CHAPTER VI

SUMMARY AND CONCLUSIONS

VI.1 Introduction

In Haryana State Agriculture has witnessed significant changes in the state of Haryana since its inception as the 16th state of India on November 1, 1966. The change in agriculture are largely due to the adequate, assured and timely supply of water. From a largely food deficient area, Haryana has now emerged as one of the most agriculturally developed region of the country.

VI.2 Summary

Haryana State constitutes 1.44 per cent of the geographical area and 1.82 per cent of the total population of the country. Agriculture as a primary sector activity employs 82 per cent of the state’s population. Water has played an important role in the development of agriculture. Earlier, Haryana was a rain fed state, so the area under crops and crop production was also less at that time. The need was felt to increase the production and also the productivity of crops to meet the demands of the growing population. For this, efficient utilization of water
resources was necessary. Along with water, soils are also vital source for agricultural development. According to the characteristics of soils the crops are chosen and irrigation facilities are also provided accordingly. The availability of water from surface as well as ground sources and their conjunctive use is essential for the agricultural development.

The second chapter deals with the study area. the geographical personality of the state, the collection of data which is based on secondary sources. The present study aimed at studying the position of water resources in the State. So far as the identification of the water resources is concerned the problem has been analysed at the district level as well as state level as a whole. The other objectives were to evaluate the availability of this resource and its role for agricultural development besides water, in the agricultural development has also been analysed. In the last is research methodology, in this, all the methods of calculation are given.

In the third chapter the availability of water from different sources like rainfall, surface water and ground water have been discussed. In Haryana rainfall is insufficient for crop production and sometimes there are also found conditions of drought and at that time crops fail. To avoid the conditions of drought, Government of
Haryana started extension of the network of canals, installation of tube-wells, pump sets and lift irrigation schemes.

The availability of rainfall is highest in the district of Ambala district followed by Karnal, Hisar and it was lowest in the case of Mohindergarh district.

The availability of water for irrigation from surface water resources is highest in the district of Hisar and Karnal. The gross irrigated area by canals was maximum in 1986-87 (3912 thousand hectares) and minimum in 1966-67 (1736 thousand hectares). Canal is the major source of irrigation in the state.

About 60 percent of the ground water available in the state is of saline type. Even then, the ground water has been over utilized in the state. The net utilizable water available for irrigation in the State in 1979 was 6176.94 MCM and it increased to 13943.31 MCM in 1983. In some districts like Kurukshetra, Government has banned further installation of tube-wells and pump sets because depth of water table is declining in the state as a whole and in these districts in particular.

In the fourth chapter the utilization of water resources in the state is studied. The total supplies of water utilized in the state come from Bhakhra Canal, Western Jamuna Canal, Gurgaon Canal and lift
schemes. The total supplies as well as the State through each system is increasing with the passage of each year.

The area irrigated by different canals is also increasing with time. In a period of twenty years the increase in area is nearly 6 lakh hectares. It is remarkable achievement in the field of agriculture. In sixties the total area irrigated by canals was 13,45,129 hectares, which increased to 15,89,710 hectares. In seventies it further rose to 19,51,259 hectares in eighties. It is the result of the extensive coverage of the canals in Haryana.

In 1965-66, there was hardly 1 lakh hectares of land irrigated from ground water sources. The sources of ground water i.e. tube-wells, wells and pump-sets etc. are also important because of the rugged terrain of Haryana.

Net area irrigated in Haryana is gradually increasing. In 1966-67 the net area irrigated was 1293 thousand hectares after 10 years it rose to 1798 thousand hectares and further to 2579 thousand hectares in next 10 years i.e. in 1987-88. This is also the result of the increased and optimal utilization of water in the state.

Intensity of cropping is also on an increase in the State. In sixties the average intensity of cropping was 134.91 per cent for the state as a whole and district wise, the highest intensity of cropping was in the district of Jind and lowest in case of Gurgaon and Hisar districts. In
seventies the intensity of cropping rose to 148.13 per cent. This time the highest intensity was in case of Kurukshetra district and lowest in case of Sirsa districts. These two districts were newly created at that time. In eighties the percentage declined to 108.72 percent because of the severe drought faced during this period.

In the fifth chapter the impact of water was studied on agricultural development along with some other selected factors like changes in net sown area and gross cropped area, changes in cropping pattern, changes in productivity, number of tube-wells, number of tractors, fertilizer consumption and number of male agricultural workers.

