CHAPTER VII

MAIN FINDINGS AND POLICY RECOMMENDATIONS

This chapter intends to present the main findings and conclusion of the present study. The study area presents diverse physical conditions. It has dominated by fertile alluvium plain. The general physical setting, economic condition of the state and its demographic and cultural identity are based on its rich heritage. The state has made tremendous progress in agriculture sector after its making. The per capita income also has increased over the years. The state has also achieved progress in every sphere of development viz. power sector, industrialization, urbanization, agriculture and in education etc.

The agriculture scenario at macro level is presented in chapter-III of this study. The state has made a tremendous achievement in agricultural sector since the time of Green-revolution. The introduction of HYVs coupled with assured irrigation in mid 1960s led to transformation of the agricultural scenario of the state. The new water-seed technology enhanced the maximum area under cultivation. It is seen that scope for further increase in area under cultivation is limited. The expansion of area under cultivation realized the need of some modern implements, tools and machinery in our agricultural that can do work in minimum time. As a result the state experienced increased amount of various things e.g. rise in total food grain production and productivity, rise in per capita income, high use of modern inputs, etc. The state also reflects a change in structural organization of the agrarian society over the years due to green-revolution. The introduction of this new technology in agriculture breaks down our agrarian structure of the society. For instance modernization of agriculture displaced labour force from our agriculture. It is also emerged from the chapter that net sown area has reached a saturation level and scope for further expansion is almost limited.

The regional dimension of agriculture presents a broad picture of various aspects of agriculture e.g. application of modern inputs, cropping pattern, and productivity levels
at district levels etc. that is described in Chapter IV. The chapter finds out that the use of modern inputs that was confined to the irrigated tract of the north and east till the early years of green revolution has expanded sharply to other areas also with the passage of time. The per hectare consumption of chemical fertilizers, pesticides, HYVs, etc has increased in almost all districts of the state with the passage of time. In the early years of green-revolution this development of the modern inputs were confined to irrigated areas of the north. The use of tractor was also proved a mile stone in this story. The application of tractor in the farm land mechanized our agriculture. The increased production and productivity also enhanced the per capita income of the people in the state which enable the farmer to purchase more farm implement. As a result our farm yard led to a significant change in cropping pattern generally after green-revolution in favor of rice-wheat cultivation. The study demonstrates the fact that the green-revolution was marked by a change in cropping pattern that was strongly in favor of rice-wheat cultivation. There was maximum coverage of area under food grain crops to that of net sown area at this time. In the north rice and wheat emerged a main cropping pattern. It is also emerged from the study that in the western part of the state wheat-cotton emerged as a main cropping sequence. In the south and south west Haryana wheat is the main crop. Here some coarse grain crops still dominate and rice is cultivated on irrigated land. Due to expansion of area under rice and wheat cultivation in some part of the state some crops drive out from the traditional cropping pattern. The cropping intensity which was higher in the northern part of the state in the early years of green revolution also increased in almost all part of the state. The cropping intensity is directly co-related to irrigation. It is high in irrigated tract of the north. Further it is found that the productivity levels in almost all districts of the state have increased over the years. Here it is to be noted that the productivity levels of western wheat-cotton growing areas is higher than rice-wheat growing areas of north and east. The inter district variations of productivity levels has increased over time in the state. The exponential growth rate of land and labour productivity also improved over the years. But it is significant to note that it also showed sign of stagnation or decline in recent years. This not good for our sustainable development of agriculture.
Chapter-V deals with issues pertaining to agricultural sustainability. It has been seen that although there are various forms of land degradation in Haryana viz. water table decline, water table rise, water logging and salinity, but after all the problem of water depletion became acute over the years because a significant part of the state is presently affected by the same. Tube well irrigation is the major catalyst in path of water depletion in most of arid and semi-arid part of the state. This is also to be noted that there is no power back system that can recharge our aquifers. On the other hand it is seen that canal became the main source of water logging/salinity in some canal command areas. It is important to note that a major portion of the area affected by twin problem of water logging and salinity has been reclaimed. It is also find out that coverage of area under tube well irrigation has increased more rapidly compared to coverage of area under canal irrigation. The maximum area under tube wells irrigation reached up to the year 1990-91. It is also the time when water table started declining more rapidly. After the year 2001 water table declined to more than 4 m in both the season viz. pre monsoon and post monsoon. The study reveals that more than half of the farmers are aware about the problems of water table decline and water logging/salinity etc. The farmers are of the opinion that cultivation of rice is no longer remained economic one so they are dropping out rice cultivation in water depleting and water rise semi arid areas. It emerged from the chapter-VI that the expansion of area under water intensive crops e.g. rice and wheat with assured tube well and canal irrigation led to critical level of water table. Tube well became the cheap and main source of irrigation in all parts of the state. It is significant to note that some farmers have more tube well. Their farms are in different location which obliged the farmer to install separate for each farm. Almost half of the surveyed villages farmers accept rice and tube well/canal irrigation for responsible to depletion/rise in water table. Some blame low rainfall for depletion in water table. It can be concluded from the chapter that the application of modern inputs have utilized our natural resources beyond sustainable limit which has led to land degradation in the state. Due to land degradation farmers feel that agriculture is became a uneconomic activity. Farmers are obliged to change in cropping pattern from water intensive to less water crops. The paddy cultivation is replaced by cotton cultivation in some areas. Some farmers starts the
cultivation of horticulture drops. The horticulture crops are more sustainable, economically viable, ecologically supportive.

