hypothesis and methodology.

Chapter-II

Design of Study, Role of minor irrigation in Agriculture.

Chapter-III

Agriculture Transformation through Minor irrigation and Economic Development.

Chapter-IV

An analysis of minor irrigation and Agriculture in Karnataka.
Chapter-V :

The Analysis of Karnataka Economy, Irrigation and Agriculture Development.

Chapter-VI:

The study area: Tumkur District and Analysis of the Survey based Results.

Chapter-VII

Conclusions and Suggestions.