The net sown area in the state was much less earlier in comparison to the present. Due to the lack of irrigation facilities much of the land was left every year as fallow but with the availability of water i.e. assured and timely supply, more and more land was brought under cultivation. This gradually resulted in the reduction in the percentage of fallow land and an increase of net sown area. This became possible with the supply of water from the two main sources, surface and ground water. In 1966-67 the Net Sown Area was 3423 thousand hectares because during that period the country experienced a difficult phase of drought.

As far as the gross cropped area, in 1966-67 the GCA in the state was 4599 thousand hectares and in 1976-77 it was
5451 thousand hectares, and in next ten years it rose to 5601 thousand hectares.

Earlier, Haryana was a rain fed state, so mostly dry crops like bajra, maize, etc., were grown in the state with the extension of irrigation facilities in the state changes in cropping pattern are also visible now. Earlier, more area was devoted to the production of above-mentioned crops as compared to cereals. Now the area and production of cereals is increasing year after year. Wheat crop dominates among all the major crops followed by rice and sugarcane crops. Hisar and Karnal are considered the most agriculturally developed districts in the state. Now, the state has not only become self-reliant in the production of food grains but it also exports food grains to other states in the country.

Productivity is also an important factor in agricultural development. In this production of major crops and their productivity is studied. The production of six major crops (Rice, Wheat, Bajra, Sugarcane, Cotton and Maize) is increasing in the state. In sixties the average production of major crops was 2659.22 thousand tonnes which increased to 8584 thousand tonnes (increased 4 times) in eighties, it rose to 12552.33 thousand tonnes which means an increase of 1.5 times from 1966-67 to 1987-88. Productivity of these major crops is also increasing. In sixties average
productivity of these crops was 8.72 tonnes per hectare. In seventies it was 12.33 tonnes per hectare and in eighties, after 20 years it was 13.61 tonnes per hectare which is a significant achievement and only possible due to sufficient availability of water whenever necessary.

In other selected factors, first are tube-wells, Haryana was a water deficit state. So, government gave incentives for installing tube-wells. With their installation farmers do not have to depend on rain water and also for their turn to get water supply from canals. They are also cheap and dependable sources, so their number increased rapidly from 11,200 in 1966-67, to 4,31,732 in 1987-88.

Second was number of tractors, with the increase in net sown area and gross cropped area, this machine, a gift of modern technology was adopted by farmers on large scale to plough and sow their field. So, their number also increased significantly. In was 25,451 and in 1987-88 it rose to 96,313 almost 19 times increase.

The use of HYV seeds now-a days also demands chemical fertilizers, especially nitrogenous and phosphorous ones because they are important plant nutrients. So their application in the fields is increasing day by day. In 1966-67 the consumption was 13,347 tonnes in 1975-76, it was
96,915 tonnes and in 1987-88 it was 3,93,903 tonnes which is a sharp and steep rise.

Number of male agricultural workers is increasing as now two to three crops are taken from the same field in a year. So, need of extra workers is felt. According to 1961 census there were 2,34,587 cultivators, which rose to 12,61,054 in 1971 and further to 14,97,901 in 1981. Similarly agricultural labourers were 1,56,388 in 1961. In 1971 they were 4,01,132 and in 1981 they were 5,28,256. The significant rise in the number of agricultural labourers is because the government, in seventies distributed the surplus land among the weaker and poor sections of the society.

Thus, it is clear that water in the field of agricultural development holds the key and its development should, continue to receive top priority. The policy, therefore, should be to enhance tube-well and canal water supplies in different areas in order to bring all the cultivated areas under irrigation and achieve the target of 100 percent irrigation. Besides, there is enough scope for increasing the use of key inputs like fertilizers and plant protection for certain crops and in certain areas. To some extent, this increase will come automatically through increase in irrigation. The new seed fertilizers technology has played an important role in raising yield levels of
various crops. This new technology however, needs assured and timely irrigation.

VI.3 Suggestions:

The irrigation sector faces a larger number of problems and these need urgent attention for future course of action in the development of Irrigation in India. There are three main types of problems that arise are: (a) Construction type (b) Operation type (c) Maintenance type.

But problems related to operation and maintenance are studied here such as (i) under-utilisation of irrigation capacity (potential), (ii) iniquity in irrigation, (iii) lack of dependability of irrigation, (iv) indifferent quality of irrigation, (v) wastage of irrigation water, (vi) water logging, soil salinity and alkalinity, (vii) sustainability of irrigated farming, and (viii) financial losses and pricing of water.

