CHAPTER-I
INTRODUCTION, OBJECTIVES & METHODOLOGY

1.1 Introduction

Water is essential; there will be no ceaseless supply of rainfall. The idea of this couplet is obvious because “rain gives life to all creation, revives the dying vegetation, restores life to what seems dead.” Thus, water from rains is as precious as gold itself. Indeed, it is considered to be “liquid Gold.”

Agriculture is a large activity in India as well as Maharashtra. The term ‘Agriculture’ is originated from the word ‘Ager’ meaning there by a cultivation.

Increase in agriculture production and productivity depends, to a large extent, on the availability of water. Hence, the importance of irrigation. However, the availability of irrigation facilities in highly inadequate in India, for example, in 1950-51, gross irrigation area as percentage of gross cropped area was only 17 percent. Despite massive investments on irrigation projects over the period of planning, Gross irrigated area as percentage of gross cropped area was only 44.6 percent in 2007-08 (87.26 million hectare is out of 195.83 million hectares), currently 63 million ha, or 45 per cent of net cropped area, is irrigated. Thus, even now more than 55 percent of gross cropped area depends on rain that is why Indian agriculture is called a gamble in the monsoons.

Irrigation is the most important instrument of the development of agriculture. The agriculture of different regions and countries in the world enjoying high productivities in different crops are found to be mainly depended on irrigation. Irrigation is an agrarian economy assumes the
same importance as blood in human body. In the earlier times, when there was no pressure of population, water blowing in the rivers, supported by the rainfall was adequate to meet the needs of human life and for cultivation of the required crops. As the pressure of population increased and standard of living of human beings raised, necessity of increase water resources has been left. This led to the concept of storing water through the construction of dams and using it through a canal system.

Development in India is synonymous with rural development because more than 60% at it population lives in rural areas with nearly 40 percent below the poverty line. Agriculture is the main occupation of these people. Near about 70 percent of the population are in agriculture, it engages 60 percent of work force. And it contributes around 26.8 percent in 1998-91.\(^6\)

Although agriculture, including allied activities, accounted for only 14.1 per cent of the GDP at constant (2004-5) prices in 2011-12, its role in the country's economy is much bigger with its share in total employment according to the 2001 census, continuing to be as high as 58.2 per cent. The declining share of the agriculture and allied sector in the country's GDP is consistent with normal development trajectory of any economy, but fast agricultural growth remains vital for jobs, incomes, and the food security. The growth target for agriculture the Twelfth Five Year Plan remains at 4 per cent, as in the Eleventh Five Year Plan.\(^7\)

Eighty (80) percent of farmers are small and marginal farmers and 75 percent of the poor are in rural areas. Acceleration of agricultural production and productivity has become the primary objective to meet the increasing demands, both food and employment, of the population and also boost the national economy on a sustained basis. For realizing this full potential of agriculture, water is the most crucial input and efforts to
harness it in the form of irrigation are being done extensively both by the central and state governments of India.\textsuperscript{8}

India has made considerable progress in developing irrigation infrastructure. However irrigation efficiency is low for both surface and ground waters. In order to help the rain fed farmers improve productivity and profitability, in situ soil and water conservation practices are developed for different agro-climatic regions with special emphasis on effective rainwater management along with a suite of location-specific technologies. Substantial irrigation potential has been created through major and medium irrigation schemes.\textsuperscript{9}

Irrigation is defined as the artificial application of water to soil, for the purpose of supplying water essential to plant growth. It is mean by which water is conveyed to arid areas from rivers reservoirs or wells to increase the fertility of the land. Scientific irrigation involves knowledge of the available water supply its conservation and application to the land, the characteristics and needs of the different types of the soil and requirements of various crops to be produced. It is the science of harnessing the source of water and distributing the same for agriculture.\textsuperscript{10}

Irrigation has been an important input in rural development. Irrigation is a tool by which land is made useful in drought prone areas by providing water for land\textsuperscript{11}

The assured water availability leads to change cropping pattern from inferior coarse grains to superior quality cereals, pulses and millets and more area would be brought under commercial crops. Also agriculture can shift from single and traditional cropping to multiple and commercial crops.

