CHAPTER-6
SUMMARY, SUGGESTIONS AND CONCLUSION
6.1 SUMMARY

The NE India is a home to a large number of ethnic groups which are unique in their belief, tradition, custom and life style. But the common trait among them is that they are very skilled in making sound management of their available resources based on century old experience and ethos. The Apatanis of Ziro valley and the Chakhesangs of Kikruma village of Nagaland practice organic farming where they use available surface and rain water respectively for irrigating the cultivated fields using water through traditional methods. These practices form important segment of integrated farming that boost productivity and income. In their habitat the Apatanis are surrounded by the Nishis and other tribes who once upon a time dominated their life and living. As a result of this fear the Apatanis had to confined in the small valley popularly known as Ziro valley and innovated a system through which they could get the maximum output from the limited soil, water and forest resources. By practicing century old land use system and wet rice cum fish cultivation the Apatanis are protecting their land from exploitation and degradation. They harness the hill streams to irrigate their paddy field where they cultivate integrated paddy-fish- millets and thus get triple benefit from single area using low input and deriving high output. The fish serves as an agent simultaneously for controlling the pest, increasing soil fertility, boosting production and reducing the cost of pisciculture as against individual practices. The system of cultivation is eco friendly, low cost and community oriented. So the Apatanis 'wet rice
cum fish cultivation’ system has tremendous scope to be developed into a viable and sustainable farming using further research and innovations

In the Kikruma village of Phek district of Nagaland which is situated at the hill top, there is no other source of water for farming except rain water. So to cope with the existing situation the ancestors of Chakhesangs of Kikruma innovated the ‘zabo’ system of cultivation in which rain water is harvested in ponds called ‘Zabo’. Since the time of immemorial, generation after generation has been practicing zabo farming. In zabo farming cultivation of integrated crops, fishes and livestock are done so scientifically that even modern methodologies seem to have no match for it (Sharma and Sharma, 2003). Zabo farming is a combination of forestry, horticulture, animal husbandry and paddy cum fish cultivation. It is a practicable process of maintenance and management of natural resources. It controls soil erosion and manages soil fertility.

Dongs, the traditional water harvesting channels innovated by the indigenous people of Assam specially the Bodo people, are used to irrigate the paddy fields by harnessing the stream water to the paddy fields. It has certainly an edge over other systems like lift irrigation and deep tube well irrigation as in this case, the available surface water is just diverted to the field without any use of energy due to natural slope of the area. Presently due to modification of earthen channels by the Irrigation department of the Government and some NGOs, the farmers are considerably relieved from the burden of breach of the channels and wastage of time in these constructions every season. So now the farmers can devote more time in cultivation. Use of dongs is an ecologically sound method of water management in agriculture that enhances production and productivity of land without harming the environment and utilising locally available resources. Dongs are suitable for the immediate local environment.
The indigenous people of North east India evolved these typical systems of harvesting water which are very efficient and viable under the existing condition of topography and terrain. The traditional systems that they use are local specific, of low cost and community oriented and hence labour intensive. They are masters to adapt with the situation using locally available resources very skilfully. These systems also control soil erosion and increase soil fertility. These systems are not only economically feasible to the indigenous people but also important for maintenance of ecological balance. These are labour intensive that makes these systems participatory. There may be possibly added scopes to make these traditional systems more productive, effective and adaptive. If affords are made in this direction, then the traditional systems of water harvesting as evidenced in NE India can evolve into a new paradigm for the farming communities living in areas across the country as well as outside.

6.2 SUGGESTIONS

Though the traditional systems are best in their utility, but there are certain scopes to improve the productivity of these systems. Some of scopes are discussed below:

- Attention should be given by the Government to improve the infrastructure like marketing of local products, to develop storage facility, transport facility and to develop fishery co-operatives.

- Animal power is not used in Ziro and Kikruma for cultivation. Initiative is necessary in this regard because use of animals in farming can reduce their labour and time.
In Ziro, Government fish farm could not supply the necessary fingerlings to the farmers. About 22 million fish seeds are required to meet the demand. But the supply is low in comparison to the necessity. If required amount can be supplied, then it can boost the production to a large extent as correlation is seen between distribution of fingerlings and production of fish.

