CHAPTER -IV

IMPACT OF IRRIGATION

4.1 INTRODUCTION:

In the previous chapter the physical and social bases of irrigation have been examined in the region. The present chapter attempts to highlight the impact of irrigation particularly on landuse pattern, cropping pattern, irrigated cropping pattern fertilizer consumption, mechanization and intensity of Irrigation. etc

4.2 AGRICULTURAL INPUTS :

The tools used in agriculture operations such as wooden and iron ploughs, oil engine, electric pumps, crushers, sprayers, dusters, tractors, etc. are considered as agricultural implements. The energy inputs such as cultivators, agricultural labourers, ,bullocks, fertilizer, consumption are also given due waitage. However, some of the important implements are considered for present investigation. Although, the region under study is experiencing adoption of improved implements, the use of traditional implements associated with subsistence agriculture is common.

TABLE NO. 4.1

COMMAND AREA OF LOWER REACHES OF CHIKOTRA IRRIGATION PROJECT: AGRICULTURAL INPUTS, 1995-96 TO 2005-06.

Sr. No.	Agricultural Implements	Agro inputs	
		1995-96	2005-06
1.	Cultivators per 100 hectare of		
	i) Cultivated area.	90.00	85.13
	ii) Irrigated area.	1114.18	252.72

2.	Agricultural Labour per 100 hectare of irrigated area	640.91 (12.40)	262.13 (19.60)
3.	Tractor Per 100 hectare of irrigated area.	13.23 (52)	4.73 (84)
4.	Iron plough Per 100 hectare of irrigated area.	78.84 (310)	16.27 (289)
5.	Wooden plough Per 100 hectare of irrigated area.	63.58 (250)	10.81 (192)
6.	Bullocks Per 100 hectare of irrigated area.	48.32 (190)	11.26 (200)
7.	Oil engine Per 100 hectare of irrigated area	16.53 (65)	2.42 (43)
8.	Electric pump Per 100 hectare of irrigated area.	27.98 (110)	32.55 (578)
9.	Use of fertilizer per 100 hectare of irrigated area	90 tons (0.9 tons)	155 tons (1.55 tons)

N.B: Figures in the bracket indicates quantity of agricultural implements.

Source: Compiled by the researcher.

4.2.1 Agricultural implements :

The use of traditional implement is dominant in the region. However, adoption of mechanized implements is increasing with the development of irrigation facilities. The number of wooden ploughs per 100 hectares of irrigated area has reduced from 63.58 (250) to 10.81 (192) during the period under review. Similar trend is observed in case of iron-plough and oil engines (Table no 4.1). This is due to the adoption of modern implements such as tractors, tillers, electric pumps etc.

The use of modern implements such as tractors has increased but the proportion to per 100 hectares of irrigated area

has reduced simply because rate of increase of tractors is not proportionate to the rate of increase of area irrigated. As such the number of tractors per 100 hectare of irrigated area has reduced from 13.23 to 4.73. However, the total number of tractors has increased from 52 to 84.

The ratio of oil engine has decreased from 16.53 to 2.42 per 100 hectare of irrigated area .It is simply due to electrification, oil engines are replaced by electric pumps. By contrast the proportion of electric pumps has gone up from 27.98 to 32.55 during period of study.

Modern implements and irrigation development go hand in hand especially in irrigated tracts of the study region. Dr. Gadgil's (1948) Survey of Economic effects of irrigation, farmers would make additional investment in cattle,farm implements and on more valuable crops like sugarcane.

4.2.2 Irrigation and fertilizer consumption :

Fertilizer, a land saving and labour saving input play predominant role in increasing the fertility of soils (Pawar, 1989). After water, it constitutes their next most vital impact for modern agriculture.

Irrigation and fertilizer consumption are important aspects. In fact, the irrigation is corelated with consumption of fertilizer. The average fertilizer consumption per 100 hectares of irrigated area in 1995-96 was 90 tons which has increased up to 155 tons in 2005-06. This is mainly because, increased irrigation facilities are utilised for cane cultivation which requires fertilizer doses on large scale. However its consumption differs arealy,

particularly away from river banks the consumption is decreasing (field work and farmers interview).

4.2.3 Cultivators :

Both cultivators and agricultural labourers form the farm working population. This kind of source is of fundamental importance particularly at the time of sowing and harvesting period. Agriculture is the main occupation of the people in the region, as about 85 percent people of the geographical area is brought under plough. At present cultivators per 100 hectares of cultivated area come to about 85 which was 90 during the base year. Similarly cultivators per 100 hectares of irrigated area was 1141 which comes to about 253 during the year 2005-06. This is simply because of significant increase in irrigated area after the completion of Chikotra irrigation project.

