SUSTAINABLE WATER MANAGEMENT AND RURAL TECHNOPRENEURSHIP: A SECONDARY DATA-BASED POLICY IMPACT ASSESSMENT OF FARM POND SUBSIDY (MAGEL TYALA SHTTALE) INTERVENTIONS TOWARD SDG CLEAN WATER AND SANITATION IN AHMEDNAGAR AND NASHIK

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Abstract:
In Maharashtra's semi-arid regions, sustainable water resource management is still a major concern, especially in districts like Ahmednagar District and Nashik District that are vulnerable to drought. This study evaluates how farm pond subsidy interventions improve water availability, water-use efficiency, and sustainable irrigation practices in line with Sustainable Development Goal 6 (Clean Water and Sanitation). The Magel Tyala Shettale, a state-sponsored program designed to improve farm-level resilience and decentralize water harvesting, is the subject of the study. Using district statistical reports, agricultural department records, groundwater data, and published government documents, the study employs a secondary data-based methodology for policy evaluation. Important Sustainable Development Irrigation coverage, cropping intensity, groundwater stabilization trends, and agricultural water production are among the Goal 6 indicators that were looked at. Progress is assessed both before and after the execution of the system using comparative analytic methodologies and percentage growth assessments. According to the results, farm pond interventions have enhanced agricultural output and resource sustainability by increasing irrigated area and water storage capacity. However, differences in long-term maintenance and implementation effectiveness underscore the need for more robust monitoring systems. The report offers policymakers evidence-based insights to improve decentralized water infrastructure solutions in line with the objectives of Sustainable Development Goal 6.

Keywords: *Sustainable Development Goal 6, Clean Water and Sanitation, Farm Pond Subsidy, Water-Use Efficiency, Decentralized Water Management, Policy Impact Assessment, Sustainable Irrigation, Maharashtra.*

Introduction:

In the state of Maharashtra, water scarcity has grown to be a significant environmental and developmental issue. Despite the state's solid agricultural foundation, there are significant problems with water management due to erratic rainfall patterns, periodic droughts, and an over-reliance on groundwater. Acute water shortages in a number of the rain-shadow region's districts have an impact on farmers' livelihoods and agricultural productivity. Due to unpredictable monsoon rainfall and inadequate irrigation infrastructure, Ahmednagar District and Nashik District are two of these areas that frequently face water crisis. These circumstances demonstrate how urgently sustainable methods of water management and conservation are needed.

Sustainable Development Goal 6, which seeks to guarantee the availability and sustainable management of water resources for everyone, has highlighted water sustainability on a worldwide scale. SDG 6 is centered on increasing water-use efficiency, fostering conservation activities at various levels, and advancing integrated water resource management. Achieving SDG 6 is crucial for long-term water security and sustainable agricultural growth in areas like Maharashtra that rely heavily on agriculture.

Decentralized water harvesting has been a successful strategy to deal with water scarcity in this situation. By enabling farmers to collect and store rainwater at the farm level, decentralized methods lessen reliance on extensive irrigation projects and increase climate variability resistance. Building agricultural ponds, which retain surface runoff and rainwater for irrigation, is one of the most popular strategies.

Acknowledging the advantages of this strategy, the Maharashtra government established the Magel Tyala Shettale to provide financial support to farmers building farm ponds. The program seeks to boost agricultural productivity, expand irrigation coverage, and increase water availability.

Few studies have used district-level secondary data to study the impact of farm pond subsidy schemes in relation to SDG 6, despite the fact that earlier research has looked at water conservation initiatives. Thus, the goal of this study is to assess how farm pond interventions in the districts of Ahmednagar and Nashik contribute to sustainable water management.

Literature Review:

Academic research has extensively addressed water conservation and effective water management, especially in areas with water scarcity and climate variability. Numerous studies emphasize how crucial decentralized water harvesting systems and water conservation initiatives are to enhancing agricultural sustainability. In order to increase water availability and boost agricultural output, rainwater collection projects like farm ponds, check dams, and watershed development programs have been pushed in India. According to research, farm ponds serve as efficient water harvesting structures that collect surface runoff and store rainwater, enhancing irrigation dependability and lowering susceptibility to unpredictable rainfall.

