Geographical Perspective on Some Aspects Of Shirpur Pattern of Water Harvesting and Conservation

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INTRODUCTION

This paper is based on the basic research done on technique of water harvesting and conservation which is implemented in Shirpur Tehsil. This technique is popularly known as 'Shirpur Pattern.' It has considerably improved the groundwater levels, while indirectly mproving socio-economic status of farmers in the region.

KEYWORDS: Shirpur Pattern, Water Conservation, Water Harvesting, Check-dams

STUDY REGION

The study region is the area of Shirpur Tehsil. It lies at the northern part of Dhule district of Maharashtra State. The latitudinal and longitudinal extent of Shirpur Tehsil is $21^{0} 11$ ' N to $21^{\circ} 37$ ' N and $74^{0} 42$ ' E to $75^{\circ} 11$ ' E. Total geographical area of Shirpur Tehsil is 1510.67 sq.km. The study region is bounded by Satpuda ranges at North and Tapi river valley in South. The total net sown area is 61541.30 hectare, out of which 13262.15 hectare (21.55 %) are irrigated in Shirpur Tehsil. As per the 2011 Census, the population of Shirpur Tehsil was 4,22,137.

Shirpur Tehsil receives rainfall mainly in the months of June to September. The annual average rainfall of Shirpur Tehsil is 780 mm. About 75% of total rainfall occurs in only 15 to 20 days of monsoon season. Thus, the maximum rainfall occurs in fewer number of days. The rainwater does not percolate much and runoffs to the near-by river.

The main occupation in this region is agriculture. As rainwater run-offs and get wasted in river, the water scarcity arises immediately during the month of December. Therefore, water conservation is much necessary in this region to tackle water crisis.

Initially, the technique of water harvesting and conservation was implemented only in the study region. As its implementation and innovation took place in Shirpur Tehsil, so the technique has acquired the name 'Shirpur Pattern'.

METHODOLOGY

For the study of 'Shirpur Pattern,' the primary data is used as the raw data collected through different sources. Field visits were done on project-sites. The geographical features of the study area were studied. Shirpur Pattern's advantage to agriculture and villagers was studied by surveying beneficiary farmers and interview of project in-charge officer Mr. Suresh Khanapurkar was taken.

The additional analysis of present agricultural, social and economic pattern was

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prepared with the help of secondary data obtained from Socio-economic review, District Census, agro-social and economic magazines, research papers, Ph. D. thesis and webpages. **OBJECTIVE**

The objective of present study is,

To study the geography of Shirpur Pattern as a Water Conservation and Harvesting Technique.

DISCUSSION AND RESULT

Shirpur Tehsil is mainly covered by alluvium soil and remaining portion is covered by mountainous region and Deccan Basalt. In alluvium region and as well as in Deccan Basalt region multi aquifer system occur. In Deccan Basalt, alternate layers of weathered basalt and hard massive basalt are observed. In the same manner, in alluvium regions, alternate layers of yellow silt, sand and boulders can be observed. The effective porosity of sand bed in this alluvium region is estimated to be 30%. As the semi-porous alternate layers of silt transmit very little water, groundwater levels decline. This clearly shows that there is very little lateral and vertical percolation through the yellow silt. Even after heavy rainfall the wells remained dry before the implementation of Shirpur Pattern.

In Basalt area, due to the change in nature of rainfall (heavy rainfall within short duration, major runoff and very slight percolation), though having effective porosity of 2.5% to 3%, aquifers used to barely saturate. The excessive development of this aquifer system is to cater to the ever increasing needs of irrigation.

In absence of any regulatory measures to control groundwater consumption, the farmers were resorting to ceaseless groundwater pumping to meet the water requirement of cash crops. The groundwater based drinking water schemes were the first measure of such development. Due to over exploitation of groundwater resources, groundwater levels declined and all the dug wells in the alluvium region dried during 1990 to 2005. Average depth of the dug wells in this area is 40 meters. Even the tube wells having depth of about 150 to 200 meters used to become dry. That's why, dug wells and bore wells in Deccan basaltic region used to hardly yield water up to December. Only Kharif crops were possible.