4.2.4 Agricultural labours :

The availability of labour, its quantity and quality at the period of demand have great influence on the agricultural landuse and decision making process of the farmer. The different crops and agrarian system vary in their total labour requirements, as well as in the seasonality of their demands (Hussain 1979).

As the family labour force is not sufficient for agricultural operation, particularly at the time of harvesting the farmers, therefore, have to take the help of hired labourers. The use of labours per 100 hectare of irrigated area was 640.91 in 1995-96 which reduced to 262.13 in 2005-06. But in total number of labour in the region has increased from 2520 (12.40%) to 4654

(19.60). The general fact is that human labour requirement increases with the availability of irrigation facilities. The number of labours is prominent in the close area of river banks, i. e. Kapsi, Nandyal, Arjunwada, Metage and Lingnur, villages. It is observed that the agricultural labourers migrate from the agriculturally backward areas, at the time of harvesting of sugarcane.

4.3 LANDUSE AND CHANGES :

Although an agricultural landscape is largely controlled by physical factors of an area the socio-economic factors also have an important role to play in promoting agricultural development. The farming is the product not merely of physical setting but also of man made frames (Sing 1976). Since irrigation is an artificial way of providing water to various crops, it is necessary to portray agricultural landscape in the region in view of irrigation development in the region. This sub-section therefore deals with some aspects of existing agricultural, social and economic conditions of the study region.

4.3.1. General landuse pattern and changes :

The physical and socio-economic factors determined the nature of landuse pattern. It represents the use of regions natural resources. The dynamic phenomenon changes with the introduction of new technology, irrigation and other inputs. Such study may help in understanding the regional variations which corresponds with the development of irrigation facilities.

TABLE NO 4.2

COMMAND AREA OF LOWER REACHES OF CHIKOTRA IRRIGATION PROJECT : GENERAL LANDUSE PATTERN - 1995-96 TO 2005-06

Sr. No.	Category	1995-96		2005-06		Volume of change
		Area in Hectare	Percen-tage	Area in Hectare	Percenta-ge	
1.	Forest	172.36	2.80	129.52	2.10	-0.7
2.	Area not available for cultivation	217.48	3.53	217.48	3.53	-00
3.	Other uncultivated area excluding fallow	190.78	3.09	100.86	1.64	-1.45
4.	Pasture land	152.55	2.47	100.05	1.62	-0.85
5.	Fallow land	445.52	7.23	345.79	5.61	-1.62
6.	Net area sown	4985.40	80.88	5270.61	85.50	+4.62
	Total	6164.09	100	6164.09	100.00	± 4.62

Source : Tahsil office, Kagal 2006.

The total Geographical area of the region is 6164.09 hectares of which forest covers 2.10 percent (129.92 hectare). Due to extension of cultivated area the land under forest has reduced. The major landuse category in the region is net sown area which share 85.50 percent of total geographical area. However, its ratio varies at village level. The villages along the river occupy more than 87 percent of geographical area. Where as about 80 percent area under this category is observed in the western and northern part of the region. The fallowland occupies about 5.61 percent of the geographical area followed by area not available for cultivation (3.53 percent).

The overall change in the general landuse area is about 4.62 percent. The major landuse category increased is net area

sown by 4.62 percent, Table no(4.2). The major landuse category decreasing is fallow land (-1.62) followed by other uncultivated area excluding fallow land (-1.45 percent). This change is mainly due to increase in irrigated area by which fallow land is brought under plough.

4.3.2 Cropping Pattern and changes:

The important crops grown in the region are sugarcane. Soyabin, Tobacco, Groundnut, Rice and Chill. The sugarcane ranks first by occupying 22.36 percent of gross cropped area. The soyabin ranks at second position is (22.16 percent). Other important crops are Tobacco (18.55 percent). Groudnut (11.79 percent) Rice (9.31 percent). Grass (13.08 percent) and Chilli (1.65 percent). The other crops (1.17 percent) including Jowar, Vari, Nachani etc. are commercially less important. The Rabi crops have also good share in cropping pattern (85 hectares). Table (4.2) shows the cropping pattern during 1995-96 and 2005-06. and changes.

TABLE NO. 4.3
COMMAND AREA OF LOWER REACHES OF CHIKOTRA IRRIGATION PROJECT: CROPPING PATTERN, 1995-96 TO 2005-06.

