-I- INTRODUCTION -I-

1. THE PROBLEM :

Irrigation is an ageold practice. It is " essentially an artificial application of water to overcome deficiencies in rainfall for growing crops," (Cantor,1977). In a country like India where the rainfall is both inadequate and unpredictable, irrigation plays an important role in minimising its adverse influence on agriculture. Agriculture is a backbone of our economy. Therefore, its stability and development depends on the availability of water for irrigation.

The land is fixed in its areal extent and the growing pressure of population on land resources is a major problem of the Third World Countries where there is an acute problem of food scarcity. To feed these teeming millions, we have to increase farm production by a more intensive utilization of land and application of modern farm technology. 'The bulk of increased food production at least in the immediate future will come from further expansion of irrigated area and from the technology, already available in the areas with water availability' (Swaminathan,1977)

India started marching in this direction particularly since 2nd Five Year Plan - when the first priority was given to the agricultural sector. The new technology was adapted through Green Revolution, leading to enhancement in food production which is still continuing. Thus, new culture and

its success is linked closely with the development of irrigation (Sharma and Coutinho,1982).

During the successive plan periods, a special attention was given to the extension of irrigation in the dry areas of our country. Irrigation development and improved farm practices have tackled the basic problems of low productivity, inferior cropping pattern, subsistance agriculture and rural poverty in the rainfed areas (Singh,1982).

With the introduction of irrigation facilities farmer is able to grow cash crops like sugarcane, cotton etc. for gaining more benefits which bring about the changes in cropping pattern of the region. Irrigation responds the shift from seasonal cultivation to permanent and promotes more intensive cultivation. It motivates the multiplicity in cropping and secures high yield per unit area and thus attains optimum level of verticle expansion and output.

Irrigation attains the proper growth of crops, makes up the moisture deficiency in the soil and assures the safe harvests. But irrigation is not only a protective measure against the vagaries of rainfall but it promotes the use of high yield varieties, chemical fertilizers, other inputs, increasing the productivity and obviously stabalizing the agriculture.

The another important benefit of irrigation is that it can promote expansion of land under cultivation, reducing

the land under fallow. Irrigation increases the horizontal expansion of cultivation. Irrigation acts as an catalytic agent for the adaption of modern farm technology and thus brings commercialization in agriculture. It is common picture that the improved farm machinary is used in the irrigated agriculture as the farmer is capable to purchase machinary resulted from high purchasing power.

Irrigation increases the farm income and improves standard of living, social and economic status of the farmer. The socio-economic need for irrigation has also been recognised for supporting the growing population, rehabilitating the poor sections of the society and narrowing the gap of regional imbalances (Singh, 1982).

Besides, irrigation provides the employment opportunities in the rural areas. It supports many agro-based industries and the process of rural industrialization. All this leads to strengthen rural economy. Naturally, irrigation as an economic element revolves within the orbit of the agricultural development (Das and Singh, 1982).

The literature on irrigation, in Geography, is very limited. The regional studies in this respect at micro level are also inadequate in number. Such studies are very important in view that the new technology has appeared in a better position in Indian agriculture. The entire need for such investigation arises from the fact that the economic development in India is

planned and executed at this level and the studies at lower level becomes cumbersome without adding much by way of quality while overgeneralization at higher level renders them irrelavant (Sharma,1979).

Any region, micro or macro, provides an example of regional imbalances in the development of irrigation facilities in its spatio-temporal perspectives. The region under study is not exception for this. It is the task of geographer to study the spatio-temporal distribution of irrigation and its relationship with other attributes. Such studies stand as the basis for further planning and development of the region.

In view of this, irrigation has become an essential input by which agricultural production could be enhanced. In fact, the disparities in irrigation developments are observed within the boundaries of either macro or micro level region. The regional distribution of irrigation is uneven in the region under investigation. The Upper Vedganga basin records about 2,218 hect.(10.57%) area under irrigation which is mainly confined to riverside flood plains. The physiographic setting has become the major constraint for the development of irrigation facilities. In the present investigation an attempt has been made to analyse the spatial pattern of irrigation from different sources. Obviously, the attempts are also made to assess the physical constraints in the context of irrigation facilities.

