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Spatio temporal analysis of watershed management programmes in Chamarajanagar district

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Abstract

Watershed is a geohydrological unit draining to a common point by a system of stream. The study area is a sub watershed region of Cauvery river basin. The district is predominantly composed by agriculture forest areas. Most of this region is rain fed agriculture which is severely suffering from water resources. Since several Watershed Management Programmes have been implemented to rejuvenate water resources, the best practices of Watershed management are to increase infiltration of rain water, increase water holding capacity and prevent soil erosion through amelioration measures.

Keywords: Watershed, geohydrological unit, rejuvenate, infiltration, amelioration, afforestation, conservation, infrastructure

Introduction

The watershed is geohydrological unit or a piece of land that drains at common point. Watershed is a topographically delineated area that is drained by a stream system. Watershed is made up of its physical and hydrological natural resources as well as human resources. Management of a watershed thus entails the rational utilization of land and water resources for optimum production but with minimum hazard to natural and human resources. Therefore, watershed management is the process of guiding and organizing land use and use of other resources in a watershed to provide desired goods and services without adversely affecting soil and water resources. Embedded in this concept is the recognition of the interrelationships among land use, soil and water and the linkages between uplands and downstream areas.

The watershed concept for development of rain fed agriculture has gained importance and it has been demonstrated that watershed development approaches are very effective in improving livelihoods in dry land areas. *Watershed management* is the integrated use of land, vegetation and water in a geographically discrete drainage area for the benefit of its residents, with the objective of protecting or conserving the hydrologic services that the watershed provides and of reducing or avoiding negative downstream or groundwater impacts.

Study Area

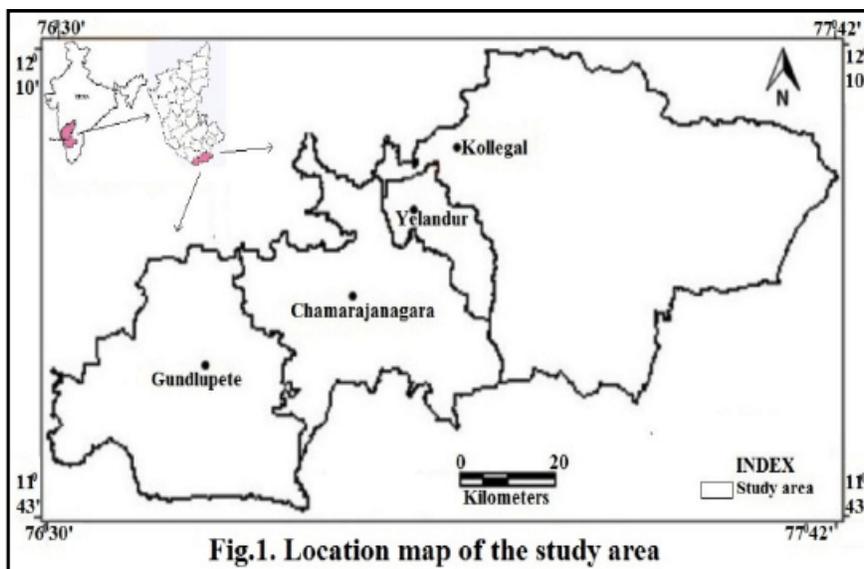
Chamarajanagar district was formed during 1997 after the reorganisation of districts in the state. Chamarajanagar district lies in the southern part of Karnataka State and is located between latitudes 11°35'21" to 12°8'59" N and longitudes 76°23'57" to 77°46'40" E. This district has a geographical area of 5671.71 square kms, constitute 2.96 % of the state's area. The district with a population of 10, 20,791 (2011 census) accounts for 1.78 % of the total population of the state. It consists of 4 taluks, 16 hoblies, 424 inhabited villages and 85 uninhabited villages. The four taluks of the district are Chamarajanagar, Gundlupete, Kollegala and Yelandur. The Chamarajanagar town is the district head quarter. The district is bounded by Mysore district on the West, Mandya district in the North and Tamil Nadu State in the South and East and Kerala in the Southwest.

