CHAPTER I

INTRODUCTION

The ever-growing stock of food grains in the early 80s created a sense of complacency among the planners and the academicians alike in the country. But the successive droughts during 1984-87 and the consequent fall in food grains production have made everyone realize how dependent Indian agriculture still is on the vagaries of monsoons.

The drought in 1987-88, one of the worst on record in the country, resulted in a fall of about 7 to 10 per cent in food grains production in that year relative to the previous year (1986-87). The year 1986-87 was, by itself, a bad agricultural year, notwithstanding the efforts made by the government to offset the fall (Economic Survey, 1988). The rapid increase in population (which was 2.25 per cent during 1971-81) had the effect of pushing up the demand for food and, had the trend persisted amidst little or no growth in food grains or agriculture.
tural production, it would have led to a terrible scarcity in food grains. (Seventh Five Year Plan, 1985-90, p.11). This is increasingly being realized and therefore the ways and means of increasing agricultural production to match the targets set in the Seventh Plan and Eighth Plan are being developed.

One obvious means that is sought to be pursued to reduce the dependence of agriculture on monsoon is to strengthen the irrigation network in the country. Access to irrigation (surface or ground water) can act as a substitute for any deficiency in natural rainfall, besides being a must for crop husbandry in rain deficient tracts (Dhawan, 1988, p.13). It can also result in the adoption of a profitable cropping pattern which cannot be taken up when there is uncertainty regarding the availability of water for cultivation. Implicit in the above points is the fact that irrigation can not only have a positive impact on agricultural production, but also on its stability. In fact, in the mid 60s when the country was desperately seeking to reduce its reliance on food imports, especially from the U.S.A under P.L.480, it was the areas endowed with better irrigation facilities which encouraged the government to go in a big way for the high-yielding variety seeds.
Irrigation has also the effect of increasing the intensity of cropping by making it possible to cultivate lands which would otherwise have to be left uncultivated. The beneficial role of irrigation in curbing farm instability in area, yield and output is also clearly established (Dhawan, 1988, p.172). The crop-wise trends also reveal the importance of irrigation in stabilizing production (Mahendradev, 1987, p.87).

Dhawan estimated that for the country as a whole the yield on irrigated land was 22 quintals in food grains energy equivalents (FEES) per hectare of gross irrigated area in 1983-84 (Dhawan, 1988, p.87-89). His estimates also show that on lands not benefited by irrigation, the yield was not more than nine quintals per hectare. Thus the yield differential between irrigated and unirrigated agriculture worked out to be about 13 quintals per hectare. Of course, all this is not to be taken as the pure yield effect (that is, rise in yields of crops without any change in the crop pattern following access to irrigation). A decomposition exercise shows that the pure yield effect was only 6.9 quintals out of the 13.3 quintals of yield differential observed during 1983-84 (Dhawan, 1988, p.85). Of the rest, 2.6
quintals was the pure crop pattern effect. "A positive value of 3.8 quintals for the interaction term signifies that irrigation induces a change in the crop pattern away from low to higher yield in crops" (Dhawan, 1988, p.85). The beneficial effects of irrigation have prompted the government to expand irrigation facilities right from the beginning of the planning era. An enormous increase in investment in irrigation has the effect of contributing to irrigation development in the country. The expansion of irrigable area as such is an inadequate measure of irrigation development, because there is a divergence between irrigation potential created and utilized. Further, even the expansion of area actually irrigated cannot be a true measure of irrigation development, because it reveals little about the quality of irrigation as reflected in the quantum of water available per unit of area, the assurance and timeliness of water supplies and the extent of flexibility in adjusting water supply to crop water needs.

In the agricultural sector there is not much scope for increasing the net sown area and it has been almost stagnant. Another discouraging factor is that, a significant proportion of the net sown area has been taken away for developmental activities. This has reduced the net area available for cultivation
and it would continue even in future. Realization of this fact has led to the enhancement of agricultural production and employment opportunities within the rural sector itself, by strengthening the use of the new technology consisting of the water-seed-fertilizer-strategy. It means that water origination is realized as one of the very important and crucial factors in increasing agricultural production, employment generation and additional net return. Since about 50 per cent of the irrigation potential is yet to be utilized, there is still significant scope to irrigate a vast agricultural area to enhance agricultural production and absorb more additional labor within irrigated agriculture (Government of India, 1988)

Statement of the Problem

Increasing agricultural production is one of the important objectives of the five year plans in India. This objective can be achieved by increasing the net area for cultivation. But at present the country faces the problem of inadequacy of land due to the diversion of land from cultivation to developmental activities. This has reduced the net area available for cultivation. This shortage of land poses the need for increasing production and productivity per unit of land with the help of the
new technology consisting of irrigation-seed-fertilizer-strategy. This has led to the emergence of a number of large scale irrigation projects in Kerala. Several economists have analyzed the various aspects of development of irrigation in the agricultural sector. But hardly any systematic and exhaustive study covering cropping pattern, intensity of cropping, adoption of technology, production, employment, cost and yield structure per unit of land as a result of irrigation in the state has so far been conducted. The present study is directed to fill this gap in a small way.

The Kuttiadi irrigation project in Kerala has been selected for the present study. This is mainly because this project is one of the major irrigation projects in Kerala situated in kozhikode district. The district is endowed with a high average rainfall (exceeds even 5000 mm per annum). The average rainfall in the state is roughly assessed as 3085 mm per annum.

Objectives of the study

The present study is undertaken with the following objectives:
1. To assess the nature and direction of change in the cropping pattern due to irrigation.

