

Role of Watershed Development Programme in Sustainable Development: Nidhal Experience from Satara District, Maharashtra

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Abstract-

Water is essential for the existence of the biotic world including human beings. Watershed is a hydrologic unit is often used for the management and planning of natural resources. Watershed development is a need of hour for sustainable water resource development and management of rain shadow region. Nidhal is a small village situated in the critical drought-prone Khatav Tahsil of Satara District, Maharashtra. Scarcity due to erratic and scanty nature of rainfall study area experiences drought conditions repetitively. Main objective of the study is to study role of watershed development programme in sustainable development. Present study is based on the primary and secondary data. In the study area Indo-German Watershed Development Programme and other programme was successfully implemented under active leadership and guidance of Mr. Chandrakant Dalvi (IAS) from 1998 to 2012. 'Panlot Kshetra Vikas Sanstha' of Nidhal village was successfully completed various area treatment and drainage line treatment activities along with community contribution. Due to that at present the watershed is self-sufficient in agricultural production. Ground water level of the region and socio-economic status of villagers is increased. Present work shows that role of watershed development programme is helpful for sustainable development of watershed.

Keywords: Watershed Management, Sustainable Development, Nidhal Watershed, Yerla River, Maharashtra

Introduction:

Watershed management is a practice of managing human activities on a watershed by recognizing the interrelationships among landuse, soil and water as well as the linkage between uplands and downstream areas. Watershed development is a useful for sustainable development of any region. Nidhal watershed of the Yerla basin was in need of drinking water supply through water tankers in every summer season before implementation of watershed development activities. In the study area Indo-German Watershed Development Programme and Community Action for Poverty Alleviation Programme (CAPA), funded by Watershed Organisation Trust, Ahmednagar, was successfully implemented under active leadership and guidance of Mr. Chandrakant Dalvi (IAS) from 1998 to 2012. Nidhal village was successfully completed various area treatment i.e. afforestation, reforestation, dry land horticulture, etc. and drainage line treatment i.e. loose boulder and gabion weir structure, check dam, etc. activities along with community contribution.

It is widely acknowledged that sustainable development of societies is closely related to the management of water resources by various countries. Global convention has accordingly recognized watershed management as a necessary responsible action by the governments. In India in the absences of adequate storage facilities, about 37 percent of fresh water is drained to the sea. It evidences that more than the availability of water,

in India, the problem is related to collection, storage and management of available water (Jog *et. al.*, 2003). The Government of India has been deploying considerable resources in different watershed development programmes since mid-1960s (Sharda *et. al.*, 2008). The importance of watershed management can be gauged from the experiences of the Ralegan Siddhi, Hivre Bazar, Darewadi villages of Ahmednagar district of western Maharashtra and from many other villages across the country (CSE, 2009). In view of planning and management of natural resources, the catchment remains very important area, proper treatment of which offers a solution for meeting the frequent drought situation (Tideman, 2007). Water conservation and management have been mentioned in the ancient scripts-Vedas, around 3000 B.C. Singh *et. al.*, (2003) has emphasized on sustainable management of water resources, water resources in India, drought and depletion of water resources, cartography for water management and rain water harvesting techniques to reduce water crisis and sustainable management. According to Sharda *et. al.*, (2008) for successful development of any watershed soil and water survey and analysis is a key deciding factor. Narayana *et. al.*, 1990) contributed on soil and water conservation research at watershed level and gives emphasis on water literacy.

CSE, (2009) and WOTR, (2010) reports on the result of comprehensive watershed development programme through voluntary organizations at different villages shows that watershed management is essential for overall development of basin. Watershed planning and management activities were studies worldwide. Schwab et al. (1996) has been highlighted a need of soil and water survey, study of rainfall, various parameters associated with rainfall like pattern, intensity and duration of rainfall and estimation of runoff generated from these rains for effective watershed development. Schultz and Engman, (2000) intended to provide methods to help the water managers solve their own problems in water management and also reports on number of successful international watershed examples from Brazil, USA, China, European Union, NE Asia and African countries using remote sensing. The effect of human activities and natural activities like climate change, water scarcity necessitates continuous monitoring and evolution of geomorphological and hydrological regimes. Ramotra and Gaikwad, (2009) stated that rooftop rainwater harvesting techniques are useful to solve daily water problems of semi arid villages in drought-prone zones of Maharashtra. Pawar, (2011) observed that motivational leader and community contributions (shramdan) are essential for the successful implementation of watershed development programme in Maharashtra.

