WATERSHED MANAGEMENT IN MAHENDERGARH DISTRICT, HARYANA

Doctoral Dissertation Abstract (2016)

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Management of watershed encompasses various activities ranging from delineation of watershed to its monitoring. Watershed management involves judicious utilization of natural resources in a hydrological unit. Since, land and water resources have maximum interaction and synergic effect on development, therefore watershed becomes a convenient unit for implementation of various developmental programmes. In this study watershed management approach has been adopted for planning of land and water resources of Krishnawati and Dohan watersheds, falling in Mahendergarh district of Haryana.

Objectives

Major objectives of the present study are:

- To delineate major and micro-watersheds falling in Mahendergarh district.
- To evaluate the present status of land resources in selected micro-watersheds of the study area
- To find out the spatio-temporal changes in land use/land cover and land suitability for different crops at micro-watershed level.
- To study the government intervention regarding watershed development programmes in selected micro-watersheds.

Database and Methodology

The present study is based on both primary and secondary sources of data. Land use and land cover data for the year 1974-76 is based on SOI topographical maps. While, land use land cover data for the year 2012 is based on multi-spectral satellite data of IRS-P6-LISS III and PAN merged images. Data pertaining to number of indicators such as cropping pattern, per cent irrigated area, irrigation intensity, cropping intensity and livestock have been collected from sampled households to ascertain the economic status of the study area. To delineate the vulnerable areas Satty's Analytic Hierarchy Process (AHP) classification has been utilised.

To evaluate the effectiveness of watershed programmes, households have been selected through stratified random sampling technique. In all, 347 households from all selected villages have been surveyed. Secondary data from Department of Rural Development, Department of Agriculture, Haryana, Panchkula and ASCO (Assistant Soil Conservation Officer), Mahendergarh have also been collected.

Organisation of the Material

The study is composed of seven chapters. First chapter deals with the general introduction and contextualisation of problem, geographical setting of the study area, objectives, data base, sample design and methodology. Second chapter is devoted to the review of literature on all the aspects of the study related to management of land resources, water harvesting, groundwater utilization, land capability studies, watershed programmes and their socio-economic impacts.

Chapter three, deals with delineation, codification and characterisation of micro-watersheds. The analysis suggests that 99 km² of area comprising 58 km² of Dohan watershed and 41 km² of Krishnawati watershed is highly vulnerable in terms of soil, land and water resources. Further in both watersheds, 40 micro-watersheds of various size have been delineated, of these 18 are in Dohan watershed and other 22 in Krishnawati watershed. Out of these, 7 micro-watersheds of Dohan comprising 32 villages and 8 micro-watersheds of Krishnawati with 73 villages have been identified as most vulnerable and require urgent intervention by the government.

Existing land use pattern, temporal change over period of time and suitability of land for present crop selection and sustainable development are discussed in chapter four. The analysis reveals that depletion of water bodies and presence of scrub-land over large area, poses serious problem to the environment. However, there is decline in area under water bodies and scrub-land in both the watersheds. Scrub-land is being converted into crop land. The area under forest cover and rocky barren waste land is almost unchanged over a period of last 36 years.

To study the land suitability of various crops, Analytical Hierarchy Process (AHP) has been applied. Suitable areas for crop cultivation have been identified based on seven parameters like soil texture, depth and pH, slope, temperature, rainfall and groundwater depth. The analysis on suitability of land for different crops reveal that Krishnawati watershed is relatively better placed than Dohan watershed.

The status of land resource in terms of irrigation, cropping pattern, agricultural productivity and other economic activities like livestock has been determined by primary survey and the results have been discussed in chapter fifth. The distribution of land resources and the analysis on land holding size reveals that about two-third sample households own land. Majority of upper caste households own land, while it is the lower and intermediary caste groups, which are landless. Irrigation facility is better among large farmers as compared to small and medium farmer households. Irrigation intensity in both watersheds is much better than district average, however, in comparison to Haryana, this is rather low. In both the watersheds, pearl millet (Bajra) in kharif and mustard in rabi season are major crops, which occupy about half of the net sown area in respective seasons in all the villages of both watersheds. As far as productivity is concerned, Dohan watershed shows better performance than Krishnawati watershed.

Households from both the watersheds are adopting "mixed crop-livestock farming system" which is a common practice under rainfed condition. Results reveal that about 86 per cent households own livestock. The most common livestock is buffaloes which are owned by 82 per cent households in almost all the villages. Large percentage of goats and sheep, ownership is found among landless households in both watersheds. Selling of milk product is a common practice among large

farmers and upper and dominant caste households in both watersheds.

Chapter six is devoted to study the government intervention regarding watershed development programmes in selected micro-watersheds. Taking into account the number of beneficiaries from the projects, it has been found that there were 161 beneficiaries from Krishnawati watershed against 95 from Dohan watershed, suggesting that Krishnawati watershed programme had been more successful. It has been found that most of the upper and dominant caste groups and large farmers have been benefited from the outcomes of watershed programmes, whereas a large number of lower caste and landless households have been benefited only from entry point activities.

Recommendations and policy implications have been presented in chapter seven. About 110 villages in both watersheds are most vulnerable in terms of natural resources. Therefore, augmentation of land, soil and water resources needs to be addressed in these villages on priority basis. Small and medium farmers require financial support to venture into agro-allied activities to supplement their household income. Finally, the study recommends continuous monitoring of conservation sites from time to time by the field officials. Besides, landless and lower caste group households should be targeted for watershed activities in future watershed programmes.