Drying of wells and tube wells in alluvial area and inadequate availability of water in the Deccan Basalt area were the main problem of the Shirpur Tehsil. There was no water for drinking, household activities, and farming. Villagers had to travel miles to get water. Water tankers were one of the options, but it was not sufficient and permanent solution. Majority of the land was not getting cultivated. Cultivation is rain dependent. Farmers were becoming poorer due to less farming yield. People were migrating to cities for livelihood, unemployment was increasing. Girls were unwilling to marry a person in drought prone village.

Shirpur Pattern

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The technique of Shirpur Pattern is very basic and easy to implement. It requires few engineers and can be carried out with equipment like dumpers and pock-lands. The project is highly cost-effective as compared to its benefit.

The principle of Shirpur Pattern is to build back-to-back check-dams on streams, which leads to recharge of aquifers and also storing surface water to be available enough to meet drinking and agricultural needs for three years.

The project can be classified into two sections:-

1) Shirpur Pattern is the construction of check-dams on every stream, whether it may be small or big and west weir to augment huge storage of surface water. It follows the principle of water flowing from 'Ridge to Valley'. It focuses on lengthening the project area on stream up to 400m, deepening the streams up to 15 to 20 mt and widening it up to 20 to 30 mt.

2) The project stresses on artificial recharge of water of dry dug wells in alluvial area of Shirpur Tehsil.

In 2004, Maharashtra's former minister Shri Amrishbhai Patel, with the help of famous geologist Shri. Suresh Khanapurkar, implemented Shirpur Pattern Water Conservation Technique. In this project several check-dams of different heights and widths were built back-to-back, from ridge to valley. The streams were widened up to 20-30 m and deepened up to 15-20 m. Also, the fertile soil which was dug spread over the barren land as well as neighboring farms.

When runoff stream flows through the slope to meet river, the check-dams obstruct it. When the first check-dam completely fills with water, the overflowing water is then obstructed by the next check-dam and so on. Thus, by the end of monsoon, maximum checkdams are filled with water and the runoff water doesn't meet the river. The check-dams contain surface water used for basic, agricultural and commercial purposes, and it's also percolates in ground.

The groundwater level increased significantly, because of higher penetration of water that got stored in check-dams. The wells and tube wells that used to get dry till the month of December, now have water throughout the year.

Results

- 1. As per the report of March 2020, 215 check-dams are completed and almost all of them are noticeably filled with large volumes of water.
- 2. Farmers can cultivate 2 to 3 type of crops in a year. This has resulted in increase in per hectare yield of farmers drastically. There social status improved too.
 - 3. Due to this stored water across all the check-dams, fishing opportunities are increased and people practice pisciculture.
 - 4. Agro-based industries are developed.

5. The problem of drinking water is potentially solved.

6. Increasing employment opportunities led to stoppage of migration.

- 7. Energy consumption is decreased. Due to reduction in suction length, low HP pumps have been installed to draw water.
- 8. It controlled eroding runoff and degradation of soil.
- 9. It helped to rehabilitate the deteriorating lands.

CONCLUSION

1. Over the past years, we have been recklessly pulling out water from the earth. We need to establish a balance of our needs and consumption of water.

2. It is essential to increase the capability of percolating water in the ground and this is what Shirpur Pattern thrives to do.

3. Present study gives strong indication of the benefits received from the construction of check-dams at the micro level. Though there are some negative impacts, the positive benefits largely outweigh those.

4. Small check-dams should be built for water conservation and to help farmers for irrigation.

5. Shirpur Pattern clearly fulfils the purpose for which it was created.

6. By this, the farmers are able to grow 2 to 3 crops in a year and they no need to

search for employment or migrate to urban area for opportunity.

7. If the implementation of this project is done throughout water scarce parts of India, it would be a huge help for problems of water scarcity.

8. If the project is implemented everywhere, potentially there will be no incidents of farmer suicide.

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