All these problems which are come across during operation and maintenance phase are a fall out of Construction phase for example if a project is declared as completed by the authorities but its tail reaches are yet to be constructed is field channels and leveling of the land is still incomplete. The potential was created but due to the lack on the construction part its optimal utilization was not possible. This leads to the under-utilization of the capacity. Some times most of the canal Command is ready to
receive the water but the upper reaches are not able to supply the water needed for the irrigation. This also leads to under-utilization or mis-utilization of irrigation potential.

The under-utilization of the potential created is very difficult to measure because different states adopt different criteria for reporting.

The utilization rate is related to a particular area, a change in crop combination. From seasonal to perennial or from low water using crops to high water using crops would change utilization of irrigation water considerably for example if a crop is irrigated once out of 3 or 4 times required for it during its growth period. It comes under the category of irrigated area regardless of inadequate water supply. It is the case of over-estimation of utilization considering this, it is very difficult to reach at a precise estimate of the under-utilization.

The second problem is that of iniquity in irrigation. It is closely related to the first problem of under-utilization of irrigation resource. Under-utilization of the potential created leads to unequal distribution of water across canal command in its different reaches.

The third problem is lack of dependability on irrigation and the fourth problem is the indifferent quality of irrigation are also inter-linked with above problems of
irrigation water management. The magnitude of these problems also depends on the manner in which the canal supplies are regulated. This regulated supply can vary in a particular year or season in different regions of India. In north India there is rotational system on the basis of which rationed water is delivered to a farm. A pattern of rotation at water-courses level is worked out in advance on the basis of forecast of available water supply every season. The amount of water is in proportion to the area and the cropping pattern. This rationing is followed by rigid schedules and amount of water supplied. In western India, the systems are mainly demand based and the flows are intermittent.

Water is delivered according to area and types of crops grown. In South India, where rice is the dominant crop water is released to the command area from a fixed date of the beginning of the crop season till the harvesting.

These systems have their disadvantages from the point of view of efficient utilization of irrigation water. There is water loss in conveyance and field applications physical control is not sufficient, so the canal authorities have take recourse to manual control through supervision and policing for proper rationing of water supply.

The fifth problem is related to the wastage of water. This wastage occurs through conveyance losses at different
stages of the distribution system and through losses at users field level application of water, finally through over-irrigation (Dhawan 1989). There are some normal losses which cannot be checked are from main storage to the tertiary level through evaporation, and seepage.

The actual ones are needed to be avoided by proper maintenance of the physical structure. Secondly undue wastage occurring in the fields should be checked by leveling the land and construction of field channels. Only after the introduction of Command Area Development Authority in mid 70's that some improvement was done to check the field losses. The most important wastage was through over irrigation i.e. supplying of water to a greater depth than what the root zone warrants. This occurs firstly due to lack of knowledge on the part of the farmers about the water requirement of the crops and their exact periodicity, secondly due to the uncertainty about the water supply which is required. Thirdly, due to the distribution of water, which is not volumetric and fourthly of low water rates.

The sixth problem is that of water logging, soil salinity and alkalinity. The land area under this category is growing. This problem can be tackled urgently through proper management of soil and water in canal command. In this regard better adaptation of crops grown to the varied soil conditions in the command area and more careful
management to avoid over irrigation is of utmost importance source.

The conjunctive use of ground and surface water means taking comprehensive account of all the available water resources, both surface and underground, in a canal command, based among other things, on canal seepage and recharge of ground water. It also means developing crop-sequence and water delivery systems which are most suitable. This approach aims at reducing the externalities of canal operation and maximising the positive extraction of canal irrigation.

The seventh problem is that of sustainability of irrigated farming. There is lack of treatment to upper catchment area in maintaining and regenerating vegetative cover also leads to soil erosion from such deteriorates the environmental and ecological conditions, it also affects the storage through siltation. It results in the reduction of live storage capacity in short span of time. A comprehensive approach to land and water management is needed.

The last problem is of financing irrigation management and pricing of water. The problem over-rides all other problems. It is a well known fact that the revenue collected from the sale of water does not even meet the operation and maintenance expenditure of all the major and medium
irrigation schemes. The revenue collected works to half a percent of the investment made in this sector. Under these conditions it is very difficult to expect proper operation and maintenance of systems. A committee under the chairmanship of A. Vaidyanathan is set up in 1991 to study the various aspects of pricing of irrigation. (G.O.I. 1992) (Ashok K. Mitra 1996).