Sr. No.	Category	1995-96		2005-06		Volume of change
		Area in Hectare	Percen-tage	Area in Hectare	Percen-tage	
1.	Rice	867-96	17.45	490.96	9.31	-8.14
2.	Groundnut	1046.93	21.99	621.51	11.79	-10.2
3.	Sugarcane	311.59	6.25	1178.09	22.36	+16.1
4.	Soyabin	1479.17	29.67	1168.4	22.16	-6.47
5.	Tobacco	607.22	12.18	977.47	18.55	+6.37
6.	Grass	517.98	10.39	685.47	13.01	+2.62
7.	Chilli	72.29	1.45	87.05	1.65	+0.2
8.	Others	82.26	1.65	61.85	1.17	-0.48
Gross Cropped Area		4985.40	100	5270.61	100	± 25.29

Source : Tahsil office, Kagal, 2006.

Table No. 4.3 reveals that sugarcane is the main crop in the region which shares about 22.36 percent of total cropped area. Then soyabin stands on second position (22.16 per cent) and tobacco contribute 18.55 percent of total cropped area. Groundnut shares about 11.79 percent of total cropped area. Thus, the cash crops share about 74.86 per cent of total cropped area of the region.

After the introduction of irrigation there has been marked change in the respective position of crops. The area under food grain like rice has decreased significantly by 8.14 percent followed by groundnut (-10.2). Other important crop of leading increase is soyabin whose areal extent has decline from 29.67 to 22.16 percent during the period under review.

Sugarcane and tobacco are leading crops in the region. The area under sugarcane has dominantly increased over three times i.e. from 6.25 percent to 22.36 percent during period of a decade. Similarly the area under tobacco has increased from 12.18 percent to18.55 percent. This shift from cereals to cash crops is due to the availability of perennial source of irrigation through lift irrigation of K.T weirs which is predominant source of irrigation and also well irrigation and other sources of irrigations in the region

In brief, availability of irrigation facilities cultivators have changed their attitude and they have turned towards the cultivation of cash crops. The main crops in the region are analysed below.

1) **Sugarcane :**

The sugarcane is single dominant crop in the region which occupies 22.35 percent of gross cropped area, and uses 66.35 percent of gross area irrigated, while ranking first among the irrigated crops. However, its areal distribution differs throughout the region. (Fig. 4.1).

The lower part of the valley has relatively very high (above 15) percent area under sugarcane .The reasons behind growing the sugarcane area are the relatively high intensity of irrigation, presence of fertile soil and efforts of the cultivators. The village Khadakewada contributes high (over15) percent of area under sugarcane cultivation. The villages of north eastern and western parts of the region (Nandyal, Lingnur Galagale Hamidwada etc). occupy moderate (10-15) percent of area under sugarcane. This

zone has newly come up as irrigated part due to the construction of K.T.weirs. The central and southern parts of the region occupy 5to10 percent of area under sugarcane. It covers the villages namely Arjunwada Metge, Kardyal, Alabad and Kapsi. This low proportion under sugarcane can be well attributed to the low intensity of irrigation in these villages.

The period under investigation has witnessed phenomenal growth in the area under sugarcane, the area under this crop rise from 311.59 hectares (6.25 per cent) to 1178.09 (22.36 percent) hectare during the period under investigation. The significant increase in sugarcane area is confined to the villages in lower part of Chikotra basin. This is made possible due to the increase in perennial source like lift irrigation and the special efforts made by sugar factories who have supported cane growers in all respect to grow sugarcane.

2) Soyabin :

Soyabin is the second ranking crop in the region. The area under Soyabin has increased in 2005-06 as compared to 1995-96. This crop shares about 1168.4 hectares of area and occupies 22.16 percent of net sown area.

The southern part of the region i.e. Kapsi village contributes high (above 20) percent area under Soyabin. (Fig 4.2) This is due to the availability of medium deep black soil which is very fertile and suitable for Soyabin crop. The moderate (10 to 20%) percentage of area under this crop is occupied by the villages namely Khadakewada, Hamidwada, Nandyal and Alabad. Where as low proportion (below 10%) is observed in the

