CHAPTER 9

SUMMARY AND CONCLUSION
Agriculture is the life blood of a nation. Physiocrats thought that agriculture played a strategic role in economic development by generating economic surplus. They were the earliest economists who recognised the significance of agriculture in economic development. The significance of agriculture in Indian economy is not debatable.

In an effort to revamp Indian agriculture different strategies were adopted from time to time. Among others, they include Cooperative Farming, Intensive Agricultural District Programme, Green Revolution and Integrated Rural Development.

Irrigation has a direct bearing on agricultural strategies in India. It is helpful for sustained and successful agriculture. An assured water supply helps increase farm yield and income and facilitates increased capital formation. Irrigation in India performs protective and productive functions. The protective irrigation makes up the moisture deficiency in soils to ensure the healthy growth of crops. The productive irrigation helps to raise the second and third crops. Irrigation also creates employment in a predominantly agricultural economy.

There is an imperative need to economise on water use. Economy on water use will help increase productivity and bring more areas under irrigation. This calls for improved water management practices. The new irrigation strategies facilitate improved water management. Control and proper method of irrigation in canal and tank command areas, provision for drainage and reuse of water facilities,
conjunctive use of surface and ground water, sprinkler irrigation in canal/tank command areas, drip irrigation in well irrigated areas and Bi-wall irrigation for closely spaced crops are the significant irrigation strategies.

Agriculture is the backbone of Indian economy. Indian economy, its stability and growth largely depends upon agricultural sector. The significance of irrigation in agricultural growth and stability is an acknowledged fact. Irrigation has assumed an added significance in the context of Green Revolution in Indian agriculture.

Stabilising farm output formed the basis for irrigation development during the pre-independent India. The partition of India was a severe blow to India's predominantly agricultural economy. It inherited less than proportionate share of irrigated area. Agriculture and its development formed the main theme of the First Five Year Plan in India. As a corollary, irrigation development was assigned a crucial role. Major, medium and minor irrigation schemes have been catering to the irrigational needs of post-independent India. Major and medium irrigation schemes could never be completed on time, resulting in cost escalations. There has been a gap between capacity creation and utilisation in these schemes. Inadequate development of on-farm water management facilities, lack of coordination among various agencies and lack of field channels accounted for the gap between capacity creation and utilisation. Under-utilisation of allocations made to irrigation is observable in most of the states in India, under the major and medium schemes. Inadequate planning, lack of coordination
and long drawn out execution are responsible for under-utilisation.

Major and medium irrigation systems have prohibitively high costs. Time and cost overruns are common. Big projects are also objected to on environmental grounds. The future of major and medium irrigation projects may not hereafter be as pronounced as before. Minor Irrigation schemes have been the backbone of irrigation schemes throughout Indian history. The Royal Commission on Agriculture (1926-28), the Report of the Indian Irrigation Commission (1972) have stressed upon the construction and improvement of minor irrigation works. Minor irrigation works have a short gestation period. The canon of conjunctive use of water resources also justifies the development of minor irrigation works. In drought prone states like Andhra Pradesh, Madhya Pradesh, Maharashtra, Rajasthan and Tamil Nadu provisions made could not be utilised under minor irrigation schemes. All is not well with minor irrigation planning in these states. Despite this, in most of the years, there is no gap between potential created and utilisation in the case of minor irrigation programmes.

Tanks and wells constitute the chief sources of minor irrigation. Tanks help soil and water conservatition. The contribution of tanks to irrigation is sizeable in Andhra Pradesh, Orissa and Tamil Nadu. Well irrigation could be thought of and operated with a fair degree of success in the absence of other sources of irrigation. It helps in the full and economic use of water. No damage to land occurs in this system. The performance of well irrigation has not been uniform in India.
Agriculture plays a crucial role in Andhra Pradesh too. Notwithstanding the predominance of agriculture, the per capita income from agriculture is lower in Andhra Pradesh than the All India Level. This is attributed to the relative backwardness of non-irrigated agriculture to irrigated agriculture.

Irrigation is a means to stabilise agriculture. The advent of new technology in agriculture involving High Yielding Varieties of seeds has widened and deepened the demand for water in Andhra Pradesh. Institutional support has been forthcoming in the State in the development of irrigation. The main institutional agencies engaged in the development of irrigation are Andhra Pradesh State Irrigation Development Corporation, Andhra Pradesh State Cooperative Rural Irrigation Corporation and Panchayat Raj Department. Massive investments have been made in the development of irrigation under different Five Year Plans in Andhra Pradesh. It looks as though planning for Andhra Pradesh is planning for major and medium irrigation and power. The outlays under different Five Year Plans instead of being evenly distributed over the various common and traditional heads of development, seem to be highly skewed in favour of irrigation and power.