For making efficient use of scarce water resources, it is essential to make systematic surveys of soil condition, crop water requirements and conjunctive use of surface and ground water, and to reduce the gap between the potential created and its utilisation. Increase in the potential utilisation depends upon, besides the availability of distribution networks, reducing in losses in conveyance, distribution and application i.e. construction of filed channels, lining of water courses, land leveling and land shaping, introduction and enforcement of warabandi (rotational system of water distribution) and adoption of suitable cropping pattern.

The Command Area Development Programme (CADA) started in 1974-75 with a view to increase agricultural production through better management of land and water use, in spite of its poor performance in terms of land improvement, development of drainage facilities and propagating cropping patterns and agricultural practices for optimum use of water.
resources, can be the best policy measure if implemented more effectively.

In the irrigated areas through major and medium projects the increasing problems of water logging, soil salinity and alkalinity has made good agricultural land unusable. To deal with this problem systematic survey be made to assess the extent, nature and location of water logged and saline/alkaline areas. Secondly, the conjunctive use of surface and ground water should be spread to lower the water table. And thirdly, the phased programme should be taken up to acclaim such land; necessary drainage works be made an integral part of the CADA projects and cropping pattern be revised for preventing occurrence of water logging and salinity problems.

Conjunctive use of surface and ground water in the states of Punjab and Haryana has shown very good results both in terms of increasing agricultural production and optimal use of available water. But there has been no systematic survey so far.

Flood control should be made and integral part of overall water resource management and development plans. This will not help only in reducing the loss caused to crops, houses, cattle, and erosion etc. But may increase the economic viability of the flooded areas and utilisation percolation of flood (surplus ) water. Drainage
improvements, embankments, flood zoning, flood forecasting and early warning are important measures taken for flood control. Maintenance and continuous improvements of such works with people's participation can be more effective measures for flood control.

Effective policy for optimum utilisation of water resources through major and medium projects must integrate the measures for flood control, power generation and irrigation.

User's participation in major and medium irrigation projects must be encouraged both at the higher level and at the local level. Various models, like Pipe Committee in Andhra Pradesh, Mohini User's Co-operative in Gujarat of water user's association are good examples of people's active participation.

To encourage such needs association transfer of some management and legal powers to the people's organisations, state's help in their enforcement, some kind of concessions or related to user's associations can be more useful.

Minor surface water irrigation schemes like lift irrigation, drip and sprinkler systems are becoming more popular particularly in water scarcity and drought prone areas. It saves wastage of water irrigate more land areas with small quantity of water and increase crop productivity in dry lands. It can be more economical and useful measure
in states like Haryana where power is available. Ground water in more dependable source of irrigation, provided it is not over-exploited in reckless manner. Minor under ground water irrigation schemes like dugwells, tube-wells, shallow and deep tube-wells, owned by individuals or community or state have found general acceptance among the farmers. The use of underground water with assured supply of irrigation increase the use of other inputs like fertilizers, pesticides, weedicides, HYV seeds etc. It is estimated that it also decreases the cost of their use by as much as 30 percent. (Eight plan, P.64).

To discourage over-use of ground water and to maintain the water table intact some sound legislative measures, water and power tariffs and some schemes of proper spacing of tubewells must be adopted and implemented effectively. Besides recharging schemes like percolation tanks, canals watersheds etc. be implemented, particularly in water scarce areas.

Thus, conjunctive use of surface and ground water resources in both irrigated command as well as in water scarce areas must be emphasised to achieve the objectives of equitable distribution of water resources for irrigation and sustainable agricultural development.

It is well recognised fact that public sector canal irrigation is the large scale irrigation means in India. And
it will remain the largest means of irrigation in the state of Haryana. It is also well known that water rates charged are very low and do not cover the working expenses (variable costs). According to the latest estimates the supply cost of public canal irrigation rose from about Rs. 488 per hectare in 1980-81 to Rs. 2277 per hectare in 1992-93. Against this the Indian farmer is paying Rs. 151 per hectare during 1992-93 (Dhawan, 1997). This cost, includes the construction, operation and replacement cost, may not be real one. Since it also includes the bribe component grabbed in by contractors, politicians and bureaucrats as well. Recovery of such costs from the farmer is neither desirable nor feasible. But the farmers must pay at least the working expenses and depreciation/replacement costs to maintain the canal system intact.

Measures adopted for the realisation of above mentioned cost must have in mind the interests of both the farmer as well as the irrigation authorities. Another lacunae in the system is that irrigation charges are collected by the revenue department in the state, while the operation and maintenance is the responsibility of the irrigation department. These two functions should be under the charge of one authority, so that an efficient irrigation system can be sustained which is the life and blood of not only
agriculture but of the entire economy of the state of Haryana.