Irrigation plays a dual role in augmenting agricultural production, first, by bringing more land under cultivation, and second, by increasing
the productivity of existing land through continuous water supply. Taking note of the importance of irrigation and the need to have state intervention in providing irrigation infrastructure, many major and minor irrigation projects have been implemented in India with the intention of enhancing the area under cultivation, besides increasing the productivity of existing lands. As a result, irrigation potential created in India has registered nearly four and half- fold increase from a mere 22.6 million hectares in 1950-51 to about 101.1 million hectares in 2006.\textsuperscript{12}

Irrigation is more and more important from the point of view of the development of the whole world’s agricultural economy. The impact of irrigation is all pervading as it leads to change in cropping pattern, increased yield rates and labour utilization and ultimately it brings prosperity to the areas, hence irrigation is regarded as a catalyst for socio-economic change that sets in nation the productive forces in the agricultural sector.\textsuperscript{13}

The term “Irrigation” includes all operations or practices in artificial supply of water to the soil for growing crops. In Indian planning since April 1978, the cultivated area is being considered as the basis for the classification of irrigation projects.

The planning commission has introduced a new classification of irrigation schemes:

1. **Major Irrigation Schemes**: Those with cultivable command areas (CCA) more than 10,000 hectar.

2. **Medium Irrigation Schemes**: Those with cultivable command areas (CCA) between 2,000 and 10,000 hectar.

3. **Minor Irrigation Schemes**: Those with cultivable command area (CCA) up to 2,000 hectar.\textsuperscript{14}
Water is one of the basic needs of all living animals. Primarily water is used for drinking and household purposes, as well as it is being used for irrigation i.e. watering the plants and crops. Since time immemorial, now a day’s water is also increasingly being used for industrial purposes as the industrial sector is growing rapidly. In the spell of growing population the demand for water for all alternative uses is expanding. Water therefore, which is basically scare in nature, is becoming comparatively more and more.

1.2 Meaning of Irrigation

Universal reference encyclopedia defines the term irrigation as the process of providing more water for agricultural land than is naturally available.\textsuperscript{15}

It further expands the term as the process which enables crops to be grown in dry areas that would not naturally support agriculture such as in the Veger area of Israel. It can also increase the productivity of land that already has same natural water as in Lebanon where farming based on rainfall alone yields only three to five times the amount of seed planted, whereas irrigation gives a yield of 86:1.

The new encyclopedia Britannica defines the term irrigation as the artificial application of water to land or soil to produce plant growth.\textsuperscript{16}

The terms usually means, however the supplying of rather large amounts of water to grow crops in arid regions. Under extremely arid conditions irrigation takes the place of rainfall. In regions where is rainfall is scant, irrigation may provide an alternative to dry farming’s whereas rainfall is abundant but uncertain irrigation gives protection against occasional draughts. Under all these circumstances, irrigation is a
method of producing crops on a controlled schedule of cultivation and harvest.

1.3 Importance of Irrigation

Irrigation is a vast subject and both its content and impact vary with the source on it is based. In the new planning strategy now being worked out, irrigation is being assigned a major role in rural development and employment generation.\(^\text{17}\)

As more than 50% of GNP comes from an agricultural sector in India, therefore it is called as an agricultural country. More than 70% of the population of the country is engaged directly on agricultural activities. No drought the agricultural sector stands as a backbone of the economic development of the country.

According to Simon Kuznets, there are three contribution of agriculture to economic growth viz. (1) Product contribution (2) Market contribution and (3) factor contributions.

