CHAPTER – VII

SUMMARY AND CONCLUSION

The work undertaken on the dynamics of general and crop land use of the two talukas of Baroda District named Padra and Karjan within a span of three decades (1960-61 and 1990-91) for the former and two decades (1970-71 and 1990-91) for the latter taluka was a task that is however achieved, even though data constraints, and official red-tapism were a retarding and disappointing factors.

The work is distributed over six chapters, beginning with the introduction which dealt with the personality of the area. The soil and terrain of the two talukas assisted in the identification of their agricultural systems and the respective changes that have occurred over time. The geology of the two talukas is found a bit different from each other which is found to have a great bearing on the soils of the area. Recently the occurrence of petroleum in the Mahi river valley of Padra has proved the age of its land and also has affected the economy of the taluka.

The time frame of the study was aimed at bearing uniformity in both the talukas, but the data constraint came in the way It was thus decided to work on which ever data available Thus Padra supported by giving data from 1960-61 while Karjan could help by giving the data a decade later Thus 1960-61 and 1990-91 for Padra and 1970-71 and 1990-91 for Karjan were taken up. As a guide line for the entire work some relevant literature have also been reviewed.

After the description of the various components of the introduction, portrait of the work, the second very important element, population on which depends the entire structure of land use, is dealt at large. The number, growth,

distribution, density, the levels of literacy, the physiological density the literacy and agricultural workers etc have been critically examined and their changing relations have been established

Then comes the main theme of the study viz general and crop land use. The location of the two talukas in geographical context are greatly responsible for their general and crop land use As such the items of general land use normally remain uniform inspite of the changing locations, as it deals with (a) land available for cultivation, and (b) Land not available for cultivation The former is used for crop culture, and the latter goes to human uses However, both of them reciprocate with each other

It is observed that the development of transport linkages in both the talukas have greatly influenced their agricultural aspect. Further reclamation of the ravines and waste lands have added to the existing culturable areas in both talukas. Unfortunately with repeated efforts the data for general land use for the base year of both could not be procured. However, the recent developments in the important aspects of general land use supported the work to proceed ahead.

In general land use all types of land used for human purposes are discussed though, their temporal change could not be established But on the basis of the developments it is presumed that their position at the base year would have been quite different from what they are today. And what is seen today is the change in their physical structure over time. However, the assumption "general land use changes are subject to the changing physical and human conditions", has been established As such, the physical conditions have not caused any conspicuous change, but the human condition have brought enormous changes in the general land use of the two talukas.

The most change prone is the crop land use which occurs season to season and year to year. The principal consideration behind such changes are the benefits out of the investment of labour and capital, as the crop land use is purely an element of economics that gives the concepı of the economics of crop ecology. The change in crop land use, therefore, occurs because of the changes in the typology of crops behind which intrinsically remains the scare and hope of economic losses or gains.

In both Padra and Karjan, the common crop was cotton Its successive failure brought tuer as its successor in both the talukas. Besides, the traditional crops grown in both the talukas were allotted more or less additional shares of G C A. at the second point of time as compared to the first This revealed that once the dominating crop dips down, the dominated crops swing upwards. This is what has happened in the two talukas where vegetables, oilseeds, even wheat etc. were at a low key during the first point of time, rose to notable significance during the second The figure numbers explicitly give the notable changes having occurred in crop typology at the second point of time. These changes are however, caused not only by one incidence, but by several others, of them the innovations and improving methodology of cropping is par excellence, most responsible factor However, the fact that the chemical fertilizers, hybrid seeds and undesired amount of irrigation tolled the death knell of cotton and gave a boost to tuer and some other crops.

Beside the general discussion of the crop land use, efforts have also been made to observe the typology of crops of both the talukas, in terms of their combinations, variance, and rank and order A sea change is notable at the two points of time in these aspects of the cropping pattern of both the talukas.