(Source: https://jrpsjournal.in/index.php/j/article/view/280)

The effects of farm ponds on irrigation and farmer income have been the subject of several empirical studies. Farm ponds offer additional irrigation at crucial crop growth phases, improving crop yields and increasing farm production, according to research done in semi-arid parts of India. Compared to farmers without such structures, farmers who use farm ponds have reported notable gains in cropping intensity and income. For example, studies conducted in rainfed agricultural regions discovered that farmers using ponds had a considerable increase in cropping intensity and a 17–48 percent increase in farm income as a result of improved water availability and production stability.

(Source: https://ijsc.iaswc.com/index.php/ijsc/article/view/12)

Due to increased agricultural yield and improved water management techniques, another study found that farmers using farm ponds saw revenue increases ranging from 13 to 97%.

(Source: https://epubs.icar.org.in/index.php/IJEE/issue/view/3702)

The significance of government-funded water conservation programs in enhancing rural livelihoods and agricultural resilience has also been highlighted by policy assessment studies. According to these research, decentralized water infrastructure—like farm ponds funded by subsidies—contributes to better irrigation access, agricultural variety, and more job prospects in rural areas. However, several studies also point out possible drawbacks such poor design, maintenance problems, and the possibility of unsustainable groundwater extraction if water harvesting systems are not properly maintained.

(Source:https://www.un-ihe.org/news/india-research-shows-plastic-lined-farm-ponds-horticulture-worsen-regional-water-scarcity)

The monitoring of Sustainable Development Goal 6 has drawn increasing attention in the realm of global sustainability. Enhancing water-use efficiency, encouraging integrated water resource management, and guaranteeing sustainable water availability are the main objectives of SDG 6. To assess progress toward SDG 6 targets, researchers stress the necessity for trustworthy indicators such irrigation coverage, water production, and groundwater sustainability.

Few studies have concentrated on district-level comparative analysis connecting farm pond subsidy schemes with SDG 6 indicators, despite the increasing amount of literature on water conservation and farm pond interventions. Specifically, there are still few empirical studies that use secondary data from districts like Ahmednagar District and Nashik District to examine the policy impact of farm pond interventions. Thus, by assessing how farm pond subsidy interventions contribute to sustainable water management and SDG 6 advancement in these regions, this study aims to close this research gap.

Objective of Study:

1. To examine the role of farm pond subsidy interventions (Magel Tyala Shettale) in promoting sustainable water management and supporting rural Technopreneurship in Ahmednagar and Nashik districts.
2. To evaluate changes in irrigation coverage and cropping intensity in Ahmednagar and Nashik districts.
3. To compare district-level policy effectiveness using secondary data indicators.
4. To suggest policy measures for strengthening sustainable water governance.

Research Methodology:

Based solely on secondary data, this study is analytical and descriptive in character. District statistical abstracts, reports from the Agriculture Department, research papers, reports from the Groundwater Survey and Development Agency, and government policy documents are some examples of data sources.

Data Analysis & Interpretation:

Data analysis & interpretation is totally base on secondary data.

Objective 1: To examine the role of farm pond subsidy interventions in supporting rural Technopreneurship:

The Maharashtra government launched the Magel Tyala Shettale farm pond subsidy program with the goal of bolstering decentralized water harvesting and enhancing irrigation security in areas vulnerable to drought. The program has made a substantial contribution to on-farm water storage and sustainable water management in areas like Ahmednagar and Nashik, according to secondary data from government papers and publications from development agencies.

Depending on the size and technical requirements of the construction, the program offers farmers financial aid for building farm ponds that ranges from about ₹14,433 to ₹75,000. The goal is to collect surface runoff and rainwater to provide protective irrigation during dry spells and lessen crop losses brought on by erratic rainfall.