SUGARCANE 2005-06

percentage of gross croped area of the region

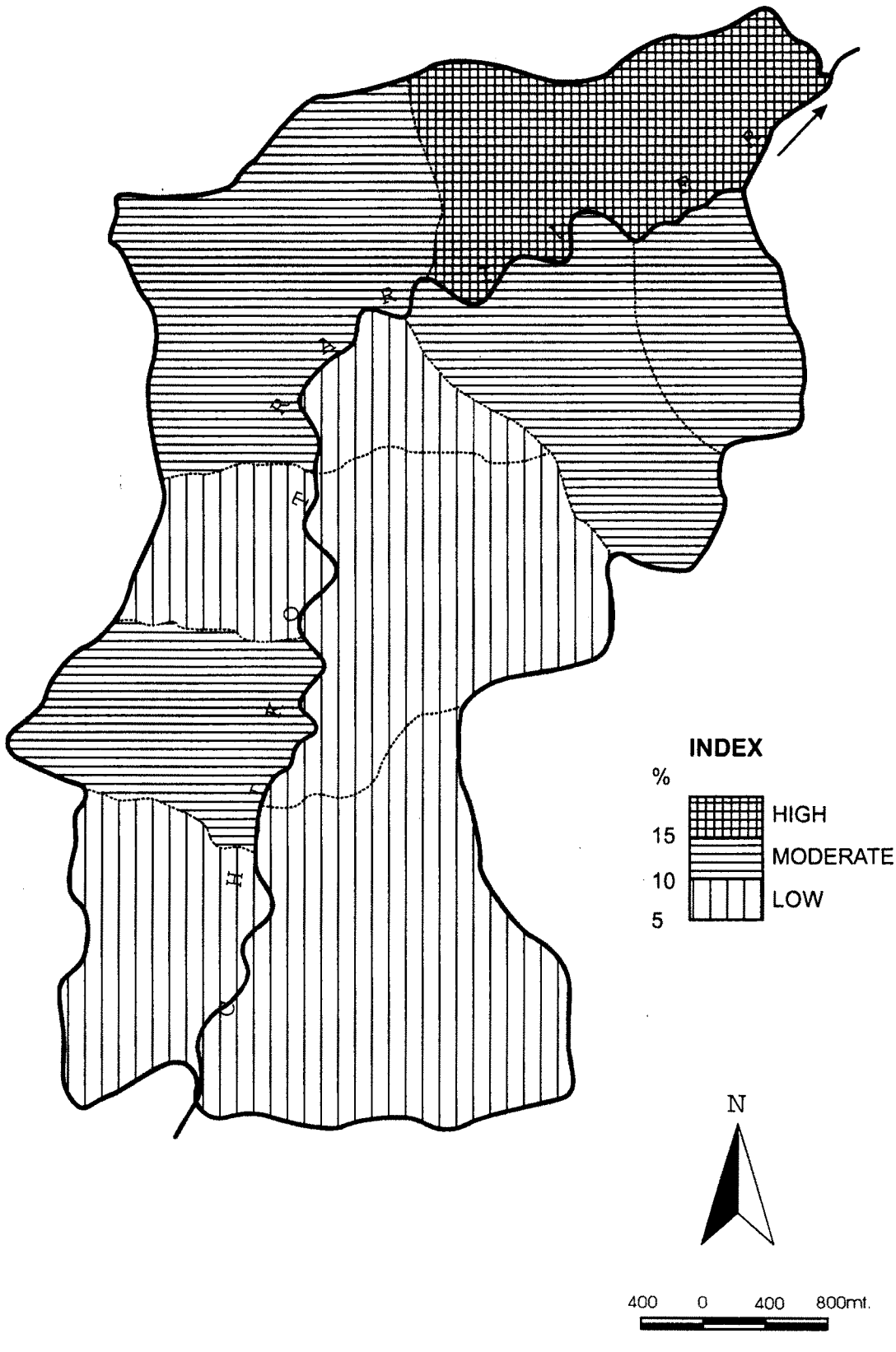

Fig. 4.1

SOYABIN 2005-06

percentage of gross croped area of the region

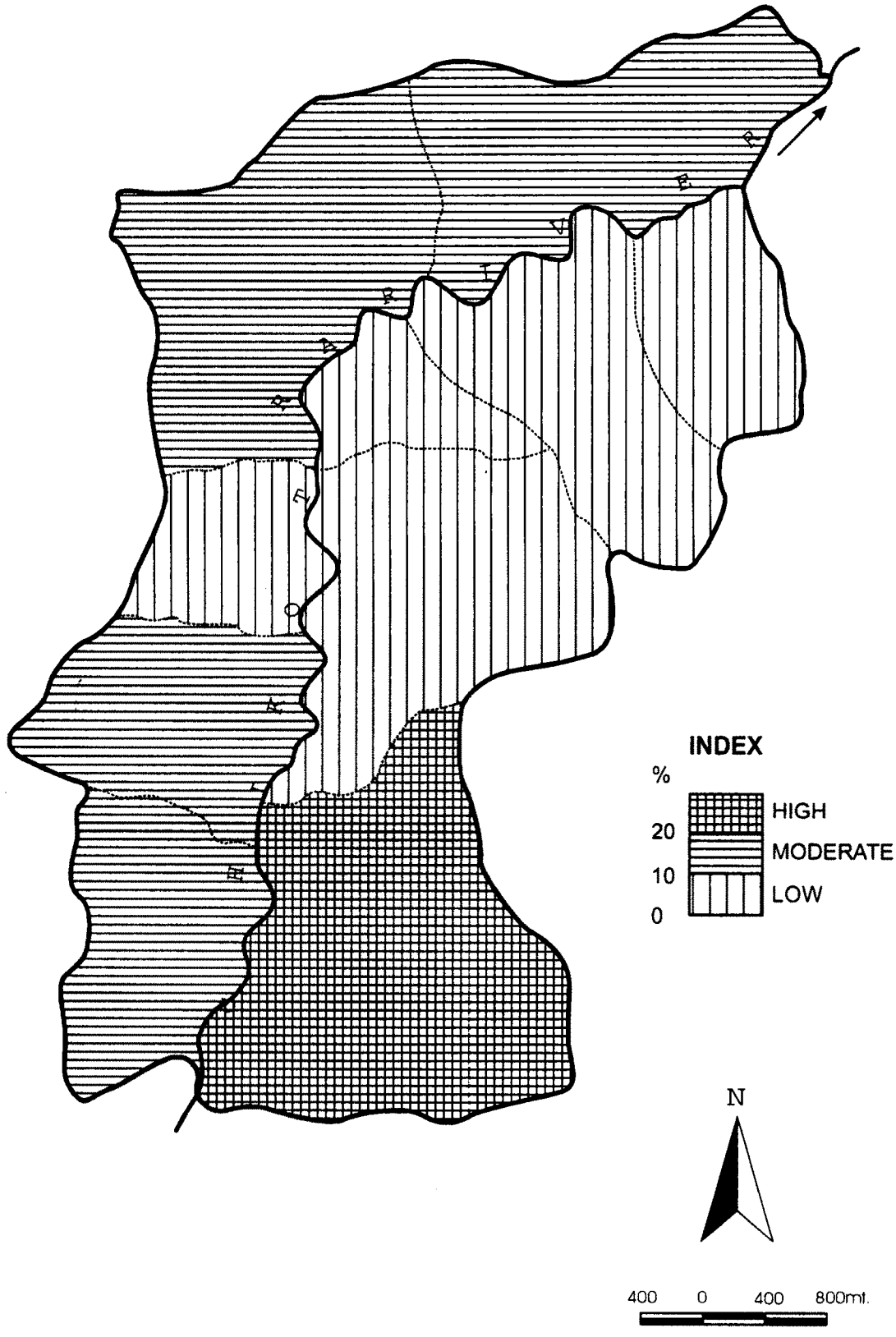

Fig. 4.2

village like Arjunwada,Kardyal, Metge, Galagale and Lingnur. This is due to coarse shallow soil available in these village. During the period under review hectarge under soyabin declined by 6.47 percent.

3) Tobacco:

Tobacco is the another significant crop in the region which stands third in areal extent. The tobacco crop comprises about 977.47 hectare which shares 18.54 percent of Gross area sown. This can be well attributed to two facts. First the soil is suitable to tobacco and another fact is that the big tobacco National Market, Nipani is close to this region.

The south eastern part of the region i.e. the village Kapsi has high (above 20) percentage of total area under tobacco. (Fig. 4.3) The irrigation intensity of this village 21.85. This region shares high area under tobacco crop because of presence of medium deep black soil which is highly suitable for tobacco. The north-eastern and western parts of the region have occupied moderate (10-20%) area under tobacco crop. This region comprises Lingnur, Galgale and Hamidwada. villages. The central, southern and north part of the region including the villages like Metage, Kardyal, Arjunwada, Nandyal, Aalabad have low (below 10 percent) hectarage under this crop. During the span of a decade hectarage under tobacco has increased 607.22 to 977.47. this increase is confined in the central part of the region.

4) Groundnut:

Groundnut is grown in both kharip and rabi season. It is largely grown as rainfaid crop but to some extent it is also grown under irrigation. Groundnut shares about 621.51 hectares which shares 11.79 per cent of gross cropped area. However, the areal variation prevails at village level.

As such high proportion (above20 percent) is concentrated in Hamidwada village (fig 4.4). The coarse shallow soil and moderate rainfall have facilated the growth of this crop. The moderate area (10 to 20 percent) is observed in the villages namely Khadakewada, Kardyal, and Kapsi. The remaining villages have low proportion (below 10 percent) under this crop. These are the villages having fertile soil and better availability of irrigation facilities due to which sugarcane is dominant crop in these villages. During the period under review groundnut has reduced its share by 10.2 percent as the increased irrigated land is used mainly for sugarcane cultivation.