**Policy Recommendations**

The policy recommendations follow from the main finding of a research. In this section a brief outline of policy recommendations in the light of the present analysis is presented. The recommendations are likely to serve useful purpose for the policy makers at central and state government levels as well as for scientist, researchers and general public.

It is important to note here that to make sustainable agriculture development cultivation of low value crops and also leguminous crops that enhanced fertility of the soil should be encouraged. At the same time restriction should be imposed on cultivation of water intensive crops e.g. rice which has over utilized our land resources and led to degradation of our most productive land. It is well documented that the increased proportion of area under different crops will enhance the productivity of land and will also maintain the fertility of soil. It would be a welcome step of the government if in future this is applied. This strategy will help to avoid the monoculture of some crops. Some crops require more water which led to water table at critical stage or dark situation. So it will be gainful to those farmers who belong to that area where water intensive cropping system is dominant. On the other hand, efforts should be taken to promote some water tolerant or salt tolerant crop varieties e.g. Kharchia-65, KRL1-4 varieties of wheat, CSR3 and CSR10 varieties of rice, CO453, CO6801,CO1148, varieties of sugarcane etc. which offers tremendous scope in areas where water logging/salinity remains a perpetual problem (malik1975).

Ground water withdrawals more than recharge leading to a permanent decline in water table. The excessive use of ground water beyond sustainable limit led to environment imbalances. Moreover the decline or rise in water table affects the large farmers in general and small farmers in particular. For this purpose rationalization of
irrigation price policy is recommended. To attain the above purpose we have to develop adequate infrastructure.

Bio drainage technique of plantation must be raised on potential water logged areas especially in areas where ground water level is just 3 to 6 m below the surface. This will prevent their conversion into wet desert. Studies in India and abroad identified several species (see for instance Dagor 2012) as being either highly tolerant (*Prosopis juliflora, Prosopis alba, Prosopis chilasis*), or moderately tolerant (*Acacia tortilis, Eucalyptus tereticornis*, etc.) to salinity and water logging. This can be used in reclaiming saline areas by lowering the ground water table levels. Crop failure is general phenomena due to paucity or excess rainfall so it is recommended that there should be a mechanism to meet the mitigation of crop failure not only for large farmers but also for small and marginal farmers. It is also recommended that government should ban and impose heavy fines on use of submersible tube-wells. There is an urgent and timely need to stop new installation of submersible and separate tube well for each farmer within the same field.

The recommendation made in the report of the National Farmers Commission that was submitted to the government of India by its chairman M.S. Swaminathan concerning agricultural security and emphasis (among other measures) on the need for appropriate credit facilities (at affordable rate of interest) for farmers should be accepted in principal and appropriate action should be taken. It is also recommended that the input subsidies on irrigation and fertilizers need to be scaled down. Government should set up more institutions related to agriculture e.g. setting up seed and soil testing laboratories, setting up flood control monitoring centre, and setting up of other research institutions at regional levels that can support the farmers at right time.

