Impact of Micro Watershed Management: A Case Study of Nakrekal Mandal, Nalgonda District, Telangna State of India

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Abstract - Water is the most precious and vulnerable resource on the earth. It is essential to all life on the planet. In rainfed areas, watershed management is utilized to turn water and other natural resources into long-term areas of land that are hydrologically defined and drained by a network of streams. It is important to remember that the watershed comprises soil, plants, water, humans, and animals. Thus, sustainable watershed management requires utilizing land and water resources to maximize productivity while minimizing environmental and human impacts. The population is increasing in the Nakrekal Mandal due to its geographical location. As a result, there is huge pressure on natural resources such as water, soil, and vegetation, mostly due to imbalanced human activities and natural ecosystem factors like flora, land and water. In this aspect, watershed management is important to prevent all these above anomalies from tracking the human factor as a more balanced activity with the ecosystem. The present paper concentrates on the impact of micro watershed management in Nakrekal Mandal in the district of Nalgonda-Telangana state. The study's outcome will benefit geographers, policy-makers, environmentalists, agricultural researchers and academicians.

Keywords: Nakrekal, Watershed Management, Land Degradation, Natural Resources, Agriculture.

INTRODUCTION

The sustainable development and management of natural resources of watersheds play a vital key role, especially from the demographic and socio-economic aspects. The process of sustainable development, on the other hand, depends on several other factors such as the history of the Region, location of the area, social customs, population, planning, laws and administration and above all, the level of awareness among the residents of the area.The expansion of the rural/urban area is due to the demographic pressure, which plays as the main cause for expansion to correlate the population with day-to-day demands on the one hand and the commercial, industrial and transportation and administration, among others.

The Nakrekal Mandal is a headquarters (town) that enjoyed a strategic location that enabled better trade corridors connecting (Junction) the National Highway Hyderabadto Vijayawada, Suryapet, Khammam, Kodad and also nearby surrounding villages. The spatial growth of the village has been looked at from the land-use point of view. Land use is the ecological balance of various parameters existing over a space. The study area is a rapidly growing village in population and area. It has surpassed several villages of a similar size andtype to become the ranking village in terms of population and one of the seven Mandal quarter villages' largest villages in terms of area (37056 Hect/148.86 Sq. Km). So, the demand created by the daily need is met by the supply generated by the amenities located in different parts of the town (village). It was entrusted with developing new colonies, housing, schools, colleges, new municipalities/gram panchayats and road widening, full-fledged and sufficient potable drinking water, fertilizers for farmer's needs, and agricultural prospects instruments area.

The spatial distribution of population to a great extent is influenced by geographical features like Area, Relief, Forest, Water Resources, Types of Soils, Economic base of the Region andAccessibility etc. finally, the study area is gradually increasing due to the facilities mentioned above and simultaneously, the Nakrekal town population is increasing. The facility to population is attributed to the long history of urbanization as administrative of Mandal headquarters. In the latest Census of 2011, the highest population was recorded in Nakrekal Mandal Headquarters (29,126 persons). The

least population in Adavibollaram (169 persons) was followed by Thettekunta (209 persons) and Nellibanda (668 persons). The factor reflects that Nakrekal Mandal is 50% of the total population concentrated in Nakrekal town. The low concentration of population due to unfavorable physical conditions like terrain, rainfall and types of soil are interspersed with lack of irrigation facilities, mobility and business aspect etc., in general, it is seen that the study area is characterized by rural background and low concentration of population except for Mandal Headquarters.

Study Area

Survey of India Toposheet Nos. E44 N8 (New) and 56 O (old) encompass the current study region (Fig.1.3). The total geographical area of Mandal is 152.41 Square Kilometer, located between latitudes N17° 00' 25" to longitude E79° 15' 26" at ridge point and between latitudes N17° 15' 24" to longitude E79° 30' 32" at valley point. The Srisailam Left Bank Canal (SLBC), which runs from Aitipamula Village in Kattangoor Mandal to and crosses the areas of Nellibanda, Nakrekal, Nomura, Palem, Vallabhapuram, and Ogode Villages, as well as the Palleru River, which flows parallel to our Nakrekal basin and is crossed by Thatikal, Mangalpalli, Chandupatla, Marror and Gorenkalpally. The study area (Fig.1) consists of sixteen (16) villages, seven of which are under the administrative control of those village panchayats of Nakrekal Mandal, with Nakrekal as the Mandal Head Quarters of Nalgonda district, and 17-gram panchayat and 42 habitations.