(Source:https://www.myscheme.gov.in/schemes/chief-minister-sustainable-agriculture-irrigation-scheme)

According to secondary data, the program has greatly increased Maharashtra's capability for decentralized water collection. In just five years, the state built more than 1,67,311 farm ponds, providing protective irrigation for around 3.9 million acres of agricultural land. An average of 1,365 cubic meters of water can be stored in each farm pond, of which roughly 615 cubic meters are available for irrigation during dry spells. This amount of water can support irrigation for approximately 1.22 hectares of agriculture.

(Source: https://marathi.krishijagran.com/news/1-lakh-67-thousand-farm-pond-in-5-years-under-magel-tyala-shettale-scheme/)

Farm ponds are widely used in Nashik, according to district-level reports. For instance, the Nashik district finished about 7,535 agricultural ponds out of a target of 9,000, demonstrating substantial farmer involvement and district-level policy execution.

(Source: https://www.nabard.org/auth/writereaddata/tender/1710185642Nasik%20PLP%202019-20.pdf)

According to additional research, over 8,000 farm ponds were built in Nashik's several tehsils between 2016 and 2020, demonstrating the increasing significance of decentralized water storage for sustainable agriculture.

(Source: https://www.aiirjournal.com/uploads/Articles/2021/07/5238_01.Dr.%20Ganesh%20Madhav%20Ganguarde.pdf)

Overall, secondary data analysis indicates that farm pond subsidy interventions support sustainable water management and SDG 6: Clean Water and Sanitation goals by increasing irrigation coverage, improving water availability, and creating opportunities for technology-based agricultural entrepreneurship.

Objective 2: Changes in Irrigation Coverage and Cropping Intensity:

Farm ponds greatly increase irrigation access in drought-prone locations, according to secondary research. With an average increase of 0.76 hectares of irrigated land per beneficiary farm, the installation of farm ponds in Maharashtra has enhanced supplemental irrigation during the rabi season.

(Source: https://marathi.krishijagran.com/news/1-lakh-67-thousand-farm-pond-in-5-years-under-magel-tyala-shettale-scheme/)

Approximately 7,535 agricultural ponds were finished in the Nashik area alone, out of a target of 9,000 ponds, indicating a high level of plan adoption.

(Source: https://www.nabard.org/auth/writereaddata/tender/1710185642Nasik%20PLP%202019-20.pdf)

Similarly, research conducted at the district level demonstrates that farm ponds play a major role in the growth of irrigation. Farm ponds play a significant role in local irrigation systems in Ahmednagar district, contributing roughly 50.53% of the net irrigated area in some areas.

(Source: https://www.ijfans.org/uploads/paper/98aeb2a98ba19198d496f6ae247ac129.pdf)

Cropping intensity has also increased due to improved irrigation access. Vegetables, fodder crops, and horticulture were among the many planting patterns that almost 33% of benefit farmers used. (Source: https://marathi.krishijagran.com/news/1-lakh-67-thousand-farm-pond-in-5-years-under-magel-tyala-shettale-scheme/)

This diversification helps sustainable water management objectives by increasing agricultural revenue and water productivity.

Objective 3: Comparative District-Level Policy Effectiveness:

Ahmednagar District:

With little rainfall and a heavy reliance on groundwater, Ahmednagar is a district that frequently experiences drought. An important factor in increasing the amount of water available for irrigation has been the building of farm ponds. According to studies, the high density of farm ponds in talukas like Rahata, Karjat, and Nagar has

greatly increased agricultural output and crop stability.
(Source: https://www.ijfans.org/uploads/paper/98aeb2a98ba19198d496f6ae247ac129.pdf)
The district's farm ponds reduce crop losses and stabilize production by acting as protective irrigation sources during rainfall gaps.

Nashik District:

Even though Nashik district receives more rainfall than Ahmednagar, there are still seasonal water shortages. Between 2016 and 2020, more than 8,000 farm ponds were built as part of the program to increase irrigation and enhance agricultural water conservation.
Source: https://www.aiirjournal.com/uploads/Articles/2021/07/5238_01.Dr.%20Ganesh%20Madhav%20Ganguarde.pdf
Additionally, horticulture-based agricultural methods in the area, such as the production of grapes, onions, and vegetables, have benefited from farm ponds.