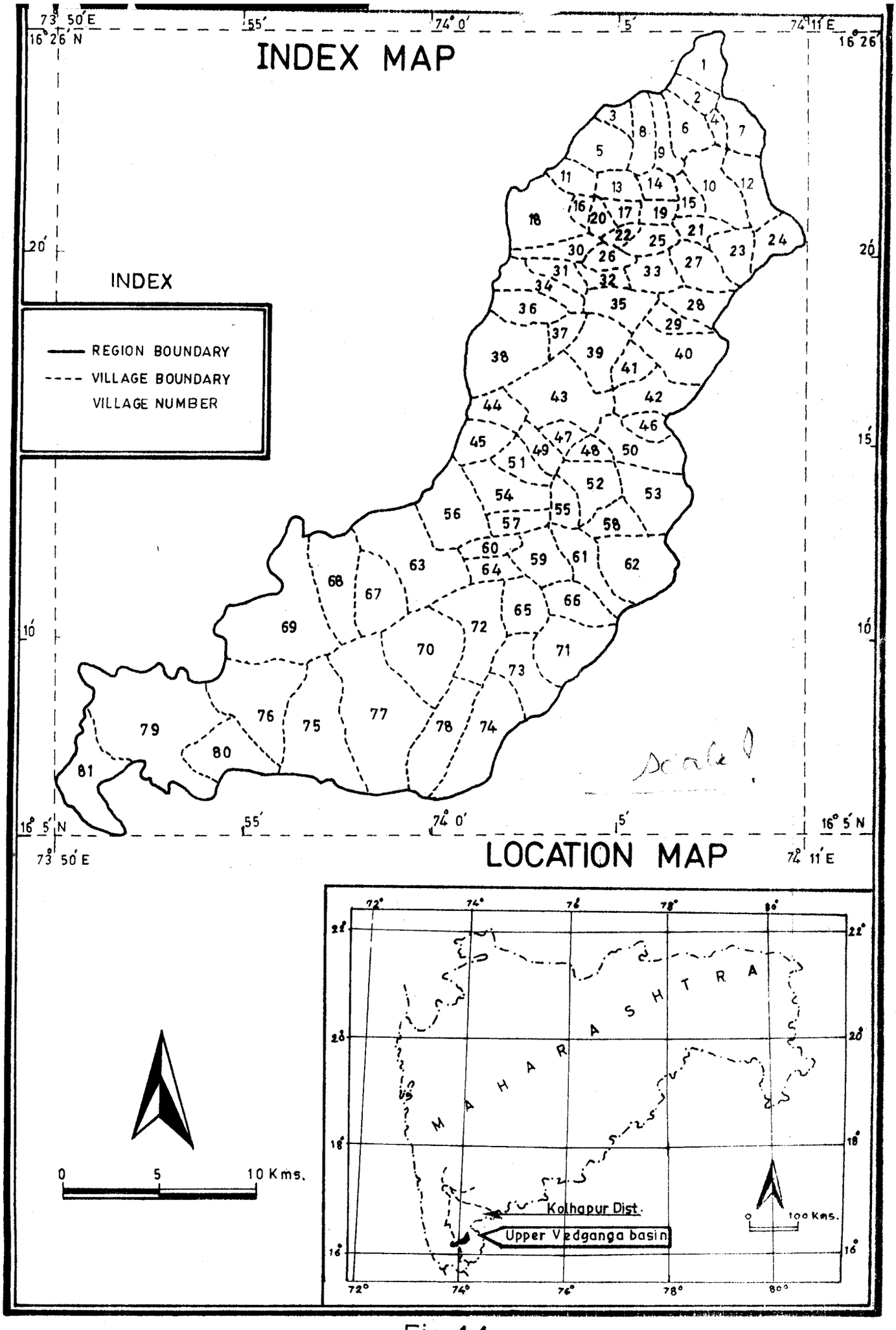
INDEX MAP
INDEX
REGION BOUNDARY
VILLAGE BOUNDARY
VILLAGE NUMBER
73° 50' E
74° 11' E
16° 26' N
16° 5' N
LOCATION MAP
MAHARASHTRA
Kolhapur Dist.
Upper Vedganga basin
0 5 10 Kms.
0 100 Kms.

