CHAPTER - VIII

SUMMARY AND CONCLUSIONS
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8.1 Background

DPAP-watershed approach is the process of formulating and carrying out a course of action in right perspectives to exploit full potential of natural, agricultural and human resources in the programme implementing areas. DPAP-watershed development and management is a multi-disciplinary activity and represents a dynamic strategy, which is much more multi-faceted than soil and water conservation. It includes development of cultivated and non-cultivated land, production of fuel and fodder, development of livestock and dairying, rural skills and industries.

DPAP-watershed areas are reflecting the entire gamut of problems like unemployment, lower productivity and production with red and black soils under dryland conditions, lower income, having different land classes. For mitigating these problems DPAP was initiated to the chronically drought-affected areas with the funds provided by both the central and state governments. Initially the programme was concentrated mainly on employment generation work in chronically drought-affected areas. But later the programme activities expanded to soil and water conservation, livestock development, maintaining ecological balance etc. Since 1982 onwards the programme was implemented on watershed basis for developing both the natural and human resources, which would serve as a model for developing various land classes, livestock and natural resources in the fragile areas.

The location specific research programme on DPAP-watershed basis, especially on land use and conservation of resources such as soil, rainwater and vegetation in both the arable and non-arable areas were taken up. The programme in arable lands involves improve and stabilization of crop yields, and grows alternative crops through in situ moisture conservation and adoption of dryland technology, agro-forestry etc. In the non-arable land involved
alternative land use systems like agri-horti, silvi pasture and silvi-horti pasture system. Besides the formation of waterways, diversion drains with crop structures and bund stabilization are some of the important items of work.

The present study has been specially taken up to review and assess the extent of changes brought with regard to the set of objectives of the programme. This would help in learning and drawing policy guidelines for the continuation and expansion of the activities to the remaining drought prone areas. In this context, the present study was initiated to conduct the economic evaluation of DPAP-watershed development in Chitradurga district with the following specific objectives:

8.2 Objectives of the Study

1. To study the structure and functions of DPAP watersheds.

2. To compare the socio-economic profile of the farmers in the DPAP-watersheds and non-DPAP-watersheds areas.

3. To quantify the differences in water availability of various use and expenditure pattern on bore well irrigation in the program and non-program implementing areas.

4. To assess the changes in soil fertility, productivity and cropping pattern of the beneficiaries and non-beneficiaries.

5. To find out the adoption level of improved farm practice and resource use efficiency by the farmers within the watersheds and outside the watersheds.

6. To suggest corrective measures for the inadequacies and difficulties observed.
8.3 Sources of Data

In Chitradurga district five DPAP-watersheds implemented by Watershed Development Department, Government of Karnataka in the II phase during 1999 to 2004 was purposely selected for the present study. The secondary data for the study was collected from the State Watershed Development Office, Government of Karnataka, Chitradurga District Watershed Development Office, concerned Taluk Offices and Gram Panchayats and Internet.

The Primary data was collected by using well-structured and pre-tested questionnaire through personal interviews from the selected farmers by employing Purposive Stratified Random Sampling Technique. The total sample size was 356 farmers, out of which 178 sample farmers selected from DPAP-watershed areas and same number of farmers from non-watershed areas. In each area consisting 52 marginal farmers (<2.5 acres), 62 small farmers (2.5 to 5.0 acres) and 64 large farmers (>5 acres) were interviewed. The data was collected for the crop year 2004-05 for comparison and to enable the researcher to assess the impact of DPAP-watershed development programme on water availability for various uses, productivity and change in cropping patterns, difference in resource use efficiency, adoption of improved farm practices, change in income and change in soil fertility level as the result of DPAP-watersheds development.

8.4 Analytical Techniques

The collected data were analysed by employing appropriate statistical or econometric techniques in the methodological part of the study. The techniques employed in the study are summarized below.

1. Simple arithmetic formulae and percentage were used to compute the variables like socio-economic characteristics, average landholdings,
livestock activities, expenditure on borewell, average area and crop/s under per borewell, water availability of various uses, land use and cropping pattern, cropping intensity, productivity and household income in both DPAP-watershed and non-watershed farmers. The obtained values were presented in tabular form for the analysis.