Indicator	Ahmednagar	Nashik
Rainfall	Low and highly variable	Moderate
Need for irrigation	Very high	Moderate
Impact of farm ponds	Significant stabilization of irrigation	Improved horticulture irrigation
Cropping diversification	Increasing	Strong due to horticulture

In general, the policy seems to be more important for areas that are vulnerable to drought, like Ahmednagar, but in Nashik, it mostly fortifies the current irrigation infrastructure.

Objective 4: Implications for Sustainable Water Governance:

The analysis shows that by boosting water storage, enhancing irrigation dependability, and promoting climate-resilient agriculture, decentralized water harvesting infrastructure like farm ponds considerably contribute to sustainable water governance.
But there are still several issues, such as

1. Inadequate tracking of water storage effectiveness.
2. Poor upkeep of agricultural ponds.
3. If water consumption is not controlled, there is a risk of excessive groundwater extraction.
4. Limited incorporation of micro-irrigation systems.

Therefore, enhancing monitoring systems, encouraging village-level water budgeting, and integrating agricultural ponds with drip irrigation systems should be the main goals of policy reforms.

Findings:

Farm pond subsidy interventions under the Magel Tyala Shettale have significantly improved water availability and supported sustainable agricultural practices in Ahmednagar District and Nashik District, according to secondary data analysis. The following are the study's main conclusions.

1. By building decentralized water harvesting facilities, the Magel Tyala Shettale has greatly expanded farm-level water storage capacity.
2. By offering protected irrigation during times of poor rainfall, farm ponds have increased irrigation coverage in both Ahmednagar District and Nashik District.
3. Higher agricultural intensity has been made possible by the availability of stored rainwater, allowing farmers to grow more seasonal crops and lessen their reliance on monsoon rains.
4. The intervention has promoted crop diversification, especially with regard to horticulture, vegetables, and fodder crops, which has raised farm income and productivity.
5. Farm ponds seem to have a greater effect in drought-prone areas like Ahmednagar, where farmers mostly depend on additional irrigation supplies.
6. The program helps accomplish Sustainable Development Goal 6, especially with regard to increasing water-use efficiency and encouraging sustainable water management techniques.
7. Despite encouraging results, implementation flaws like maintenance problems, unequal subsidy distribution, and insufficient monitoring systems continue to be major obstacles to long-term sustainability.

Recommendations:

1. To guarantee efficient use of agricultural ponds for sustainable water management, the government should improve the Magel Tyala Shettale's implementation and oversight.
2. To increase water-use efficiency and support Sustainable Development Goal 6, the integration of farm ponds with micro-irrigation technologies like drip and sprinkler systems should be encouraged.
3. To guarantee correct construction, upkeep, and best use of farm ponds, regular technical advice and training programs for farmers should be set up.
4. To assess the long-term effects of farm pond interventions, district-level monitoring systems should be established in water-scarce areas like Ahmednagar District and Nashik District.

5. To encourage responsible water usage and fair allocation of water resources, the government should support village-level water budgeting and community involvement.
6. To bolster decentralized water governance and enhance agricultural sustainability, policy convergence with other agricultural and watershed development initiatives should be guaranteed.

Conclusion:

In Ahmednagar District and Nashik District, the study emphasizes the important role that farm pond subsidy interventions play in bolstering decentralized water management and promoting agricultural sustainability. Higher farming intensity, better irrigation coverage, and more water storage at the farm level have all been made possible by the Magel Tyala Shettale. These results show that the goals of Sustainable Development Goal 6 are being met, especially in terms of increasing water-use efficiency and encouraging sustainable water management techniques. However, efficient monitoring, upkeep of agricultural ponds, and integration with contemporary irrigation systems are necessary for the long-term viability of such interventions. Decentralized water conservation programs can be made more effective by bolstering policy implementation and promoting community involvement.

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