Fig. 1·1

Irrigation influences the cropping pattern, crop productivity, the tempo of fertilizer consumption and the levels of mechanization of the region. It is, therefore, proposed to assess the impact of irrigation on these variables. The present study pertains to village level. Besides, the regional variations in the economy of well and lift irrigation are also analysed in the investigation.

2. THE REGION :

The Upper Vedganga basin comprises the southern part of Kolhapur district, covering an area of Bhudargad taluka. It falls in between 16°4' to 16°26' north latitudes and 73°50' to 74°11' east longitudes. The river Vedganga rises in the Western Ghats at the height of 992 metres. It flows eastwards bounded with the hills on the north and south of its upper part. Of its total course of 112 km; it flows for a distance of 70 km within the study area.

Upper Vedganga basin consists 81 villages (Fig.1.1 and Appendix - I). It occupies an area of 54,661 hect. (546.61 sq.kms.) and has the population of 108,061 (1981). The region has varied topography with narrow basin in the west which gradually broadens in the east. The north-south boundary of this basin is well defined by the watersheds of hill ranges, the offshoots of Sahyadri, along the both sides of the basin. The soil conditions are comparatively rich in

its lower part. The basin is drained by a number of small nalas and streams. The cultivated area of the basin is 38.56 percent and irrigated area is about 10.56 percent of the net area sown.

The selection of the region for study is made by many considerations. First, the Kolhapur district is well known for its irrigated agriculture and the Upper Vedganga basin lies in this district. The last two decades have withnessed considerable changes in cropping pattern due to irrigation. Secondly, agriculture is the major occupation of this region which is influenced by irrigation. Third, consideration being the region, though small, experiences varied physiographical and climatic conditions. Besides, the author is familiar with all these facts and the region too.

3. OBJECTIVES :

The present work incarporates the following objectives :-

i) To observe and analyse the role of physical environment in the promotion of irrigation development in the region.

ii) To map and analyse the spatial pattern of the means of irrigation.

iii) To highlight the developments and priority for irrigation in the region.

iv) To assess the economics of irrigation.

v) To map and examine the relationship between irrigation and other variables like agricultural productivity, fertilizer consumption, mechanisation and cropping pattern.

4. DATA BASE :

The work is based on primary and secondary sources of data. The primary data is collected through intensive field work comprising schedule, interviews and discussions with the farmers, other relavant persons and authorities.

Village is the areal unit of the present work. Since the data is not available at village level regarding per hectare fertilizer consumption, cropwise productivity, water-table etc., the author has generated the same through sampling techniques. The region comprises 81 villages out of which 15 are selected (18%) with the help of stratified random sampling technique.

Schedules are prepared to collect data and information regarding cropping pattern, irrigated cropping, sources of irrigation, economics of irrigation, yield per hectare, fertilizer consumption etc. The secondary data is collected from the village Revenue Officer, Tahsildar Office, and the District Statistical Abstracts, Census Handbooks, District Gazetteers, and some unpublished records.

5. METHODOLOGY :

The period for the present investigation is considered from 1960-61 to 1985-86. The collected data through different sources were processed and represented by statistical and cartographic techniques. The details regarding the various methods and techniques have been discussed at appropriate places in the text. The relationship among variables has been tested through correlation matrix in the fourth chapter. The stratified random sampling method (18 percent sampling) is adopted for the selection of the villages. Besides this, frequent visits, and personal interviews were carried out to obtain the data for two villages for case study.