Where in Padra mono-cropping (cotton) was found in 36 villages in 1960-61, it shrunk to only 14 villages in 1990-91, and tuer had it sway only in one village during the same year, but bagged nine villages during the latter year Tobacco had 3 villages and added one more at the second point of time. Thus cotton decreased around three times, tuer increased nine times and tobacco only 1.33 times

Karjan, may totally be called a mono-cropping region cultivating cotton in 77 villages, the remaining 16 villages were either two or three crop region keeping cotton among them as the first crop. But over two decades it receded to only one village as a mono-crop Tuer which was no where even upto five crop combination, but grabbed 37 villages as a mono crop at the second point of time Tuer maintained its first position up to three crops but cotton reduced to the lowest crop in each combination. Oilseeds having no trace in any combination at the first point of time got their entry in two crop to seven crop combinations placed second and third in two and three crops combinations, and the last and last but one in the rest of the combinations. The irony of the fate of cotton is notable that even oilseeds have surpassed it in certain combination e g in three and six crop combinations Even oil seeds have their conspicuous presence in those combinations where cotton is distantly not seen Vegetables and sugarcane have also their place well secured in almost all combinations at the second point of time.

Variance · Crop diversification indices are calculated by the Gibb's Martin Method i e

$$1 - \frac{\sum X^2}{\sum (X)^2} \times 100$$

These are made for the three edaphic regions of Padra and Karjan

In Padra, its different regions have shown interesting levels of variance at the two points of time. The diversity of cropping remained confined from moderate to very high (i.e. from 0 40 – 0 60 to 0 80 & above) in region I at the first point of time reflecting greater inclination towards specialization A notable change took place at the second point of time in which the number of villages (27) from very high range were reduced to only 14, and those in high went up to 18 from 8, and in the moderate were doubled One village appeared in the very low range This indicated relatively higher diversity than the previous year.

Region II ranged from low to very high with 1,3,4 and 5 villages respectively. Higher concentration of villages in moderate to very high speaks about greater levels of diversification. This shows further bent towards the same with 5 villages in very high and 3 in high one in moderate, and two in very low. Thus total 8 villages out of 11 remained in high and very high ranges only 3 have gone out with 1 in moderate and two in very low, showing further higher levels of diversification as against 1960-61

In region III a totally different picture comes to sight where low, moderate and high had greater concentration of villages i.e. 9,18 and 5 respectively and only 2 villages were found in very high, but the second point of time confined these ranges between moderate and very high with 6, 21 and 7 villages respectively showing relatively greater concentration of villages in higher ranges of diversification

KARJAN

During 1970-71, region I of Karjan is found more inclined towards specialization having higher concentration of villages in lower ranges of diversification Out of 35 villages 2, 15, 12 and 6 were confined to very low to high ranges of diversification respectively. But during the second period greater levels of diversification are seen as the concentration of villages are found ranging from low to very high with 2, 10, 19 and 4 villages respectively. This is owing to the severe decline in cotton cultivation

Region II left very low and very high ranges blank, keeping 5, 7 and 2 villages in low, moderate and high ranges respectively, reflecting comparatively lower levels of diversification. But at the second point of time it also shows greater levels of diversification keeping 2 and 1 villages in low and moderate, 7 and 4 in high and very high ranges.

Region III ranged from low to very high ranges with 6, 26, 10 and 2 villages respectively giving, however, lesser diversification at the first point of time. But it is found more diversified at the second point of time, as there were 2, 13, 27 and 2 villages in low to very high ranges.

Thus the loss of cotton caused more varieties of crops having been cultivated with sizeable shares of G C A in each region of Karjan The trend is notable that the inclination was more towards specialization owing to cotton acquiring higher shares of G C.A. in almost all villages, at the first point of time; while towards greater levels of diversification giving smaller shares to cotton, and greater divided among other crops.

It is notable that the number of crops grown were 11 each at both the point of time i e no addition was made in their number, but the diversification has come only by the allotment of the shares of G.C.A. to each crop. When cotton

receded from its substantially higher share of G C.A , the other crops got greater shares making them significant, as well as, partly compensating the decreased gain from it.

RANK AND ORDER OF CROPS

PADRA :

Padra, at the first point of time had cotton and tobacco as the first and second ranking crops ranging between 40 – 60 and 60 and above percentages Among the third ranking crops also cotton secured its first rank followed by bajra, tobacco, vegetables, kodra and fodder. All crops, were thus folded up in the first three ranks leaving vegetables alone to form the fourth rank. The scenario radically changed by the second point of time when tuer in the first rank displaced cotton to the last seat and occupied the first followed by tobacco, vegetables and wheat Again in the second rank tuer maintained its significance keeping tobacco, bajri, cotton and vegetables to second, third and fourth and fifth crops respectively. The third range of the rank and order keeps a host of 8 crops, of them tuer and cotton are first and second followed by tobacco, jowar, rice, vegetables, bajra and oilseeds. The fourth rank included only vegetables and tobacco as the first and second ranking crops

Thus, a sea change is notable in the rank and order of crops, in which many insignificant crops of the first point of time have emerged as significant crops. This is owing to the fateful downfall of cotton.