Chamarajanagar district is a major agricultural area and it is a semi-arid region with average precipitation ranging from 400 mm to 750 mm a year. These lands are subject to periodic droughts, severe soil erosion, erratic rainfall, and depleting groundwater. Nearly 80% of agricultural land in the district is drought-prone.

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The district is famous for sandalwood and other forest products. The river Cauvery flows along the boundary of Kollegala taluk. The district is mainly drained by Suvarnavathy and Chuckhole, which are the tributaries of Cauvery and are ephemeral in nature. There are no mineral based industries in the district. The district is industrially backward and is supported by agrarian economy. There hill

ranges like Gopalaswamy hill ranges, B.R. hills and MM hills with 77 hill ranges etc., are found in the south and eastern side. The highest peak of the district is in B.R. hills with 1687m. msl. The average altitude of the district is 658.58 m. msl. The land covers i) Red loamy soil ii). Yellowish grey to greyish sandy loam soils and iii) Mixed soils.



Objectives

The present paper aims to identify the problems, need of watershed management programmes and their effective implementation in the study area.

Database and methodology

The study is based on the primary and secondary data collected from the department of District Statistical Office, Department of Agriculture, Horticulture and other concerned personals. Direct Observations have been made personally in the watershed areas. The data have been analysed and depicted in table and graphic representation.

Watershed management Programmes in ChamaraJanagara District

This led to more damage to vegetation in rural areas leading to deterioration in environment through soil degradation. Different provincial Governments took up amelioration measures such as, afforestation measures, soil conservation measures, run-off water utilization programmes, etc. However, expected results did not forth come on constant and continuous basis. Therefore, Government of India launched watershed development programmes (WDPs) in 1983-84 in a big way to conserve and utilize natural resources for enhanced and productivity and higher socio-economic status. Though, it has been carried out since 1983-84, the impact of watershed programme is to be evaluated for evolving better strategies/policies to preserve, conserve and utilize natural resources for betterment of ever growing population. ChamaraJanagara district has several resources with agriculture predominant activity. It consists 2, 12,984 hectares of cultivable land. The district is facilitated by fertile soil, suitable climate and hardworking farmers. It is situated in Southern Dry Zone of Karnataka which receives less rain fall. Hence here is a need to improve the cultivable rain fed land by sinking of rain water

and to improve the ground water level which aims to result in food security among the farmers. The land available for watershed development in the district is 337619 ha. Out of the total geographical area of 570171 ha. About 1, 22,770 hectares of watershed area is developed under various projects.

Structure of Watershed in chamaraJanagara District:

The district falls under the water resource region, the Bay of Bengal (Region 4) mainly drained by Cauvery basin (4B), which includes the catchments of Krishnarajasagar reservoir (4B3) to Stanely reservoir and Amaravathy reservoir to Stanley reservoir (4B2). These 2 catchments are further delineated into 3 sub catchments, 10 watersheds, 128 sub-watersheds, 249 mini-watersheds and 1194 micro-watersheds as presented in Table 14. Nearly 95% of the district falls under the catchment 4B3. In Region 4 of ChamaraJanagara district, the average area of the micro-watershed is 472.86 ha. and Somavarpet (4B3A5J2f) is the largest micro-watershed with an area of 962.62 ha.