According to him “it Agriculture itself grows, it makes a product contribution, if it trades with others. It renders market contribution; if it transforms resources to other sectors, these resources being productive factors it maker’s factor contribution.\(^\text{18}\)

Agricultural development leads to higher levels of productions of food and other farm products, higher income, better standard of living to the cultivators in particular and non-cultivators also draw the benefits with its spread effects.

To have stable and rapid economic development of the country, the agricultural sector which is the basis of all sorts of development, must be
developed, in agricultural development water in the form of soil-moisture plays a dominant role.

1.4 Importance of Irrigation in Agrarian Economy

Irrigation is an essential input for agriculture. In India, the importance of irrigation emanates from the pervasive character of its impact on the agricultural economy. As a traditional protective input, it ensures a secure harvest, acts as an insurance against inadequate and inconsistent monsoon and such constitutes a sine-qua-non for agricultural stability. However, the advent of new crop technology, popularly known as ‘green revolution,’ has considerably enhanced the cruciality of irrigation as a basic productive input. Irrigation possesses significant ‘area effect, ‘crop pattern effect’ and ‘yield effect’. It increases the net area cultivated’ and more importantly, the gross cropped area’, by enhancing the crop intensity through double or multiple cropping. It diversifies and transforms the crop pattern with such beneficial effects as the substitution of inferior and low value crops by superior and high value ones that prove more remunerative to the farmers. Since the marginal productivity of irrigated land is higher than that of unirrigated land, it is economically more profitable to cultivate an irrigated rather than an unirrigated hectare of land. Because of such positive correlation that exists between provision of irrigation and increased agricultural production, extensive development of irrigation is, in fact, a basic and necessary pre-condition for an accelerated agricultural development.

More recently, the favorable impact of irrigation on creation of additional rural employment for agricultural laborers and self-employed family workers of the cultivating households is being highlighted. While irrigation operation itself needs labor, its availability generates on farm
employment through increased cropping intensity and adoption of improved and labor-intensive cultural practices like transplantation, line sowing, application of manures, fertilizers and pesticides. Larger volume of transaction of agricultural and their processing may also increase the off-farm employment opportunities. Thus in an abundantly labor surplus rural economy, irrigation reduces the rigors of unemployment, under-employment and seasonal unemployment by enhancing man days of employment.

In view of such multi-dimensional benefits, development of irrigation has become an issue of inescapable emphasis in Indian agricultural planning. In Maharashtra, the region of this study, it is all the more important, because the predominantly agricultural economy of the state lends overwhelming weightage to irrigation.

The irrigation is important for the development in agriculture. The importance of irrigation in agrarian economy is interpreted comprehensively as follows:

Irrigation →

- Remove uncertainly of agriculture production.
- Increase in agricultural production.
- Helps for agricultural price stability.
- Increase in marketable surplus.
- Increase in many return on high value cash crops.
- Provides employment opportunities.
- Enable adoption of modern agricultural technology.
- Reduce rural poverty.
- Promotes rural development.
- Input utilization.
Like this many other benefits we can get from irrigation, directly or indirectly. To have stable and rapid economic development of the country, the agricultural sector which is the basis of all sorts of development, must be developed.

The irrigation has many benefits such as changing in cropping patterns, absorption of modern inputs i.e. High Yield Variety seeds, chemical fertilizers, pesticides, etc. it raises gross income and promotes consumption and investment expenditure of farmers. Indirectly the irrigation increases social status, such as education level, knowledge, changes in the attitude of the farmers etc. it also, helps to give push to the growth of tertiary sector.

1.5 Concepts and Definitions

In this study many concepts and definitions have been used to explain different aspects of irrigation projects. Many of these are technical terms specific to this type of study. Hence, a brief explanation of those concepts and definitions which may be unfamiliar to many is presented below.