In Kikruma though integrated fish farming is practiced, but the production of fish is very low, about 70-80 kg per ha. As far as Nagaland is concerned, the production of fish is 5560 ton as against the requirement of 21,785 tons (ICAR, 2009). Integrated fish farming can bridge the gap between demand and supply of fishes to a large extent.

Integrated fish cum cattle farming, integrated fish cum poultry farming and integrated fish cum pig farming can be practiced both in plains and hills. Cattle sheds should be on the pond bank so that the urine and dungs wash directly to the ponds. Three to four cattle are enough to meet the fertilizer requirement of an one hectare pond resulting in a production of 3-3.5 tonnes of fish/ha/year without any supplementary feed (ICAR, 2009). In fish cum poultry integration, dropping obtained from 500-600 birds are sufficient to supply required nutrient for one ha water area (Ibid, 2009). No additional space is required for sheds as these can be constructed on pond dykes. The dropping makes the bottom of the pond soft, thus helping to release the soil nutrients. Ducks are called biological aerators as they aerate the water while swimming. Pig excreta acts as an organic fertilizer for pond and can supply 70% of food for fishes (Ibid, 2009). By this integration input cost of fish farming can be reduced.
Crop rotation is not practiced in the hilly areas. In Ziro after harvesting of paddy no other cultivation is done. They have to keep the land water logged for three months to make it soft. Ploughing can solve the problem and they can use the field for crop rotation by cultivating pulses after paddy that can fix nitrogen to the field.

Use of solar energy is still not popularised in this area. In N.E India solar energy has attained popularity in Manipur, Mizoram and Nagaland. In Assam there is a great scope to harness solar energy as this region receives enough intensity of solar radiation. In some dong irrigated area instead of koon and lahoni pumps are used where bio fuels are used. Solar pumps can tried instead of bio fuels running pumps. A 10,000 wp solar pump is capable of drawing and pumping approx. 40,000 litre of water / day from a source upto 10 m depth.

Judicious integration of traditional knowledge with modern scientific technology can change the trend of farming in the right direction which should be considered by the people and policy planners.

6.3 CONCLUSION

Observing the importance of water it is the peak time to ensure the sustainable use of water. The twenty first century is often called the ‘century of water’. Rain is the ultimate source of water which feeds ground and surface water resources. North East India is blessed with abundant rainfall and plenty of water resources. In spite of this, the region could utilise only a small portion of it. The traditional systems of water
harvesting can be a solution to this problem as these systems are local specific and so ensure optimum utilization of the available water resources in a productive way.

Though the traditional systems have been effectively practiced by the indigenous people of this area, still not much effort has been made, as yet to bring these systems to limelight. When these systems will come in focus, then only further necessary modifications can be done. The indigenous people developed these systems on the basis of their capability to adapt with the environment. By observing the utility of Apatanis wet rice cum fish cultivation system, the UNESCO has honoured “World Heritage Status” to this system. These traditional systems are the symbol of their identity. These are their pride. Their culture, traditions and ceremonies are based on these systems. As the traditional systems are community oriented, these are the bonding of their unity. These are based on local resources and so they have been sustaining for centuries. The knowledge of the indigenous people is well reflected in their traditional method of soil and water management. These are the sustainable methods of management of natural resources. Due to their viability, utility and productivity, the traditional water harvesting systems have been able to survive till today. These systems are local specific, eco friendly, small scale and community oriented. This makes the involvement of the whole community. System like zabo is a complete package of water management, animal husbandry, horticulture and soil management. It is an excellent controller of soil erosion. So it can check the problem like flood havoc downstream. Practicing dongs the indigenous people of Assam are utilising the available surface water resources in a productive way and at very low cost. This can certainly minimise the burden on ground water resources. Due to use of local resources, these systems prevent wastage of time and money. We should not feel shy to learn from these
indigenous people as they are the masters in utilising available natural resources and thus to cope with the environment. So it is the time to rejuvenate the traditional systems with judicious blending with modern scientific techniques to meet the increasing demand of water and for sustainable development. Government should take necessary steps to fulfil the requirement of people in practicing the traditional systems of water harvesting. Practice of these traditional systems also can make the democracy stronger from the grass root level due to community involvement and all communities of people are benefitted irrespective of caste, language and religion. Neither any political factor nor any other external force can break the unity of these people as water is the basic need of people and the water forms the basis of bonding and unity of these people.