Minor irrigation accounts for half of the total irrigation in Andhra Pradesh. However, expenditure on minor irrigation under most of the Five Year Plans stabilised at well under one-fifth of the total expenditure on irrigation in Andhra Pradesh. The skewed distribution of irrigation expenditure in favour of major and medium irrigation does not speak well of irrigation planning in Andhra Pradesh. Needless to say, minor irrigation should get its fair share in irrigation allocations.
Andhra Pradesh has three regions namely Coastal Andhra, Telangana and Rayalaseema. The Telangana region registered the highest growth rate in terms of net and gross irrigated area. This region's growth rate is higher than the growth rate for Andhra Pradesh as a whole. The Rayalaseema region recorded negative growth rate in terms of both net and gross irrigated area. Irrigation expansion in this region has not been significant owing to the absence of adequate and reliable sources to support major irrigation. Infact, the gross irrigated area in the Rayalaseema region of Andhra Pradesh declined. There is an imperative need to stabilise the gross irrigated area in this region. The demand for stability of the gross irrigated area stems from the assertion that even small variation can have disproportionately large consequences on output, employment and income and its distribution.

The intensity of irrigation is the highest in Telangana region. The region also tops in ground water exploitation. Coastal Andhra leads the other two regions in surface flow irrigation. Both in terms of surface and ground water use, the Rayalaseema region is at the lowest rung.

Canals, tanks and wells constitute the main sources of irrigation in Andhra Pradesh. Canal irrigation fluctuations are the least pronounced in Andhra Pradesh. However, marked fluctuations in tank irrigation are observed. Ineffective community's participation, inadequate Government attention, inefficient water management and monsoon failure account for instability in tank irrigation. Significant increase in well irrigation is noticed in Andhra Pradesh.
The Rayalaseema region comprises the districts of Anantapur, Kurnool, Cuddapah and Chittoor. It lies in the rain-shadow region. The South-West and North-East monsoons do not confer significant rainfall on the region. The region is known as the "Stalking ground of famines". Its level of socio-economic development is low. Low rainfall and lack of perennial rivers account for unstable and backward agriculture in Rayalaseema.

All the districts in Rayalaseema are nearly alike in the range of their annual rainfall fluctuations. The high level of dispersion of Anantapur's low level of rainfall, compounds its problems. Thus, Anantapur district is the worst hit.

Rayalaseema represents disturbed natural endowments compared to Coastal Andhra and Telangana. It has less than proportionate share of wells. The annual additions to wells are not very significant. Chittoor district leads the other districts in well construction. It presents a stable annual increase. The range of fluctuations in wells is quite wide in Anantapur district. Neither the range of fluctuations nor intensity at annual variations are new to the district. Anantapur district is noted for this and it is also its problem as well as its potential. In respect of tanks too, Rayalaseema has less than proportionate share in Andhra Pradesh. Additions to tanks in the Rayalaseema region are largely due to the contribution of Chittoor district.

In the Rayalaseema region, one witnesses a decline in tank irrigation. More than half of the irrigated area under tanks in Rayalaseema is in Chittoor district. Even in Chittoor, the decline of
tank irrigation is not difficult to notice. Anantapur occupies second place in the Rayalaseema region in tank irrigation next to Chittoor. However, the lowest size of tank irrigation in Kurnool is higher than the levels of Anantapur and Cuddapah. Further, the range of fluctuations in gross irrigated area in Kurnool is much smaller, compared to other Rayalaseema districts. However, in Anantapur district wide fluctuations are noticed in gross irrigated area.

The gross irrigated area per well declined in the Rayalaseema region. The three districts of Rayalaseema, namely, Anantapur, Cuddapah and Kurnool irrigate more area per well than either Chittoor district or Rayalaseema region as a whole. Nevertheless, the stability of well irrigation in Chittoor district remained unmatched. Rayalaseema's canal irrigation is largely dependent on canal irrigation of Kurnool district. Anantapur's canal irrigation is greater than the canal irrigation of Cuddapah and Chittoor put together.

A quarter of the area irrigated from "other sources" in Andhra Pradesh is from the Rayalaseema region. Among the four Rayalaseema districts, Anantapur and Cuddapah together account for nearly two-thirds of the Rayalaseema's share. Chittoor seems to be losing these sources more than Kurnool.

It is against this background, we have made a micro study of tank, well and "other sources" of irrigation in the district of Anantapur, with a view to understand Anantapur as a drought prone area of the nation as well as the state. Here, an attempt is made to present the district of Anantapur in the context of Rayalaseema of which it is a
Divisionwise information of the three administrative divisions - Anantapur, Dharmavaram and Penukonda - is analysed to seek corresponding possible inferences. With the availability of mandalwise information on all these sources for the last few years, we are in a position to examine each one of these sources, within each division as spread among mandals. Thus, we have mandalwise information amenable for inter-mandal comparison which can be integrated into divisional profile of irrigation sources and practices. A similar inter-divisional comparison in respect of each one of the sources is also attempted.