To the farmers I will like to recommend that they should avoid farming of water intensive crops generally in the state and particularly in the water depletion/ rise areas. They should avoid excessive irrigation and adopt low water irrigation technique e.g. drip irrigation. They should avoid use of chemical fertilizers and pesticides. Some farmer burn crop residue after harvesting. In past 10 to 12 years it is found that burning of residue of paddy cultivation emerged as a major factor in pollution of Delhi and in national capital
region. It is recommended that such type of practices should be strongly banned and heavy fined should be imposed on such type of farmers who practices such kind of activities because they have multiple hazardous effects for both on our flora and fauna. It is recommended that farmers should grow horticulture crops on land affected by the problem of water logging and salinity because it is experienced that that these crops retain salinity from the soil. Grazing of animals in the farm is general phenomena in the country side. The practice of grazing on farmyard demolishes both flora and fauna. This practice disturbs the cyclic nature of the environment so this practice should be also banned. It is also recommended that farmers in farm should adopt the technique of water harvest with the help of Village Panchayat and government. This will have dual impact on our agriculture, first it will recharge our natural aquifers and second one is that it will fulfill our drinking requirement. Village Panchayat should have legal right of social boycott for those who use excess water than need. It is also recommended that farmers should also grow leguminous crops to enhance and to maintain fertility of the soil. The nutrient mined of the soil has to be replenished through application of organic fertilizers. There is an urgent and emerging need to encourage community approach involving active farmer’s participation along with government interventions.

To the scientist it is recommended that highlight more issues of agricultural crises, develop that kind of technique that is environmental sensitive. To the intellectuals and respected public personalities, please avoid excessive use of natural resources e.g. use of soil for brick making, water for drinking, bathing, and sanitation, and water pollution, use bio-degradable begs for shopping etc. To the media (Print and Electronic), please adhere scrupulously to fair and objective reporting norms and play your role in promoting issues of agriculture understanding. I hope that these appeals will not be considered improper.
Concluding Remarks

The findings of this study has brought to fore some interesting concluding remarks which begin with, the transformation of agriculture in the state. The modernization of agriculture transformed the agricultural scenario in the state but it is also true that this transformation has also come with fatigue and stagnation in agricultural performances e. g. production and productivity of the state. The introduction of HYVs has led to significant changes in every aspect of agriculture viz. high use of chemical fertilizers, spread of maximum area under food grain crops and reduced area under leguminous crops, increased food grain etc. It is also important to note that improved agriculture condition over the years also led to a significant change in cropping pattern. It has been noticed that during the post green-revolution period there was a shift in cropping pattern from food grain crops to non food grain crops (some cash crops and oilseeds crops). Application of modern inputs shows the fact that at district levels irrigated tract of the state viz. northern, eastern and central parts etc. consumed more inputs of agriculture. On the other hand side pace of consumption of fertilizers in arid and semi arid part of the state viz. south and south-west etc. is slow which led to inequality in levels of agriculture development at district levels in the state. It was also noticed that a shift in cropping pattern in some district led to a change in productivity levels at district levels. It was observed that at district levels the districts which grow food grain crops with some cash crops receive high agriculture productivity compared to rice-wheat cultivation. In other words the western parts r of the state where rice-wheat cropping system is followed by cotton crop is at first place in matter of productivity levels. The issues pertaining to agricultural sustainability conclude that the problem of water table rise, water logging, and salinity is acute in some part of the state. It also concluded that excessive use of ground water and canal irrigation is main cause of twin problem of water depletion and water logging.

The farmers are aware of the twin problems of water table depletion and water table rise. It is interesting to know that almost all the surveyed household farmers are aware about the problem water depletion/rise. But more interesting to know is the fact
that farmers have taken some major steps e.g. social boycott and fine on those farmers who cultivate paddy cultivation in water logged areas. On the other hand farmers had not yet taken a serious step now except than avoid marriage alliance in water depletion areas. Over all it is found that farmers are looking on government side for seeking help to mitigate the problem.

To sum up it is clear from the study that the new seed fertilizers technology with assured irrigation has played a major role in raising productivity levels of some districts and there by augmenting a change in agriculture production in the state since the time of green-revolution. It is significant to note that the new technology was firstly adopted in highly irrigated areas e.g. in the northern part of the state but over the years it has no longer confined to the same and has in fact gradually spread to many new areas also. But what is more important is the fact that the real cost of this achievement of agriculture in the form of land degradation is tremendous. It is difficult to estimate the cost of above fact and almost impossible to give answer. The study reveals the fact that direction of agriculture development is not in right way. It is a right time to maintain the balance of our agriculture development .It is the right time to take some harsh and strict decision for everyone viz. government, farmers, and individuals to make our agriculture sustainable and prosperous.