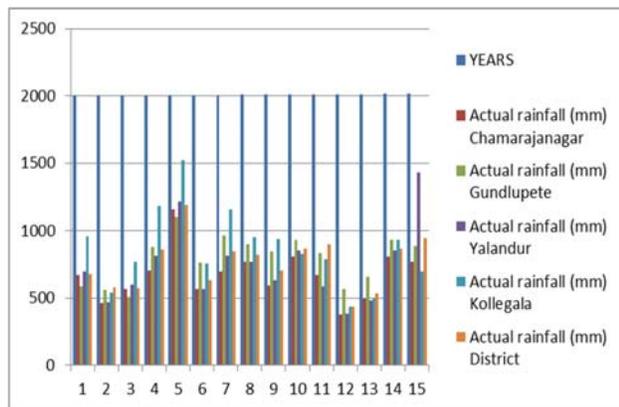
Watershed management Programmes in Chamarajanagar District

Watershed Development Department, Government of Karnataka (WDD-GoK) has selected Chamarajanagar District for the development of Watershed Areas in various dimensions. More than 80% of the Watershed areas of the district are in rain fed agriculture. The district receives a scanty amount of rainfall which is insufficient for agriculture and drinking water. The average yearly rainfall of the district has been analysed through the following table.

Table 1: Tulukwise Rainfall in Chamarajanagar District

Years	Actual rainfall (mm)				
	Chamarajanagar	Gundlupete	Yalandur	Kollegala	District
2001	670	588	695	958	679
2002	460	558	466	542	579
2003	568	507	599	768	575
2004	705	881	814	1183	858
2005	1154	1101	1215	1519	1188
2006	568	763	567	756	634
2007	699	963	814	1155	848
2008	771	899	766	954	819
2009	590	846	634	938	704
2010	807	930	853	830	867
2011	674	832	588	791	898
2012	379	565	382	438	438
2013	494	655	482	503	536
2014	807	930	853	930	867
2015	768	887	1429	696	945

Source: District Statistics



The above table and the cartographic representation reveal that it is one of the driest districts of Karnataka. The average amount of rainfall of the district is less than 750 mm per anum. The watershed concept for development of rain fed agriculture has gained importance and it has been demonstrated that watershed development approaches are very effective in improving livelihoods in dry land areas. Hence, the watershed area of the district needs treatment programmes. Watershed Development Department has implemented the several Watershed management programmes and schemes through the District Agriculture Department with the assistance of Forest Department, Horticulture Department, Animal Husbandry Department, NGO's, SHGs, and UGs. The district has a total geographical area of 5, 70,171 Hectares of land. Out of which the treatable watershed area is 214849 hectares. So far about 1, 22,770 hectares of land has been effectively treated by several Watershed Management Programms. The Watershed management programmes which have been operated in the district since from 200-01 are National Rural Employment Guarantee Scheme (NREGS) Drought Relief

Programme (DRP), National Watershed Development Project (NWDP), Pradhan Mantri Rozgar Yojana (PMRY), Sampoorna Grameena Rozgar Yojana (SGRY), Integrated Wasteland Development Project (IWDP), Rural Infrastructure Development Fund(RIDF), Rajeev Gandhi Drinking Water Programme (RGDW), Suvarna Krushi Honda Programme(SKHP), Rashtriya Krushi Vikasa Yojana (RKVY), Drought Prone Area Development Project- 6th & 7th Stage(DPAP), Drought Prone Area Development Project -Hariyali-I, II, III & IV (DPAP-Hariyali), Western Ghats Development Project (WGDP), Jalasiri Programme, Karnataka Watershed Management Project II Sujala-III (KWMP-II Sujala-III), Saline and Alkaline Soil Management Programme (SASMP), Tribal Special Programme (TSP), Special Component Plan (SCP), Integrated Watershed Management Programme-I, II, III, IV, V, VI (IWMP), Pradhana Mantri Krishi Sinchayee Yojana (PMKSY). Among these programmes DRP, NWDP, IWDP, SKHP, RKVY, DPAP, WGDP, KWMP, TSP,SCP, IWMP and the present PMKSY are implemented to improve agriculture, soil management, water management, afforestation, livestock management etc., Rest of the above are meant for drinking water, rural employment and other infrastructure of village community. Most of these programmes are executed in Chamarajanagar, Gundlupete and Kollegala Taluks because most part of these three taluks are having dry land agriculture. The other Yalandur Taluk is almost irrigated area.