Agriculture is the mainstay of Anantapur economy. More than three-fourths of total workforce is engaged in agricultural sector. Perennial rivers are conspicuous by their absence. The district's rainfall is the lowest in Andhra Pradesh. Here, irrigation facilities are meagre. Tanks and wells constitute the major source of irrigation followed by canals and other sources.

Tanks play protective role and act as pockets of insurance to crops. Tank irrigation is economically productive and profitable. In the Rayalaseema region and Anantapur district the decline in tank irrigation is unarrested, unless interrupted by nature. We cannot remain indifferent to the fluctuating and declining tank irrigation in the region and the district. The decay of tank irrigation is disastrous for the drought prone economy of Anantapur district. Whatever may be its relative efficiency, tank irrigation contributes even in the worst of drought years, about 10 per cent to gross irrigated area with negligible cost of maintenance. The support to tank irrigation has been adhoc and
half-hearted. This adhoc and half-hearted support is not justifiable. Further, local initiative and management have been inadequate. There is an imperative need to stimulate local initiative and management.

There are tanks of all sizes, spread all over Anantapur district. Practically, every village discovered and husbanded water sources. No water source is too small to be ignored and remain unutilised.

Tank irrigation is inferior to other irrigation systems is an erroneous notion. Tank activity is desirable, regardless of the size and contribution of a tank. One should guard one-self against interpreting the small size of new tanks in a mechanical sense. Indeed, the large tanks facilitate economies of scale. Nevertheless, the new tanks, though small in size, represent the increased marginal significance of additional water sources, in a drought prone area. Hence, contribution to ayacut area cannot form the sole basis for tank construction.

Tanks and 'other sources' constitute total minor surface flows in Anantapur district. The contribution of 'other sources' to total surface flow irrigation is not insignificant. 'Other sources' require no resource for investment, other than absence of indifference and neglect. These 'other sources' may be conveniently brought into an interconnected network among themselves and between them and tanks, as determined by technological considerations. This, unmistakably calls for conjunctive use of all surface flows sources. The allocations for tank development show wide annual fluctuations in Anantapur district.
Fluctuations and uncertainty of allocations tend to make the expenditure less effective and more prone to leakage and inefficiency.

Indeed, the preference for large and new schemes led to the neglect of old tanks in the system. Further, the cost of revival was held against the old ones. Water spread area of tanks too, clearly points to tank neglect. Had the tanks been maintained properly through annual desilting, water spread area could have been controlled and regulated.

The relationship between water spread area and culturable command area is not amenable for one sided unidirectional evaluation. This is because the benefits of water storage are not restricted to mere irrigation. The benefits of percolation and ecological conservation are not to be disregarded. The ecological reasons are currently recognised and valued. Minor irrigation sources have gone along with nature and seldom against it. They have done little to disturb the ecological balance. If there is any such evidence it is yet to surface. Judged from this angle, minor irrigation sources like tanks qualify for preservation and revival.

Each mandal in Anantapur district has varied surface flow sources. This wide variety in the number of these sources is true to the nature of the district. Some of these sources have potential for revival. The capacity of the neglected sources could form the basis for the formulation of a water resources plan at the micro level. Such a plan would be more economical and operationally viable.
No single division in Anantapur district appears to possess a decided edge over other divisions in all respects and viewpoints, as revealed by inter-division analysis of surface flow irrigation.

Exploitation of underground water sources could be thought of when other sources are exhausted. Well construction is the result of efforts to exploit underground water. In Anantapur district, marked variations in the number and contribution of different wells - Dug wells, Shallow Tube wells and Deep Tube wells - among different mandals are observed.

The area irrigated from well sources differs among mandals. At times, wells play complementary and supplementary role and increase irrigation capacity. In some other times, one type of well may substitute for another either to maintain irrigation capacity or not to allow irrigation to decline to nothing. Farmers deepen their wells and apply additional mechanical and electrical inputs, together with other complementary forms of capital and labour to strike water and make irrigation possible. In the process, it is not uncommon that their efforts may even go unrewarded.

Dug well irrigation predominates in Anantapur district. However, the potential for further well digging is declining in the district. If the scope for Dug wells is on the decline, Deep Tube wells seem to be making up for the losses. Economic incentives by way of subsidies are offered for well construction. Notwithstanding these subsidies, well digging is fraught with risks and uncertainties and tends to be a high cost investment activity.
Well digging could be indiscriminate and unregulated. It does not necessarily reflect a spirit of independence and enterprise. It could also be the result of unregulated competition. Nevertheless, it affects the general level of sub-soil water. Needless to say, water sharing is rendered costly even in the short run, especially in the context of dwindling water storage and recuperation levels.