6. LIMITATIONS :

In the present work village is a unit of study. The data like irrigated cropping pattern, fertilizer consumption, yield per hectare etc. is not available in a published form at village level. The data of general landuse for 1961 is also not available. Due to the inaccessibility of the region, forest cover, lack of transport facility, the villages in the hilly areas, were difficult for investigation and for data collection. This, however, was overcome by sampling technique. The majority of the people are illitarate due to which they do not give correct and relevant information. An attempt has been made to overcome such difficulties by employing schedule technique.

7. ORGANIZATION OF THE STUDY :

The entire study is organised into five chapters. The first chapter presents the profile of the region, comprising the analysis of relief, climate, soil, agricultural landuse and the sources of surface and ground water resources. The second chapter presents the pattern of irrigation, consisting of the spatial distribution of sources of irrigation, intensity of irrigation, sourcewise crop economy and the planning for irrigation. The third chapter highlights the impact of irrigation on agricultural productivity, fertilizer consumption, the levels of mechanization and crop landuse. Case studies have been undertaken to study the irrigation and its impact at micro level which is the subject matter of fourth chapter. The last chapter attempts to summerise the findings of the study. The references are given at the end of each chapter.

8. REVIEW OF LITERATURE :

Irrigation is an inter-disciplinary study. Besides geographers, it is studied by economists, agronomists, irrigation engineers, planners, administrators and so on. The geographical studies on irrigation are very few as compared to the studies done on landuse, cropping pattern, agricultural productivity etc. Since last decade, geographers have been taking interest in studying irrigation.

Cantor (1967) has given detailed account of the history of irrigation, present situation of irrigated agriculture and the problems of irrigation. Fukuda (1976) has attempted comparative studies of irrigation and drainage throughout the world. The problems of irrigated agriculture with special reference to India are studied by an Agronomist, Kulkarni (1970), Dr.V.K.R.V.Rao (1979) has forwarded a book in which the papers of different scholars are included which deal with the impact of canal, well and tank irrigation in Karnataka. Joshi A.S. (1987) deals with the economics of irrigation. He examined the comparative economics of minor irrigation from different sources. The papers read in the seminar held in the Department of Geography, Shivaji University Kolhapur (1982) on the theme 'Irrigated Farming in India' are edited by Dr.Shinde (1988) recently.

Besides, some of the important studies from geographic point of view on the regional basis include the works of following scholars. Chaturvedi and Reddy (1964) attempted the comparative study of the various sources of irrigation to analyse the causes of present backwardness of the area in respect of irrigation. Singh J. (1974) worked out the regional imbalances and temporal development in irrigational facilities in Harayana. Pawar and Shinde (1979) attempted to map, analyse and interprete the spatial spread and temporal variation of well irrigation in upland districts of South Maharashtra.

Joshi and Dube (1979) devised a suitable index of agricultural development with reference to related factors i.e. irrigated area, cropping pattern etc. and mapped the regional disparity in a quantitative form. The study attempted by Dhillon and Sandhu (1979) focusses on the spatio-temporal development of irrigation and its potentials and limitations in the light of physico-socio-economic factors. The agricultural characteristics of lower Ganga-Ghagra Doab were discussed by Singh, M. (1982). The role of ground water in the development of irrigation has been discussed by Mathur, Pandey and Rai (1983). More and Mustafa (1984) examined the requirements and developments of irrigation and workout the priority zones of irrigation in Maharashtra. Mishra (1984) attempted to assess and evaluate the impact of irrigation on the entire dimentions of farming in Mirazapur district. The study of Swapna Basu (1984) reveals as to how and to what extent D.V.C. irrigation has helped to change landuse, cropping pattern and thereby the entire agrerian economy of the region. Vijaykumar and Pal (1985) took a review of the limitations and prospects of the development of irrigation in Harayana. The work carried out in this respect by other scholars are by Andreae (1975), Baumann (1975), Schaffer (1976).

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