1.5.1 Agriculture: The word agriculture comes from the Latin word ‘Agricultura’ the main word ‘Ager’ means Field and ‘cultura’ means culture or cultivate.19

Watsons (1976), he define the word Agriculture in ‘Longman modern English Dictionary’, “Agriculture is the business or art where a lot of land come under cultivation to increase production.” 20

1.5.2 Irrigation: Irrigation means to provide water for sustainable crop production in agriculture with the help of artificial sources without rain water. For ex. Dam, Well, Canal, Tube well, etc. in artificial irrigation, canal irrigation plays vital role.
1.5.3 Canal: Canals are used for the conveyance and delivery of portable water for human consumption and agricultural irrigation. There are four types of canals that are Discharge, irrigation, electricity generation, and water transportation ways.\(^\text{21}\)

1.5.4 Command Area: it means an area irrigated or capable of being irrigated either by gravitational flow or by lift irrigation or by any other method from a Government source and includes every such area whether it is called Command Area or by any other name under any law for the time being in force

1.5.5 Culturable Command Area: It is the area which can be physically irrigated from a scheme and is fit for cultivation.

1.5.6 Gross Irrigated Area (GIA): Area under crops, irrigated once and/or more than once in a year. It is counted as many times as the number of times the area cropped and irrigated in year.

1.5.7 Net Irrigated Area (NIA): Area irrigated through any source in a year for a particular crop.

1.5.8 Ultimate Irrigation Potential (UIP): This term refers to the gross irrigated area that could be irrigated if all available land and water resources are used for irrigation.

1.5.9 Irrigation Potential Created (IPC): This term refers to the total gross area proposed to be irrigated under different crops during a year by a scheme. The area proposed to be irrigated under more than one crop during the same year is counted as many times as the number of crops grown and irrigated.

1.5.10 Irrigation Potential Utilized (IPU): This term is defined as the gross area actually irrigated during the reference year out of the gross proposed area to be irrigated by the scheme.
1.6 The Problem

The Maharashtra state is having great scope for increasing irrigation for agriculture. The area under irrigation may be increased by increasing availability of irrigation water as well as by developing irrigation technology. After the introduction of Green Revolution, there were vast changes in the cropping pattern of the state agriculture. Besides this, the high yielding varieties of different crops are introduced. In view of this, it is necessary to examine all these changes in the agriculture of Maharashtra state over a period of time in general and irrigation development in particular.

The growth and development of irrigation has not been smooth over entire state and there exists disparities in growth and development of irrigation between different regions of Maharashtra. Irrigated area under different crops in different regions is also varying over a period of time. However, a very few studies were undertaken on the socio-economic study on irrigation project in Maharashtra.

In Marathwada almost all districts comes under rain shadow area and known as drought prone zone. Irrigation project plays a vital role in agricultural development in this region. So changes occur in agricultural production, cropping patterns, etc. and its effect on socio-economic development in Marathwada region. So, it is essential to study this problem in depth and hence the research topic, is undertaken for the study with some particular objectives.

1.7 Subject Choice

Initially the objective of irrigation was confine to supply water to crops wherever it requires. Many regions of at the earth experience the uneven distribution and irregularity of rainfall. There are densely populated regions on the earth surface depend on agriculture. In such
regions, a provision of irrigation is important aspects. There are various major, medium and minor irrigation projects in the Marathwada region. This projects growing nicely or satisfactory progressed but still there is problem in front of this projects, like cast escalation, expenditure, time lag, funds, budgetary sources, etc.

The state government has spent Rs. 8,000 crore each year on irrigation projects in the past ten years, but development is very poor.

The investment on irrigation schemes creates favorable impact on economic and social life of rural households from the point of view it is necessary to assess irrigation development and problems of irrigation projects. The study is confined with this view.