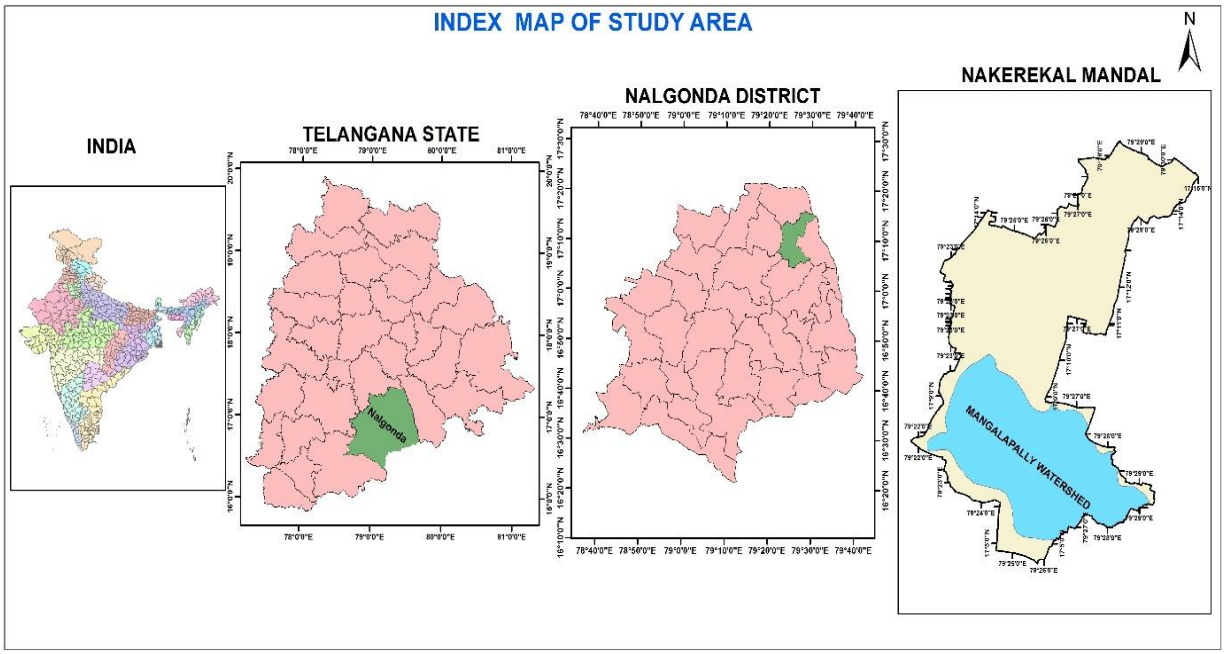

Figure 1: shows Nalgonda District, Nakrekal Mandal.

WATERSHED MANAGEMENT

A single outflow point is for all the water coming into a catchment area which also known as a drainage basin or catchment region. Watersheds are made up of people and cattle whose activities impact watersheds' productivity and the other way around.

The Watershed area grows as we move downstream, while it shrinks as we move upstream on a drainage line. The many stages of the hydrological cycle in a watershed are influenced by natural characteristics and human activities from a hydrological perspective. As a sociopolitical-ecological entity, the watershed plays a vital role in defining food, social, and economic security and delivering life-support services to rural populations (Wani et al., 2008).

Water is one of our Earth's most precious and vulnerable resources. It is essential to all life on the planet. In rainfed areas, watershed management is utilized to turn water and other naturalresources into long-term, sustainable

management. As the name suggests, watersheds are areas of land that are hydrologically defined and drained by a network of streams. It is important to remember that the watershed comprises soil, plant and water, and humans and animals. Thus, sustainable watershed management requires utilizing land and water resources to maximize productivity while minimizing environmental and human impacts. A watershed's management involves directing and managing land and other resources in a watershed so that people may get the goods and services they need while ensuring that natural resources and the environment are not badly affected (Wani et al., 2003).Land use, soil, and water are all intertwined in this theory, considering the connections between uplands and downstream areas. More than 75% of the people in India depend on agriculture for their livelihood. Our country's economy cannot function without agriculture. According to our scientific assessments, more than 70 per cent of the country is suffering from recurrent droughts, and the unpredictable monsoon season significantly impacts agriculture.

Watersheds are commonly acknowledged as ideal geophysical units for managing natural resources in the semi-arid tropics. Many disciplines and institutions are involved in watershed-based natural resource management. A long-standing dispute rages over bringing diverse fields and institutions together at the watershed. It is difficult to build a consortium to provide commodities to the rural poor by bringing together multiple agencies, each with its strengths, limits, and working style.

INTEGRATED WATERSHED MANAGEMENT PROGRAMME (IWMP)

The Watershed development programme has been part of India's national strategy to increase agricultural production and alleviate poverty in rainfed regions since the 1970s. With WSD, rain-fed regions will better store rainwater, reduce soil erosion, and boost soil nutrients and carbon Content to provide higher agricultural yields for local consumption and income production. In geohydrology, a watershed is where runoff is channeled to a common drain. The Land andNatural resources that flow into a single spot are called drainage basins. Watersheds are defined their drainage systems include arable, non-arable, public, and private land.

Agricultural Yields promote human well-being and national food security because most of India's rural poor Reside in these areas and rely on natural resources for their livelihoods and survival (Ahamad et al., 2011; GOI 2012; Kerr 2002). The "Integrated Watershed Management Program" was Established and implemented as a government flagship programme following the government's The decision to unify the centrally-sponsored schemes.