2. Tabular analysis was adopted to compare the groundnut and ragi yield, inputs used, costs and returns per acre of groundnut and ragi between DPAP-watershed and non-watershed farmers. Arithmetic mean values of these variables were computed for DPAP-watershed and non-watershed farmers' separately and depicted in the tabular form for comparison. In order to test the significance of the difference DPAP-watershed and non-watershed farmers with respect to these variables, 't' test was applied.

3. Cobb-Douglas production function was employed for computing elasticities of marginal productivity of inputs and output of groundnut and ragi growers in the programme and non-programme areas.

4. Gini's concentration ratios were calculated for comparing degrees of disparities in the distribution of income among the various categories of farmers in the DPAP-watershed and non-watershed areas.

8.5 Major Findings of the Study

1. As the consequence of DPAP-watershed implementation, the farmers of the programme areas are in a better socio-economic position with regard to assets position, livestock owned, water availability of various use and dryland crops productivity.

2. Under DPAP-watershed areas both average number of borewell failed (0.8) and average expenditure on borewell (Rs. 54114.07) were less as
compared to average number of borewell failed (1.02) and average expenditure on borewell (Rs. 62320.6) in non-watershed areas.

3. Area under irrigation per borewell (3.54 acres) and water availability of crop/s was higher in DPAP-watershed areas than area under irrigation per borewell (2.41 acres) and water availability of crop/s in the non-watershed areas.

4. Adoption of improved dryland techniques at various stages of farm operation by DPAP-watershed farmers were high in both the case of all and selected field/s with proper soil and water conservation. While the adoption of dryland techniques at various stages of farm operation by non-watershed farmers were comparatively low in both the case of all and selected field/s.

5. Watershed development programme has led to manifested changes of the all encompassing land use systems on private lands with introduction of soil and water conservation practices, agri-horti and agro-forestry components depending on land capability classification.

6. The cropping intensity of dryland in DPAP-watershed was marginally higher (120.14 per cent) as compared to (110.75 per cent) the non-watershed areas.

7. The yield of major dryland crops in DPAP-watershed like ragi, groundnut, sunflower, sesame, maize, jowar and Cotton were higher by 8.81, 19.5, 26.84, 3.95, 13.89 and 29.87 per cent respectively over the non-watershed areas.

8. There was significant difference in net returns per acre between DPAP-watershed and non-watershed farmers. The net returns over variable cost
and fixed cost in dryland crops were higher in DPAP-watershed as compared to non-watershed areas. The average net returns over total cost per acre of dryland crops like groundnut and ragi were about Rs 3006.10 and Rs 314.54 in the DPAP-watershed areas against Rs 1871.93 and 201.71 in the case of non-watershed areas, respectively.

9. The production function analysis of dryland groundnut indicated that the elasticities of production of inputs like seed, FYM, chemical fertilizer and bullock pair labour were higher, PPC and human labour lower in DPAP-watershed areas as compared to the non-watershed areas.

10. The production function analysis of dryland ragi indicated that the elasticities of production of inputs like seed, FYM were higher and other inputs like chemical fertilizer, human labour and bullock pair labour lower in DPAP-watershed areas as compared to the non-watershed areas.

11. It was observed from the production function analysis that farmers in non-watershed areas had used more than optimum bullock pair labour rate with respect to dryland groundnut. It signifies the need to educate the importance of optimum utilization of bullock labour in groundnut cultivation.

12. The decomposition analysis indicated that the dryland groundnut production in DPAP-watershed areas was higher by 3.665 per cent and in case of dryland ragi production it was higher by 5.951 per cent due higher technological efficiency.

13. In the DPAP-watershed areas farmers were found to be more efficient in almost all inputs use in the production of dryland groundnut as compared to their counterpart in non-watershed areas. In case of dryland
ragi production, some of the inputs were inefficiently used by DPAP-watershed farmers than non-watershed farmers.

14. The resource use efficiency of both human labour and bullock pair labour were less than unity in case of ragi production in DPAP-watershed areas. It suggests that there is under employment of these resources and withdrawing a part of these labourers would not affect the production significantly.

15. The major contributor to farm family income in DPAP-watershed areas was off-farm labour, especially, on marginal and small farmers. In the same way non-watershed areas contribution of off-farm labor to farm family income was more except marginal farmers.

16. DPAP-watershed development is a remunerative investment. As the result of the programme, the farm family income in DPAP-watershed areas was substantially high among all the three categories of farmers as compared to the non-watershed areas.