KARJAN :

The changed crop environment could hardly spare any big or small agricultural region Karjan has the specialization in cotton cultivation where as Padra had in cotton and tobacco at the first point of time. In Karjan cotton encompassed a very big chunk of the area of the

taluka sweeping over 77 villages as the first ranking crop, and maintaining its superiority in the second rank followed only by jowar. The supremacy of cotton was so much so that Karjan could have only three ranges of the rank and order of its crops which were from 20 – 40, 40 – 60 and 60 and above. The last range was totally blank. In the third range were only jowar, wheat and rice that too in only 5 villages.

The second point of time brought a revolutionary crop order in which down trodden were uplifted and uplifted were down razed. Tuer the very in-significant crop of the first point of time bagged the top position and became the first ranking crop in place of cotton of the former year and maintained its supremacy in all the four ranges of the rank and order of the crops. In the second range it is associated with vegetables, jowar, cotton, sugarcane and fodder. In the third range it is followed by a host of crops like jowar, vegetables, wheat, cotton, sugarcane and oilseeds and in the fourth and the last range are only jowar and vegetables as its associates.

Thus the positivity of the results are discerned in this study from its different angles. The rank and order study of crops in both Padra and Karjan has given the change as the universal phenomena covering each taluka because of a radical change in their principal crop-cotton. Thus it may be hypothesized that 'if the principal crop of any area is changed then a total change takes place in all its subordinate crops'.

THE CATALYSTS OF CHANGE :

The study of land use changes invites to investigate as to what factors individually or collectively have contributed to the over all changes having taken place over time in the different types of land uses, of Padra and Karjan talukas It

is universally accepted rule that each event has an event making factor in its back ground

The land use of Padra and Karjan is divided in two parts for study, (a) the general land use, (b) the crop land use. Per se both are subjected to change as change is the law of nature But, in the first category the vital factors are nature and man. Their role is discussed at large, (on the basis of available data) in the chapter III, in the natural factors, temperature rainfall, work of rivers, erosive agencies etc are included. Owing to paucity of data these factors could not be explained in the context of non-agricultural land. But the most conspicuous role of human factor, in respect of roads, railways building, settlements etc. have been discussed and the changes having occurred between the time frame of the study have been diaganosed

The most change prone is crop land use Though the natural phenomena, specially rainfall, winds etc play significant role in making or destroying the crops by their errant, irregular, untimely, scarce or excessive nature. But, per chance, the rains have remained quite normal and no untoward effect of wind has come to sight at the second point of time. Thus, they have given positive contributions to the then existing crops

BIOTIC FACTORS

The lust of man for getting more out of little has often given a violent blow, and that is what is seen from the diffusion of innovations. The excessive uses of chemical fertilizers and irrigation, anticipated to give greater out turn from the crop lands also produced pests and diseases, most particularly for the hybrid cotton, which had widely usurped the crop lands displacing the former desi strains These inborn pests and insects claimed their greater rights on the cotton crops so much so that they ate it away and

brought its downfall in both the talukas Thus an spontaneous change is note-worthy in the cropland use in 1990-91 over 1960-61 or 1970-71 Where 1960-61 of Padra and 1970-71 of Karjan gave a monotonous view of crop landscape dominated by cotton The next point of time depicted cotton cornered by tuer, oil seeds and vegetables. Consequently, for the loss of one, several crops appeared on the scene to compensate. This is an ostensible change observed in the domains of cotton in both of the talukas

Thus, instead of natural and human factors, the greatest catalysts are the biotic factors bringing a sweeping change in the cropping patterns of the former year by reducing cotton and increasing other crops at the second point of time.

Government Policies and Programmes

Not the least are the government policies and programmes concerning crop land uses responsible for bringing change It has brought changes in methodology, in the types of seeds, soil testing and proper uses of chemical fertilizers and biotic manures, financial assistance to small and marginal farmers, development of agricultural marketing co-operative societies, surveys and monitoring the crops, development of irrigation facilities, integrated pest management programmes, integrated rural development programmes, land to land less people, and a host of other programmes have been made operative. They have changed the agricultural vista from the former traditional character to modern innovative. Thereby a sizeable development has accrued in the agricultural landscape of both the talukas.