Understanding well digging is a complex thing. People including farmers who live in drought prone Anantapur district are prepared to trade off their occupations and losses to something better. A few who could arrange such trade offs have not let them go. But to a vast majority, such trade off is not available and they come to terms with their surroundings. It is in this context, farmers take to annual well digging in search of water for irrigation. Farmers dig wells to draw water, irrigate their lands, giving themselves work, occupation and purpose and raise crops and thereby raise themselves into income, wealth and social standing and satisfaction. Striking sub-soil water, in one's well is a gamble in a low rainfall Anantapur district. The risks of well digging are not diminished, with the offer of subsidies towards costs. Well digging is a continuous activity in search of assured supply of water in more and more areas at least in the short run. The available technology has not only enabled going deeper and deeper but may have also encouraged taking water farther and farther. Thus, drought stimulates well digging, though sounds paradoxical. Wells are dug usually in summer. Well digging gets arrested in the year of good monsoon. The priority is for using the
capacity and not for installing the capacity in the year of good monsoon. Well digging is a measure of farmers enterprise, a measure of their respect for life.

Well irrigation is mostly private owned. Most of the wells are energised in Anantapur district. Mechanical appliances and power are employed in water lifting for irrigation. Electric motors, diesel pumps, submersible pumps, turbines and jet pumps constitute the appliances employed. The bulk of Dug wells and Shallow Tube wells are operated by electric motors, while the majority of Deep Tube wells are operated by submersible pumps.

The distribution of farmers is highly skewed in favour of Dug wells in the district. Further, the farmers with higher size holdings are the prime beneficiaries of well irrigation. However, farmers with the higher sizes of land holdings are more evenly distributed under different wells, among different divisions in Anantapur district.

The ratios of well irrigated holdings to total holdings in Anantapur and Dharmavaram divisions present similar picture. They present a picture of nearness to each other. The highest number of wells not in use occurs in Dharmavaram division followed by Penukonda. Dharmavaram division has the highest average irrigated area per Dug well. The three divisions in Anantapur district present three different faces in certain respects. Culturable command area per Dug well is the maximum in Anantapur division. The irrigation potential created as a ratio of culturable command area is the highest in Penukonda division. However, the ratio of irrigated area to irrigation potential
created is the highest in Dharmavaram division. Hence, no division is distinctly superior to other divisions in all respects.

Almost all the wells, in Anantapur division are in use. Within the division, the number and composition of wells vary among mandals. Hydrological conditions account for the variations. Steady and proportionate increase in wells in all the mandals is not noticed. Over a time span, different mandals have not retained their ranks, in well commissioning activity. Some improved their position, while others reported deterioration. Private ownership of Deep Tube wells is conspicuous. Percentages of irrigated area to irrigation potential created vary widely in different mandals. A good rainfall year from the viewpoint of the district and the division, need not be a good rainfall year for all the mandals.

Dharmavaram division is the smallest with the least number of wells. The division is known for the largest percentage of Dug wells and Shallow Tube wells in disuse compared to other two divisions. Inter-mandal variation is far too wide in this division, a characteristic common to the other two divisions in the district. Shuffling of ranks among the most of the mandals with their neighbourhood in well commissioning activity is observed. Only two mandals clinged to their ranks. The dispersion of Dug wells under the lower land holding size in different mandals shows a wide range of variation. Dharmavaram division has the largest number of Deep Tube wells. These wells are widespread among different mandals.
Penukonda division with maximum mandals has the largest number of wells. Here, irrigation is found to be stable with low average values, a unique feature of Penukonda division. Less uneven spread of farmers under different sizes of holdings in this division under Dug well irrigation is noticed. However, the spread of irrigation among Scheduled Castes and Scheduled Tribes farmers against 'others' is the lowest in the division.

Any decided superiority of one division over the other in all respects among the three divisions does not seem to emerge. The same characteristic seems to govern the mandals within the division; thus referring to a homogeneous disability.

The policy implication that flows from the previous observation seems to be that the district as a whole - as one single unit; should be considered for programmes of immediate stabilisation of current activities and their development into higher levels in future. Another implication of considering Anantapur district as one single unit may imply that all the divisions seek to be considered simultaneously and not sequentially. Any attempt at ordering inter-divisional priorities may tend to become a soft option. This, however, does not preclude the classification of mandals within each division to ensure optimum effectiveness of investment in tanks and wells. Those mandals at the bottom - the nominal irrigation mandals; may call for a search for suitable set of crops rather than improvements to irrigation. The others continue to claim attention for arresting widespread fluctuation and ensuring stabilisation of existing levels.
Lastly, as between the wells and tanks, as the two constituent sources of minor irrigation; too pronounced a priority for wells over tanks may lead to more mortality among wells and unarrested indifference towards tanks.