The area under groundnut has decreased from 1046.93 hectares to 621.51 hectares during span of ten years. This decrease is mainly observed in the villages situated to the north east and south western side of the region.

TOBACCO 2005-06

percentage of gross croped area of the region

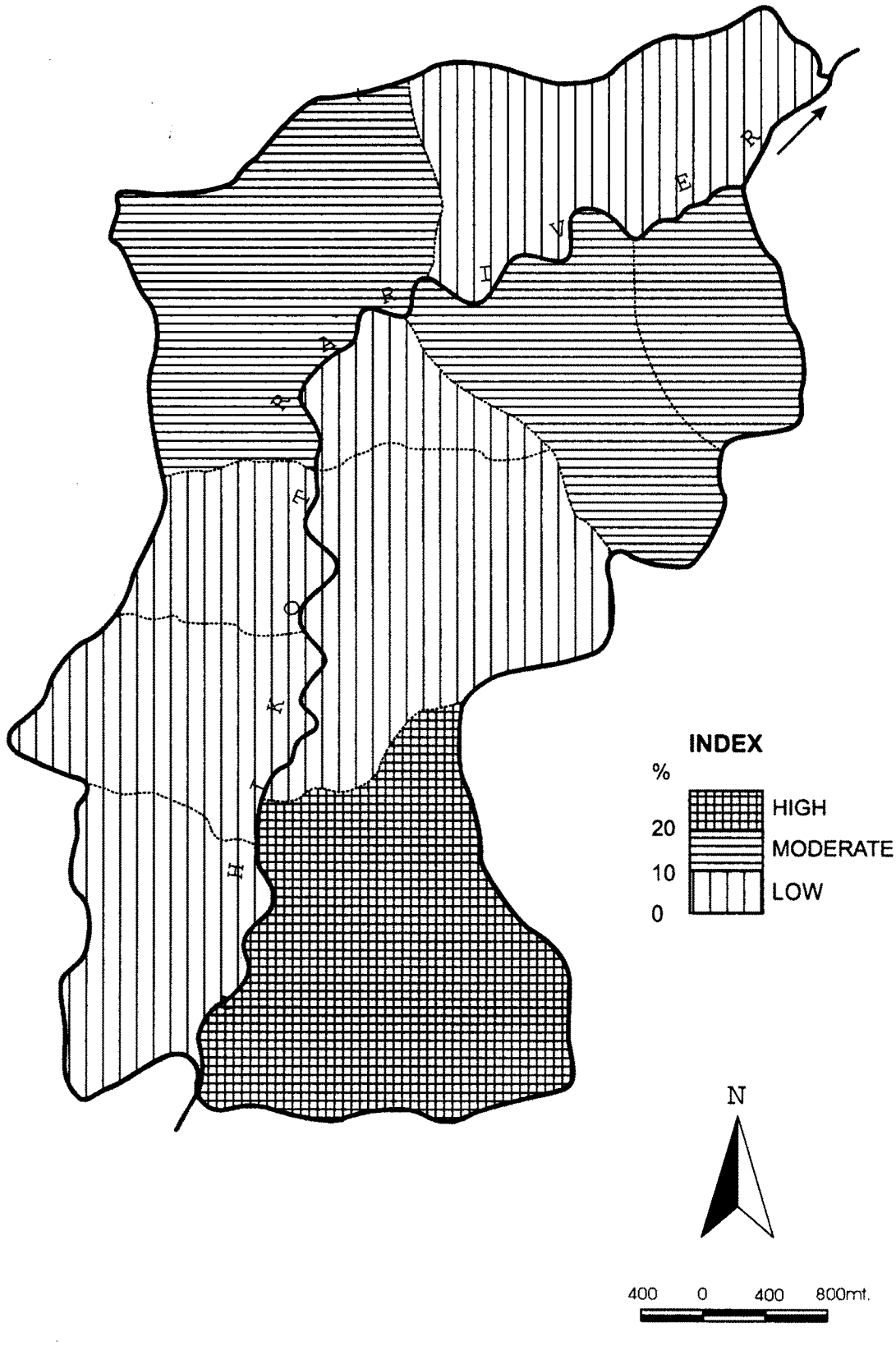

Fig. 4.3

GROUNDNUT 2005-06

percentage of gross croped area of the region

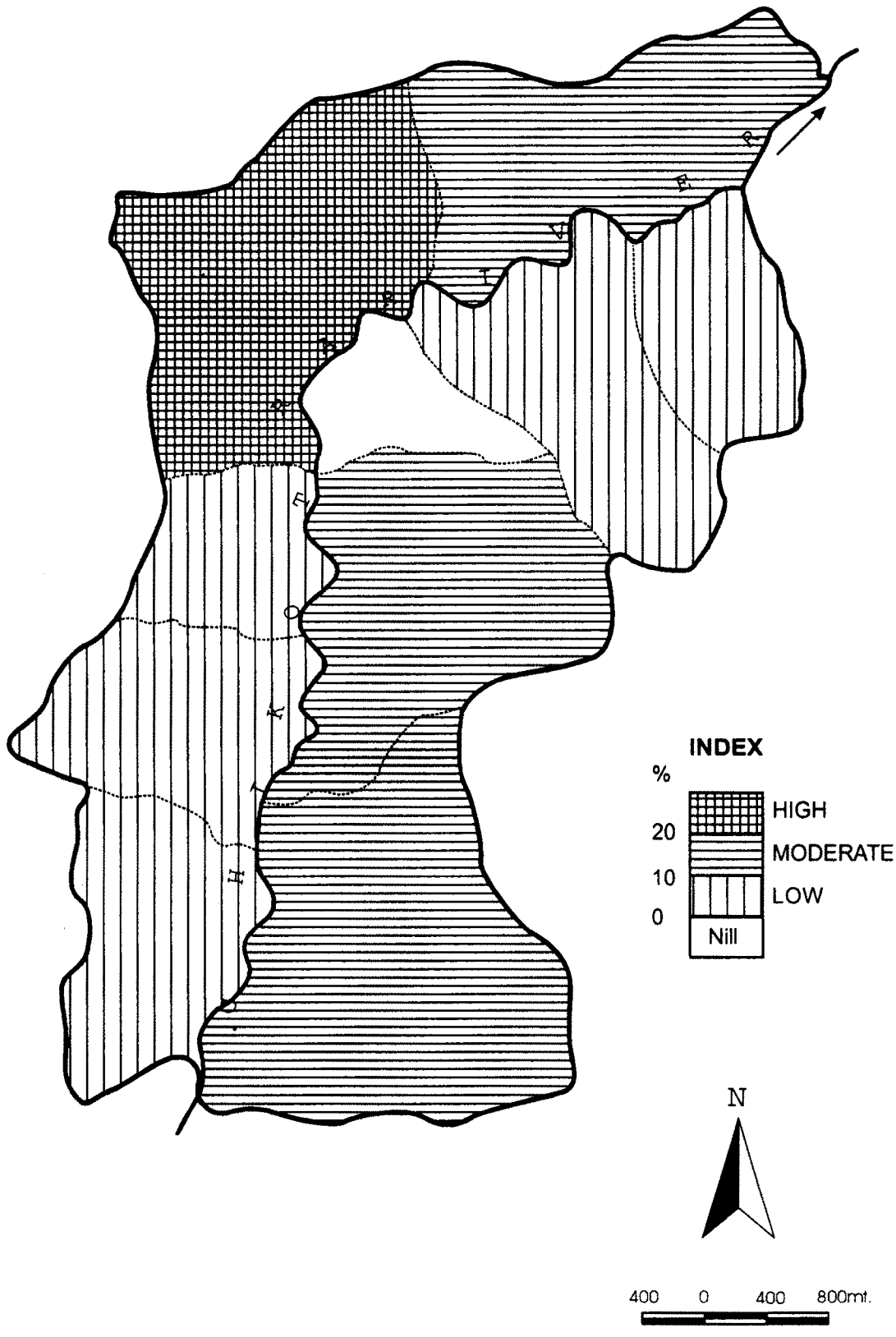

Fig. 4.4

4.3.3 Irrigated Cropping Pattern :

TABLE NO. 4.4

COMMAND AREA OF LOWER REACHES OF CHIKOTRA IRRIGATION PROJECT : IRRIGATED CROPPING PATTERN, 1995-96 TO 2005-06.

Sr. No.	Crops	1995-96		2005-06		Volume of change
		Area in Hectare	Percen-tage	Area in Hectare	Percen-tage	
1.	Sugarcane	311.59	79.23	1178.09	66.35	-12.9
2.	Wheat	35.10	8.93	181.12	10.20	+ 1.27
3.	Gram	28.48	7.24	146.77	8.27	+ 1.03
4.	Others	18.02	4.58	269.48	15.18	+ 10.6
Total		393.19	100.00	1775.46	100.00	± 12.9

Source: Tahsil Office, Kagal, 2006.