17. Almost all the DPAP-watershed development works have been carried out by machines rather than human labour. It may not help to generate more additional employment in the region.

18. The overwhelming majority of the farmers in the DPAP-watershed had clearly perceived the direct benefits like improvement in productivity of land, shift to profitable crops, prevention of soil erosion etc. and direct benefits like improvement in groundwater, higher soil moisture retention capacity etc. of the watershed development. They also believed that DPAP-watershed development programme had created positive impact in their land.
19. Although the DPAP-watershed development programme has more or less stabilized production and productivity, minimized ecological degradation etc. in the programme areas, the dryland problems still prevails in both areas from physical and economic view points. But the problems were less in the DPAP-watershed areas as compared to non-watershed areas.

20. The most heartening observation of the study was that the common property resources had reverted back to their original status within a short time after the withdrawal of the project because of apathy of local community and the absence of post project maintenance.

21. It was observed that most of the fund released under the programme was miss utilized consequences low quality of work or less work as compared to the documents in some DPAP-watersheds in the study areas.

22. There is lot of difference in the documentary physical and financial performance and actual physical and financial performance in the DPAP-watershed development.

8.6 Suggestions and Policy Implications

Many suggestions were offered by the farmers and some suggestions were brought out on the basis of observations to bring the transparency in the programme implementation, improvement in the quality of work and effectiveness of DPAP-watershed development programme. They are as follows:

1. Beneficiary participation should be ensured in all stages of project planning, preparation, project implementation and post project management.
2. One of the most important suggestions offered by the farmers was that the beneficiaries should be involved in choosing the species and varieties of perennial crops either on private or common lands.

3. Farmers suggested testing the soil nature of their land and educating them to plant both annual and perennial crops which are suitable for soil nature and water availability of their land.

4. The post-project maintenance arrangements need to be made to maintain and monitor the use of common property resources for their long-term sustainability.

5. Another important suggestion was that the conservation bunds in arable lands should be properly aligned and consolidated to increase their functional life.

6. Implementation of DPAP-watershed works should be shift from government organization to non-government organization, because leakages of fund in the government organization were more rather than non-government organization.

7. Each and every information about nature of work sanctioned, fund release under each DPAP-watershed must be published in the local newspaper or other media. In the same manner monthly physical and financial progress report of each DPAP-watershed must be published to prevent the leakages of money and bring transparency in the work.

8. They must set-up one autonomous body in the district level to review the work undertaken by the project. The autonomous body must be powerful to take action in case any discrepancy in the work undertaken by the project implementing agencies. The autonomous body must be
responsible to answer in case of low quality of work and miss utilization of funds in the project. The beneficiaries/community must have power to claim compensation against autonomous body in case of low quality of work/miss utilization of fund in the project.

### 8.7 Conclusions

1. DPAP-watershed development can be visualized as an important holistic development mechanism on small scale following natural boundary. It has brought about a perceptible change in land use and cropping pattern in the district based on land capability, community needs.

2. The overall assessment of DPAP-watershed development programme in Chitradurga district was found economically justifiable. However, economic criteria should not be considered as the only means for decision making.

3. The success of DPAP-watershed development of the district has entirely depended on beneficiaries' knowledge about the programme and its activities. Along with their effective participation in the programme.

4. In the study area DPAP-watershed development had protected the inhabitations of the deplorable and fragile ecosystem of the area from acute distress caused by recurring drought, land degradation, denuded vegetation and scarce water resources.

5. Though natural resources were improved and quality of resources of farmers were enhanced through watershed development programmes, there was no strategy/institutional set-up to maintain technical inputs such as structures, systems etc. after withdrawal of project. Hence, there
is an urgent need to evolve suitable strategies to maintain and sustain DPAP-watershed management activities.

6. The basic idea behind DPAP-watershed development is to promote the economic well-being of the village community that requires development of resource users’ organizations for managing these DPAP-watershed activities in an ecologically sound and economically viable manner.

7. The planning and management of the DPAP-watersheds have hampered by limited manpower and lack of availability of labour in time.

8. DPAP-watershed development is an integrated area approach. It has been helpful in arresting land degradation, improving its productivity and prevents the ecological imbalance in the study area. Hence, the programme may be extended to other dryland/rainfed areas of the state.