1.8 Importance of Study

With the help of irrigation projects agricultural production is increased in Marathwada region. Agricultural practices are also changed due to irrigation facilities. So it is important to study the agricultural and economic changes in Marathwada region. The study focused on Scio-economic condition of the Beneficiaries by selecting socio-economic indicators. It will be helpful to formulate schemes pertaining to the specific region. Results will identify specific crops in the different regions for which modern water saving technologies can be used. The findings of the study will be useful for preparing policies regarding irrigation projects. It will also helpful for construction and maintenance of canal as per need of the particular region. It will be useful for reduce the gap between irrigation potential created and irrigation potential utilization.
1.10 Objectives of the Study
The study was undertaken with the specific objectives, which are decided in relation with the development of irrigation. These are as follows:

1. To study the irrigation development in India.
2. To study the irrigation development in Maharashtra state.
3. To study the irrigation development in Marathwada region.
4. To assess the socio-economic impact of irrigation projects on farmers in Marathwada region.

1.11 Hypotheses
On the basis of the above stated main objectives, the study presents below the main hypotheses which are relevant for the analysis.

1. There is a gap between irrigation potential created and utilization.
2. The Socio-economic condition of farmers under different irrigation projects are similar

1.12 Research Methodology
To investigate the major objectives of the study both quantitative and qualitative research techniques has been used. For the quantitative analysis, data were collected by using well-structured schedules comprising of questions pertaining to important variables which are included in this study. These questions have been framed as the basis of the objective and hypotheses presented above. The schedule was put to a comprehensive test in the pilot survey which was conducted among the selected respondents coming under the field of the study.
1.12.1 Quantitative Methods

Under the quantitative method both primary and secondary data have been used for the study. Primary data were collected from a sample frame chosen through appropriate sampling procedures by adhering to relevant and well-accepted sampling techniques. Secondary data for the purpose of this study have been collected from various plan documents and other sources of information from the Department of Irrigation, Central Water Commission, and the Department of Statistics of the Government of Maharashtra, besides the All India Irrigation Reports. The following section discusses the procedure adopted for the selection of sample.

1.12.2 Selection of Sample for Collecting Primary Data

To study the socio-economic impact of irrigation projects on farmers in Marathwada region, a field survey was conducted in three districts viz. Aurangabad, Jalna & Parbhani at randomly out of eight districts of Marathwada region. Data from primary source have been collected through field survey and interview scheduled. From the each districts 150 respondents have been interviewed from different fourteen major, medium, minor irrigation projects by the quota sampling method. Total respondents are 450.

1.12.3 Secondary Data

An Adoption of sound research methodology is a vital part of any research study. For the present study secondary data also used such as; Study reports of irrigation projects, economic survey of India and Maharashtra, research books, thesis from university library, research journals, magazines, newspapers, etc.
1.12.4 Tools for Data Analysis

The data collected from the respondents were scored, tabulated and analyzed by using simple statistical methods such as total, average, percentage and data has been presented in the form of tables and graphs.

1.13 Limitations

The study does not claim to be devoid of limitations even though it is extensive, innovative, and pioneering in some aspects. The major limitations are:

1. Due to the lack of technical and administrative coordination between the Irrigation Department and the beneficiaries of the project, the study found it difficult to collect the actual information.
2. During the course of the survey, some of the sample respondents were reluctant to co-operate by giving correct information.
3. Since the study is based on opinions, attitudes and judgment of beneficiaries of Irrigation Project, it is not free from bias.

In spite of the above limitations, an earnest attempt has been made to arrive at an objective based conclusion by analyzing the available data sufficiently

1.14 Chapter Scheme

This work is structured as follows:

Chapter I
Introduction, Objectives & Methodology

Chapter II
Review of Literature

Chapter III
Irrigation Development in India
Chapter IV<sup>th</sup>
Irrigation Development in Maharashtra State

Chapter V<sup>th</sup>
Irrigation Development in Marathwada Region

Chapter VI<sup>th</sup>
Socio-Economic Impact of Irrigation Projects

Chapter VII<sup>th</sup>
Conclusions & Suggestions
References

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2. Tirukkural ch. 2:10 tr. G. U. Pope
5. Economic Survey of India 2012-13 p.145