The Desert Development Initiative (DDP), the Integrated Watershed Development Program(IWDP), and the Drought Prone Areas Programmes (DPAP) of the Department of Land Resources have all been combined into a single programme now known as the Drought Prone.Areas Programme (DPAP).The "Integrated Watershed Management Program (IWMP)" was implemented in 2009-10 and is now in its third year. In the 12th Plan, the Indian government has set up Rs. Twenty-nine thousand two hundred ninety-six crores for implementing the Integrated Watershed Management Plan (IWMP) is a programme for community development. More than 54.0 per cent of India's agricultural land is used for rain-fed agriculture. In addition, these places are afflicted by poverty, water scarcity, low productivity, hunger, and land degradation. Watershed development has been used as a strategy to deal with the country's rain-fed or degraded areas (Figure.4.4). There will be a 90:10 split between the federal and state governments for the project's costs. As a result, Indian watershed management seeks to maximize productivity while offering the least risk to natural and human resources. A watershed management plan serves to guide and organize the land use in a watershed to achieve desired goals and services while minimizing the environmental impact.

NAKREKAL MICRO-WATERSHED PROJECT AREA

It is the Mandal headquarters and forty Kilometers from the district headquarters. Both bridge and valley points of the watershed are located at latitudes 17° 06' 25" to 79° 25' 26" and 17° 06' 24" to 79° 35' 32" respectively. The average elevation of this watershed is 125 meters above sea level. One hundred sixteen meters above sea level is the elevation of the watershed's zenith. Micro Watershed covers 1826 hectares, and 165 hectares are usable for treatment. A five-year average of rainfall in the area is 750 millimetres. Between 39 and 24 degrees, Fahrenheit (24 and 39 degrees

Celsius) are typical summer and winter temperatures in the area. As can be seen, the Micro Watershed contains three inhabited areas.

Table 1. Completion of the Micro watershed in Nakrekal Mandal and its villages

NAME OF AREA	MICRO WATERSHED	TOTAL
NAKREKAL MANDAL	BOREWELL RECHARGE	15
	BOULDER REMOVAL WITH MACHINARY	4
	CHECK DAM	0
	GABION SMC	0
	ROCKFILL DAM	0
	HORTICULTURE PLANTATION	4
	MINI PERCOLATION TANK	0
	AVENUE AND BAND PLANTATION	0
	NADEP COMPOST PIT	30

Source: Local Watershed office and DWMA Nalgonda, 2022.

IMPACT OF MICRO WATERSHED IN NAKREKAL MANDAL, NALGONDA DISTRICT

The Micro watershed project is implemented in seven villages and their habitations of the Nakrekal Mandal. The pre-project status of the villages covered in this has less groundwater availability. Due to scarce water and landholders migrating to other places, landless poor people not working in their villages also migrated for their survival. As the water availability is less, the irrigation potential is low, and the average water table depth in dug wells tube wells is less. Much of the area got under wastelands because of inefficient use. Also, the number of children enrolled in schools in the project area is low, and the drinking water availability is not more. However, after the implementation of the watershed programme, all the particulars mentioned above improved. The pre-project and post-project statuses are given in below table 2.

Table 2. Impact of Micro Watershed in Nakrekal Mandal and its villages.

S.No	Name of item	Before Watershed	After Watershed
1	Status of Water table depth	40.10 Meters	35.5 Meters
2	Groundwater structures rejuvenated	4	8
3	Quality of drinking water	Purified water Krishna water	Purified Water
4	Increase in irrigation potential (ayacut)	24.80 Ha	32 Ha
5	The area under Single Crop	75.07 Ha	78 Ha
6	Area under Double Crop	0	0
7	Net increase in Crop production area	82.47	100 Ha
8	Increase in area under Vegetation	73.15 Ha	91 Ha
9	Increase in the area under Horticulture	0 Ha	5 Ha
10	Increase in the area under Fooder	1.10 Ha	3 Ha
11	Increase in Milk production	93.50 liter/day	105 liter/day
12	Increase in livelihoods	3	7
13	Migration	2 people	0
14	Availability of Drinking water	1337 liters	1400 liters

Source: Local Watershed office and DWMA Nalgonda, 2022.

CONCLUSION

Micro Watershed management is essential for sustainable water management to utilize land and water resources to maximize productivity while minimizing environmental and human impact. The implementation of the micro watershed programme has been considered successful in the Nakrekal Mandal. The survey has shown that the local

people are satisfied with conducting and implementing such grassroots projects. After the project implementation, the water level has risen to 5.5 meters, the groundwater level rejuvenated, and water quality and purification have been seen. Moreover, the irrigation potential has increased up to 30 per cent. As a result, there has been an increase in agricultural productivity, horticulture, milk production, and vegetation. Overall, the impact of projects of micro watershed management in the study area led to the increasing livelihood of the people and drinking water. In this aspect, watershed management is important and suggested to increase the quantity to tackle the imbalanced activity in the ecosystem, particularly in the study area.

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