Lastly, it may emphatically be said that above all 'man is the most powerful catalyst', in respect of all changes taking place in both general and crop land uses, not only in the talukas under study but on the global scale

CONCLUSION

The task of the study of change in land use patterns undertaken for the two talukas of Baroda District viz Padra and Karjan, for three and two decades respectively, has finally reached to the stage of conclusion

The objective behind taking two talukas was to make a comparative study of land use dynamics of each of them Even though, they are nearest neighbours, separated by one common boundary from the southern direction They are found having some similar and some dissimilar geographical characteristics Where Padra is composed of two types of soils viz alluvial in the north and besar in the south, suitable distinctly for two major commercial crops tobacco (in the alluvial) and cotton (in the besar or black cotton soil), Karjan is a monotonous flat plain composed of one type of soil viz besar or black soil, however in the southern segment of Karjan a few places reveal the influence of deposited soils by Narmada, but they also are dominated by the common soils of the main terrain Thus, Karjan in all its totality is fit for cotton crop The northern part of Karjan and southern part of Padra have one common stretch of black soils, mostly occupied by cotton

But the northern part of Padra, having alluvial loamy soils has all fitness for the successful cultivation of tobacco and cereals

In respect of the cereal crops also, both of them have a distinct diversity at least in jowar and bajra, where bajra is the crop having befitting conditions in Padra, jowar finds the same in Karjan Rest others such as wheat, rice, pulses, vegetables, oilseeds and fodder are the common crops of both the talukas But these crops were normally cultivated for the domestic consumption in both of them during the first point of time

The study of the dynamics of the general and crop land use of the two points of time (1960-61 and 1990-91 for Padra) and (1970-71 and 1990-91 for Karjan) has, at its each step shown interesting changes particularly in the changing pattern of the crop cultivation. In respect of the cotton crop both talukas have suffered the menace of the common enemy (pests and insects) and having been hard pressed by the inevitable circumstance reduced its cultivation to a minimum during the second point of time.

After its downfall, tuer received relatively greater favour than other crops and to some extent, replaced cotton in most of the villages of each taluka. Besides tuer, oilseeds, vegetables, fodder, cereals got partially greater significance in both Padra and Karjan But tobacco in Padra increased its importance by acquiring all time higher percentage of G.C.A. but remained third order crop preceded by tuer and cotton, where as formerly cotton and tuer (Table 6 2)

Thus a sizeable change in crop land use pattern took place in both the talukas at the second point of time which affected the crop combinations, diversification and the rank and order of the crops grown at the first point of time.

The analysis of the factors affecting this change shows role played by both natural human, and innovative factors and their combined product the biotic factors.

The innovative measures in the methodology of cultivation have to a great extent contributed to its development. But beside some undesirable wrong results have accrued proving quite dangerous for the very important crop of the region – cotton. The pests and insects infested this crop so much so that its defence went beyond the human might, and finally it was dropped to a stage much lower than the very low grade crops of the former year This is what

the fate of hybrid cotton in the entire cotton belt of mainland Gujarat

Though physical factors do affect cropping patterns, they have remained quite normal at the two points of time. there effect was therefore positive in all respects

Government policies and plans of development have their distinct effects on the development of agriculture in both the talukas

Finally, it is found that the assumptions set at the outset of the study are by and large proved They are

1 General and crop land use changes are subject to the changing physical and human conditions The soil, terrain and rainfall have their significant role in the general and crop land use changes over time Population, its growth, quality etc. have a wide ranging bearing on both general and crop land uses The growth and distribution of population goes on changing the land man ratio, and the most vital part is that it is man who gives a function to any land In some cases in the study areas, it is found that the G.C A. has decreased inspite of land reclamation and management. This is mainly because that a part of the crop land has been allotted other functions Thus the assumption is proved by the analytical study in the previous chapters.

2 The methodological changes and innovations in the crop land use are no less effective than any other factor particularly in the crop land use changes This is also proved in the discussion in the crop land use (Chapter IV).