Study Area

Nidhal watershed is situated in the source region of the Yerla River, which is the largest northern feeder of the upper Krishna River. Study area lies in the Mahadev hill range of Western Ghat (Sahyari Ranges) between 17°40' 40" N to 17°44' 43" N latitudes and 74°24' 43" E to 74°24' 09" E longitudes. Administratively, Nidhal village is situated in the critical drought-prone Khatav Tahsil of Satara District, Maharashtra. Study area lies in the Survey of India toposheet number 47 K/5. The total geographic area of watershed is about 2001.48 ha. The average rainfall is 547 mm per year with most of rainfall is concentrated during south-west monsoon period particularly June to September. The study area comes in the shadow of the Western Ghat and is therefore called 'Rain-shadow' area. Scarcity due to erratic and scanty nature of rainfall study area experiences drought conditions repetitively. The climate is of tropical monsoon type the annual mean temperature ranges between 29° C to 35° C. The main occupation of villagers is agriculture. Figure 1 (a) and 1 (b) shows the location of the Nidhal watershed in Yerla Basin, Maharashtra.

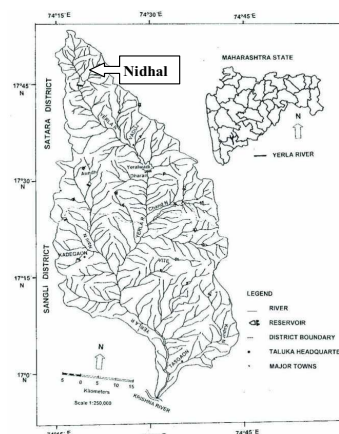


Figure 1 (a): Location Map of the Study Area - Yerla River

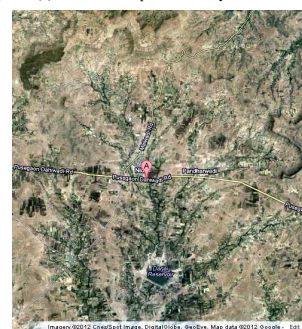


Figure 2 (b): Location Map of the Study Area - Nidhal Watershed (Courtesy: Google Earth)

Material and methods:

The main objective of the study is to study role of watershed development programme in sustainable development. Nidhal watershed of western Maharashtra is selected for the present study. To achieve the objective methodology is divided into three stages. In the pre-field work stage literature reviews, interpretation of SOI toposheet and Google Earth, BHUVAN images, collection of primary (field observations and measurements) and secondary data (IMD, pre and post monsoon water level data, etc) is completed. In the field work stage reconnaissance survey, field check of the Yerla watershed is completed. In the post-field work stage organization and tabulation, analyze and correlate the data from different micro-watersheds to fulfill the objective.

Geographic area of Nidhal watershed is shown in Table 1. Total geographic area of watershed is 2001.48 ha from which, 1558.86 ha area is private cultivable land, 182.19 is private uncultivable land, 12.11 ha is revenue land and 223.34 ha is N.A. land.

| Sr. No. | Type | Area (ha) |
|---------|---------------------------|-----------|
| 1 | Private Land Cultivable | 1558.86 |
| 2 | Private Land Uncultivable | 182.19 |
| 3 | Revenue Land | 12.11 |
| 4 | Forest Land | 223.34 |
| 5 | N.A. Land | 24.98 |
| | Total | 2001.48 |

Table 1. Geographic area of Nidhal Watershed (Source: Panlot Kshetra Vikas Sanstha, Nidhal)