Table No.4.4 indicates that there is 25.76 percent increase in the total irrigated area, during the period under investigation. The same period has witnessed relatively decrease in the area under sugarcane which show – 12.9 per cent volume of change. In fact actual hectarage under sugarcane has increased over three times from 311.59 to 1178.09. On the other hand wheat (+ 1.27) and gram (+1.03) show increase in their share in irrigated crop. The other crops together including vegetables, jowar, maize also show remarkable increase (+ 10.6) in their areal extent.

4.4 IRRIGATION AND CROP PRODUCTIVITY-

The influence of irrigation in association with the increased use of fertilizer high yield varieties of seeds have led to increase the agriculture production per hectare.

Agriculture has always occupied an important place in Indian Economy. The proportion of cultivated land per man has been decreased considerably during the recent past. The increase in crop production is a must in India since the areal spread of crop land has almost reached to it's saturation limit (Vidyanath, 1985).

Agricultural productivity is a dynamic concept. It is dynamic in its spatio-temporal perspective. The development of irrigation facilities, mechanization, use of fertilizers and high yielding varieties of seeds, adoptions of other components of new technology lead to variations in agricultural efficiency per unit of time and space.

Among the various factors responsible for the productivity of land, irrigation is one of the significant factors, which has direct relationship with crop yields. Here, productivity refers to the production of crops per hectare of land. Sugarcane, Rice, Soyabin and Tobacco are the main crops cultivated in the region. Thus the productivity of these crops has been taken into consideration. The data on productivity of these crops is given in the table No4.5.

TABLE 4.5

PER HECTARES YIELD OF SELECTED CROPS (IN K.g).

Sr. No.	Crops	Yield per hectare		+ Increase - Decease
		1995-96	2005-06	
1.	Sugarcane	68,000	92,000	+ 24000
2.	Soyabin	1,850	2,100	+ 250
3.	Tobacco	1,045	1,189	+ 114
4.	Groundnut	2,400	2,800	+ 400

Source : village records, 2006.

The influence of irrigation in association with increased use of fertilizer and HYV seeds have led to the increase in agriculture productivity. The per hectare yield of most of the crops has been increased. (Table 4.5) . The per hectare yield of sugarcane is also high in 2005-06 as compared to in year 1995-96.

Increase in the yield of sugarcane is high in Khadakewada, Lingnur, Nandyal and village. Per hectare yield of Soyabin is also high in Kapsi and moderate in Khadkewada, Hamidwada ,Allabad and Nandyal villages. The Tobacco productivity is high at Kapsi, Kingnur, Hamidwada and Moderate in Metage, Khadakewada.. The Groundnut productivity is noted in Hamidwada followed by the Kardyal after that there was Kapsi, Khadakewada villages.

The per hectares yields of crops are increased because of availability of irrigation facilities, in the region. In brief, Irrigation is the basic input in most parts of the cultivated land

in our country who has played a vital role in stepping up food production..

4.5 SUMMARY:

The study reveals that there is spatio-temporal change in the cropping pattern. Irrigation is responsible for bringing about such changes. The traditional cropping pattern have changed due to the perennial availability of irrigation facility.

With the introduction of irrigation, cultivators have interested the use of fertilizers. The average fertilizer consumption per hundred hectare of irrigated area has increased up to 155 tons in 2005-06. The number of cultivators has also increased but the proportion to per 100 hectares of irrigated area has reduced because of the significant increase in the irrigated area after the construction of Chikotra irrigated project. On the other hand, the total number of labour increased from 2520 (12.40%) to 4654 (19.60%).

The number of tractors and electric pumps have increased from time to time. On the other hand the number of wooden plough, iron plough and oil engines have decreased after the availability of irrigation facilities. It means that the modern implements have replaced by the traditional implements.

In brief, after the completion of Chikotra Irrigation project, one can find the crucial change in agricultural scenario.

REFERENCES:

1 Gadgil D. R. (1948) : Economic effects of Irrigation. Ghokhale Institute of Economic and Political Poona P 173.

2. Pawar, C.T. (1989): Impact of irrigation, A Regional Perspective, Himalaya Publishing House, Bombay, p47

3. Singh, Jasbir (1976): An agricultural Geography of Harayana, Vishal Publication, Kurukshetra, pp. 33-120.

4. Vidyanath, V. (1985): Agricultural Productivity in Andhra Pradesh, The National Geographical Journal of India, Vol. 31, No. 3, pp. 204-207.