2. To know the changes in intensity of cropping as a result of irrigation.

3. To understand the effects of irrigation on adoption of modern technology.

4. To estimate the extent of increase in crop production per acre of gross cropped area due to irrigation.

5. To understand the impact of irrigation on employment and on the changing composition of male and female labour.

6. To examine the cost and yield difference between irrigated and non-irrigated lands.

7. To estimate the net return per acre in the command area and in the non-command area by different crops.
The impact of irrigation is evaluated in this study on the basis of "with" and "without" principle. The study is both descriptive and analytical. It is descriptive as far as literature survey is concerned and analytical with regard to the primary and secondary data collected for analysis, interpretation and conclusion. Both primary and secondary data were used for this study.

The Kuttiadi irrigation project has two main canals namely, Left Bank and Right Bank main canals. Each main canal has six and four branch canals respectively. The Left Bank main canal was selected purposively for this study. The reason for selecting this is that it covers two third of the total ayacut areas of the study region. Three villages namely, Kuzhakkoth, Sivapuram and Unnikulam also were selected from outside the command area to make a comparison between command area and non-command area to find out the real impact of irrigation.
A three stage sampling procedure was adopted for the selection of the study locations. First, the total length of 45 km of the Left Bank main canal with three reaches representing head, middle and lower (tail) was identified. Then, based on the criterion of water allocation by the canal authorities the head reaches were identified. This covered a length of 15 km where the first two branch canals, namely, Kallur and Kakkodi are located (at a distance of 11.400 km and 14.400 km). Thereafter, the middle reaches was identified. This again covered a length of 15 km. It is here that the third and fourth branch canals namely, Naduvathur and Ayanikad were designed (at a distance of 20.200 and 26.300 km). Finally, the lower reaches were identified. This also covered a length of 15 km. It is here that the last two canals namely, Thiruvangur and Iringal are designed (at 45 km; one is on the right and the other on the left).

At the second stage, each branch canal was again subdivided into three portions, viz. upper, middle and lower on the basis of one third of the total length of the branch canal. Three distributaries—one each from the upper, middle and lower portions—were selected and 12 beneficiaries from the area served by each of these three distributaries were canvassed. These 12 beneficiaries were grouped into marginal, small, medium
and large operators. Thus, 36 beneficiaries from each branch canal were surveyed. Altogether, $36 \times 6 = 216$ household schedules were used in the command area for collection of data. To understand the level of development and for comparison, three neighboring villages from outside the command area were also selected. Thirty six households from each village were selected at random. Altogether 108 households were selected from outside the command area. In total, $324 (216 + 108)$ sample household schedules were used to collect data both from the command and from the non-command areas.

A pilot survey was undertaken to pre-test the schedule. It was on the basis of the pilot survey that the questions were finalized. The finalized schedules were used to collect information from the respondents.

The schedules were administered during the seasons of Viruppu, Mundakan and Puncha, during the months from May 1992 to April 1993. The puncha crop mainly depends on irrigation.
The primary data collected from the command area were compared with the primary data collected from the non-command area. For the purpose of this study, command area is that which is endowed with assured water supply, while the non-command area is that which does not possess assured water supply under any major or minor irrigation works extended by the government. Here the area that is not covered by any major irrigation canal system is named as non-command area.

Data thus collected was tabulated with the help of statistical tools like arithmetic mean, percentage, Correlation - Co-efficient, t-test, Anova test, etc. and the data collected were analyzed. And on the basis of analysis and interpretation, conclusions were drawn.

Limitations

The study has the following limitations. In the first place, the revenue records in the study villages have not been
updated. A few sample farm households selected on the basis of the revenue records could not be retained in that particular farm size group, as they actually owned either less or more land than what is given in the revenue records. Secondly, there were time and resource constraints. So an extensive survey could not be conducted. Thirdly, Right Bank branch canals were not selected. This was due to frequent siltage problem.

Organization of the Study

The present study is organized under nine chapters. The first chapter, which is in the nature of an introduction, states the problem of the study and the methodology adopted for the study. The second chapter presents a brief summary of the literature on the subject. The third chapter presents a brief history of the development of irrigation in the state. It also explains the profile of the study area. The fourth chapter deals with the socio-economic conditions of the sample households both in the command and in the non-command areas. The fifth chapter examines the impact of irrigation on cropping pattern, intensity of cropping and the adoption of modern technology. The sixth chapter discusses the impact of irrigation on production of paddy
as well as in non-paddy crops. The seventh chapter examines the impact of irrigation on employment and the composition of male and female labour. Chapter eight presents the cost and yield structure of cultivation of crops in the command and in the non-command areas. Chapter nine presents the summary and conclusion of the study.

**Definition of Concepts**

1. **Crop Intensity**

   Crop intensity is the ratio of gross sown area to net sown area.

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   \text{Crop Intensity} = \frac{\text{Gross Cropped area}}{\text{Net cropped area}} \times 100
   \]

   It is normally expressed in terms of percentage and therefore, it has been multiplied by 100. Under the present study, the agricultural year has been divided into three seasons - (1) viruppu.
(2) Mundakan and (3) Puncha (summer crop). If a piece of land is sown only once or in only one season, the crop intensity has been treated as 100 per cent. If the same plot is sown two or three times, the crop intensity is considered as 200 or 300 per cent, as the case may be.

2. Command Area

Command area is that which is endowed with an assured water supply through a major irrigation canal system.

3. Non-Command area

Non-command area is that which does not possess an assured water supply under any major irrigation canal system.