In the Nidhal watershed various area treatment (Table 2) and drainage line treatment (Table 3) works was successfully implemented by the Panlot Kshetra Vikas Sanstha, Nidhal under active leadership and guidance of Mr. Chandrakant Dalvi (IAS) from 1998 to 2012. Under area treatments afforestation on 231.55 ha, reforestation on 70 ha, dry land horticulture on 17.10 ha, agro. horticulture on 41 ha, continuous contour trenches (CCT's) up to 3 % slope on 116.44 ha and above 3 % slope on 1185.66 ha works was implemented with the help of community participation. Photo 1 shows the CCT's and plantation on hill slope in Nidhal watershed. Under drainage line treatments in the study area 6 loose boulder bunds, 3 gabion structures, 12 check weirs and 6 check dams are constructed using community support. In a watershed 9 check dams was constructed under the Community Action for Poverty Alleviation Programme (CAPA) funded by Watershed Organisation Trust, Ahmednagar in 2002-2003. Photo 2 shows the CCT's and check dams in the study area.

| Sr. No. | Type | Area (ha) |
|---------|-----------------------|-----------|
| 1 | Afforestation | 231.55 |
| 2 | Reforestation | 70.00 |
| 3 | Dry Land Horticulture | 17.10 |
| 4 | Agro. Horticulture | 41.00 |
| 5 | CCT up to 3 % slope | 116.44 |
| 6 | CCT slope > 3 % | 1185.66 |

Table 2. Area Treatments in Nidhal Watershed (Source: Panlot Kshetra Vikas Sanstha, Nidhal)

| Sr. No. | Type | No. |
|---------|--------------------|-----|
| 1 | Loose Boulder Str. | 6 |
| 2 | Gabion Structure | 3 |
| 3 | Check Weir | 12 |
| 4 | Check Dam | 6 |

Table 3. Drainage Line Treatments in Nidhal Watershed (Source: Primary Data)

Table 4 shows the impact of Nidhal watershed management programme during pre project period (1998) and post project period (2012). In comparison, Kharif crops area of village is increased from 1138.50 ha to 1444.31 ha. Rabbi crops area also increased from 937 ha to 1265.70 ha, this shows improved water level of a region. Horticulture area of watershed is increased upto 90.4 ha from 4 ha. Now Villagers used advanced irrigation systems on 275 ha earlier which is negligible. Milk production of village interestingly increased from 440 ltr to 2605 ltr. This shows that role of watershed development programme are important for the sustainable development of the region.

| Sr. No. | Product | Pre Project Period (1998) | Post Project Period (2012) |
|---------|--------------------------------|---------------------------|----------------------------|
| 1 | Kharif Crops Area (ha) | 1138.50 | 1444.31 |
| 2 | Rabbi Crops Area (ha) | 937 | 1265.70 |
| 3 | Horticulture (ha) | 4 | 90.4 |
| 4 | Advance Irrigation System (ha) | — | 275 |
| 5 | Milk Production (ltr) | 440 | 2605 |

Table 4: Impact of Nidhal Watershed Management Programme during pre project and post project period

(Source: Primary Data)

Results and Discussions:

Nidhal watershed of the Yerla basin was in need of drinking water supply through water tanker in every summer season. In the watershed Indo-German Watershed Development Programme and Community Action for Poverty Alleviation programme was successfully implemented from 1998 to 2012. Various area treatment (afforestation, reforestation, dry land horticulture, etc.) and drainage line treatment (loose boulder and gabion weir structure, check dam, etc.) activities implemented along with community contribution in the watershed. Due to that at present the watershed is self-sufficient in agricultural production. Water level of a region is increased by 2 to 8 meters. Socio-economic status of villagers is also increased. The village received first prize in Sant Gadgebaba Gram Swachata Abhiyan of Government of

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Maharashtra in 2000-2001 and other prizes. It indicates that watershed development programme is helpful for sustainable development of this drought prone region. It is useful to increase agricultural production, to stop ecological degradation in rain fed and resource-poor areas.

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Photo 1: CCT's and plantation on hill slope in Nidhal watershed



Photo 2: CCT's and check dams in Nidhal watershed