Integrated Watershed Management Programme (IWMP)

There are 16 Sub watersheds with 168 Micro-watersheds of Chamarajanagar, Gundlupete and Kollegala Taluks have been selected for the treatment under IWMP. The public awareness has been created among the farmers about the water resources through the street play, jatha and Grama sabha by the members of the department and NGOs. Thus the people became the beneficiaries of various schemes by a major financial assistance of the government with a little self-contribution. This programme is successfully operated through Private Public Participation.

IWMP has been introduced during 2009-10 and continued batch by batch every year for a period of five years. The IWMP Batch VI, now known as Pradhana Mantri Krishi Sinchayee Yojana (PMKSY) is an outstanding programme of the district. At present about 80,831 Hectares of land has been treated by various activities. The activities undertaken by the IWMP in the district are soil and moisture conservation measures like construction of check dams, water harvesting structures, ground water recharge, percolation tanks and farm ponds, desilting of village ponds, treatment of drainage lines/ gullies, land levelling, bunding of farms, graded bunding, contour bunding, treatment of problem soils, sericulture, sheep rearing, fisheries, nurseries, agro-forestry, agri-horticulture, silvi-pasture, organic farming, use of bio-fertilizers, value addition and marketing of produce through farmers groups, training & capacity building of stakeholders.

Some quantifiable indicators for outcomes of the programme:

As for as the primary observation and the department information about 90% of progress have been succeeded in the district. The principal outcomes of the programmes are,

- Additional area brought under single/multiple cropping, productivity and production of crops, horticulture,

- Increased livestock, fodder, agro-forestry, fisheries products, farming systems, land use and commodity /crop diversification,
- Wasteland brought under cultivation, etc.
- Changes in water availability (surface storage and ground water table), quality of water, irrigated area, per capita income, creation of livelihood opportunities, out migration, cropping intensity, feed and fodder availability, etc
- Environmental impact like change in soil loss, the perennial flow and reducing peak flows, recharge of ground water, improved drinking water availability, etc.
- Casual and regular Employment opportunities through SHGs, livelihood activities.

Issues before Watershed Management Programmes

1. Watershed projects have not been succeeded to generate sustainability because of failure of implementing agencies to involve the people with their contribution.
2. It has been noticed in many cases that the stakeholders were neither involved in selection of project ingredients nor encouraged to participate in various project activities.
3. Since watershed is a land bases activity, the benefits of watershed management accrued mainly to farming community where as the livelihood security of the landless families have not been taken care.
4. The primary stakeholders could not maintain those activities after the completion of project period.
5. In majority of the cases sustainability had been caused mainly due to absence of primary stakeholders in project planning and implementation stages.
6. Withdrawal mechanism has not been properly spelt out by the project



Street Play



Krishi Honda



Check Dam



Grama Sabha



Village Tank Reconstruction



Trench Bund

Conclusion

Implementing agencies for which local community level institutions did not come up to own the project. Due to lack of capacity and involvement of the community at project completion stage, the assets created under the project could not be maintained with the involvement of local community which ultimately affected long run sustainability of the project.

A balance between economic and environmental objectives and consideration of all interactions of the watershed system are important criteria in watershed management. This balance is necessary for the district at various stages of development. Conflicts are increasing over shared water resources between agriculture, industry, and urban domestic use. Sustainable water management is thus crucial for economic development and livelihood of the people. In a district like Chamarajanagar, where a lot of running water goes waste, it becomes very important to apply the technology of watershed management to solve its annual problems of droughts and floods.

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6. Related Pictures:
7. Note: Jatha Programme, Grama Sabha and Street Play to aware the people
8. Krishi Honda, Check dams, village tanks and Field Bunds are the Watershed Management Programmes. Please insert these pictures wherever necessary.