3. Biotic factors have played a very significant role in crop land use changes. This has been a global phenomenon. The locusts in the past have caused havoc to standing crops The boll weevil in the cotton belt of U S A seriously damaged the crop, the 'Lashkari ead(Prodenia)

and its associates 'Leeli ead' (Heliotheis) have successively damaged the cotton in cotton region (Kanam) of mainland Gujarat so much so that it declined to the status of a very low crop causing significant changes in the hierarchy of crops and their patterns. To say, it is the effect of the biotic menace that the cropping pattern in these talukas and their neighbouring ones has distinctly changed

4 Market and market prices have significantly over ruled the decision making of the cultivators Agriculture is simultaneously both primary and tertiary activity Where it produces something for the cultivator's domestic use, it also produces for supplying to the demand areas, particularly urban areas or markets It is rather urban markets and in them the rising and falling prices of agricultural commodities directly influence the cropping patterns in rural areas. An example from the study area may establish this fact, that tuer and oilseeds were the most undesired crops in Karjan at the first point of time, but on one hand downfall of cotton and on the other soaring prices of tuer dal in urban markets made tuer a crop of status almost at par with cotton. Oilseeds may also be taken to have gained their significance from the ever increasing prices of edible oil in the cities It may thus be asserted that 'the demand areas activate supply areas'. It may be hypothesised 'the higher the demand and prices in the consuming areas, the greater their production in the producing areas'. Thus it establishes the assumption and the hypothesis, and also proves that the decision making of the farmers largely depends on the demand in the market and the anticipated monetary gains out of the sale of the respective products It also establishes the objective of the study set at its beginning

that the urban areas influence the rural land use patterns particularly the crop land use patterns

FINDINGS

(1) Population growth of both talukas are found at the differential rates. Padra has shown relatively higher rate of growth than Karjan

(2) The land man ratio, or the population resource ratio has decreased due to increase in population and more particularly increase in the agricultural population (cultivators and agricultural workers)

(3) Literacy is inversely related with agricultural population. This is an accepted fact But the study of Padra and Karjan reveals that the ratio of agricultural worker to the total literates has invariably decreased in all the villages of both the talukas But when the agricultural workers of the two points of time are enumerated a big increase is noted at the second point of time which gives to presume that the commercialization of agriculture in these two talukas especially the attractive prices of marketable crops have made the agriculture a fascinating profession and even the literates have preferred to do it instead of seeking any comparatively low paid job elsewhere

(4) General land use changes are related to the increasing population either negatively or positively as these are used for various socio-economic purposes time to time

(5) A substantial area is found under settlements and various types of roads which gives to presume that it would have increased as against the previous point of time

(6) Even though Padra and Karjan are nearest neighbour, they are found to have conspicuous geographical differences in the favourability of crops This has established the objective of the comparative characteristics of their study

(7) It is found that bajra made inroads in Karjan and Jowar in Padra where as at the first point of time both were restricted to their former habitats (i e jowar in Karjan and bajra in Padra)

(8) The hectarage of crop land has shown a greater dynamics over the two points of time The previous cropping pattern exclusively dominated by cotton in entire Karjan and southern segment of Padra is replaced by increased hectarage under tobacco in northern Padra, general sway of tuer and oilseeds in Karjan and southern segment of Padra and sugarcane in Karjan at the second point of time

(9) Tobacco being a highly profitable commercial crop could remain confined only to northern segment of Padra, however, it partially made its inroad in its southern segment by the second point of time. It could not enter Karjan Sugarcane emerged as a new commercial crop of this region but remained confined only to Karjan This shows the environmental diversity existing in the two talukas being suitable for one crop in one taluka and other in the other

(10) The diminution of cotton is mainly attributed to acute biotic menace where man lost his might to defend the invasion of biotic elements. However, the area under cotton has drastically decreased but cotton has not been totally dismissed This explains the economic viability and also the emotional attachment of its cultivators to it

(11) Padra was partly mono-cropped region with 36 villages in cotton and 4 villages in tobacco these were the two important commercial crops of the taluka Tobacco was the principal crop of only four villages in northern segment and cotton was that of the southern segment But Karjan was exclusively a mono-cropped taluka where cotton was encompassing 77 out of 93 villages.

(12) Assessment of the factors of change revealed that the intensive infestationof pests and insects have been, by and large, responsible for the change of cropping pattern in both the talukas where as human and environmental factors were found more or less favourable Cotton the most pest prone crop receded from its former position and is over taken by tuer and others

(13) The market prices of tuer, oilseeds etc. may be taken no less responsible for these changes

(14) Government policies and programmes of agricultural development, facilities in marketing and support prices are the incentives for this wide spread change in the cropping pattern. Above all human factor may be taken solely responsible for all the land use change, be they in general or crop land uses