Synergizing Rainwater Harvesting and Aquaculture for Sustainable Development in Behrawal Village, Shajapur, Madhya Pradesh

Anubhuti Minare, Vipin Vyas, Shadab Siddiqui, Raja Mishra, Ravindra Ahirwar

Department of Zoology and Applied Aquaculture, Barkatullah University, Bhopal, M.P.

Corresponding email : annuaqua92@gmail.com

Kalapipal block, located in Shajapur district of Madhya Pradesh, is a predominantly rural area known for its agricultural activities. The landscape is characterized by fertile land, with farming being the primary occupation of many residents. Key crops include wheat, maize, and various pulses. Kalapipal block has a population of approximately 75,000 to 80,000 people. The population is primarily rural, with a diverse demographic mix, including various communities and castes. In Kalapipal block, the cropping pattern is predominantly influenced by the local climate and soil types. The major crops grown in the area include Cereals: Wheat and maize are the primary cereal crops, Pulses, Oilseeds (mustard), Vegetables and fruits respectively.

The cropping pattern in Kalapipal reflects a combination of subsistence farming and market- oriented agriculture, with farmers adapting their practices based on seasonal changes and market demands. Crop rotation and intercropping are also common to maintain soil fertility and maximize yields. In Kalapipal block, water availability primarily depends on monsoon rains, which typically occur from June to September. The region's agriculture is closely linked to these seasonal rains.

Farm Ponds as source of water conservation

Benefits of Farm Ponds

Water availability can vary from year to year based on rainfall patterns, leading to challenges such as droughts or water scarcity during critical growing periods. This variability emphasizes the importance of efficient irrigation practices and water management in the region, due to the variability in rainfall patterns in Kalapipal block, many farmers have adopted farm ponds as a sustainable water management practice.

Rainwater Harvesting : Farm ponds capture and store rainwater, which can be used during dry spells, thereby reducing dependence on erratic rainfall.

Irrigation: Stored water can be used for irrigating crops, especially during the critical growing periods when rainfall is insufficient.

Soil Conservation: By retaining water in the landscape, farm ponds help prevent soil erosion and promote groundwater recharge.

Livestock Watering: Farm ponds allows farmers to regularly provide, water for their animals, which helps in ensuring their health and productivity.

Diverse Cropping: With better access to water, farmers can diversify their cropping patterns, growing a wider variety of crops and potentially increasing their income.

This study is based on primary data collection i.e. data were collected through field survey , interaction with the village sarpach, rural farmer communities of kalapipal block behrawal.

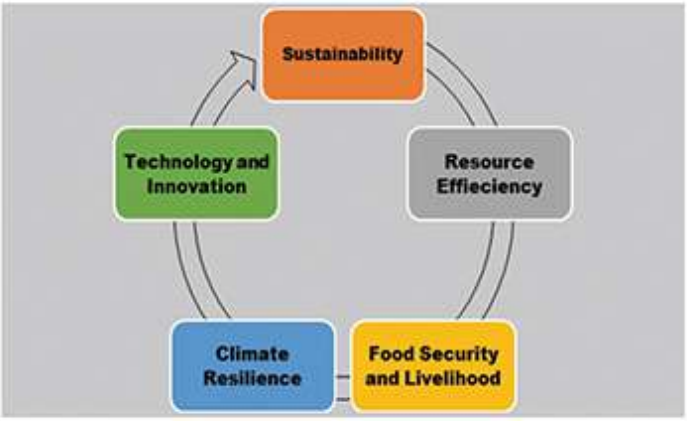
Rainwater Harvesting Ponds in Behrawal

Behrawal gram panchayat is a rural local body in Kalapipal block of the Shajapur district in Madhya Pradesh, India. This village has total 55 ponds in approx. 36.5 acre (1601500 sq feet) each 25 ponds have an area 22500sq feet each, 29 ponds 33500 sq feet, and 1 pond 67500 sq feet, and all these ponds established under various government schemes aimed at rainwater harvesting.

Primary Function: The main purpose of these ponds is to capture and store rainwater. This collected water serves as a critical resource for irrigation, particularly during the dry months when rainfall is scarce.

How can these Ponds be utilized apart from Agricultural Practices: So apart from the agricultural practices these ponds in Behrawal village can be utilized for fish farming which enhanced the agri-aqua food system in that area and also their overall utility and contributing to Community Development.

The **Aqua-Agrifood System** refers to the integration of **aquaculture** (the farming of aquatic organisms) with **agriculture** (the cultivation of plants and land-based livestock) to create a more sustainable, productive, and resilient food production system. This concept is of increasing importance as the global demand for food grows and climate change impacts agricultural productivity.



Why Aquaculture Practices are not Adopted there

Religious Constraints in the Region :

Due to religious beliefs, most villagers do not consume fish, so this is also the reason that aquaculture practices is not performed in that area.

Lack of Technical Knowledge :

There is limited technical knowledge and experience in aquaculture practices among the villagers. This lack of expertise affects the efficiency in aquaculture practices.

Agri-Aqua Food System

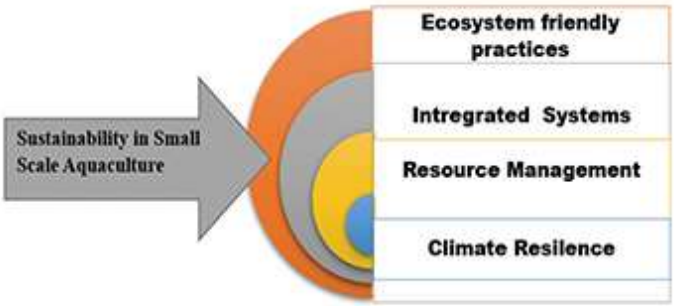
Utilizing ponds for Aquaculture- The practice of aquaculture has diversified income sources, enhancing financial stability within the community. Rainwater harvesting reduces reliance on groundwater and promotes sustainable water usage. The integration of aquaculture with irrigation reinforces sustainable Impact on Local Economy and Sustainability.

Income Generation and Economic Benefits: Despite from their religious views and local consumptions, this practice will increase the income of farmers without making extra efforts even resources is utilized which will create the double income of farmers. The practice of aquaculture has diversified income sources, enhancing financial stability within the community, even if fishes are sold outside the village.

Environmental Benefits: Rainwater harvesting reduces reliance on groundwater and promotes sustainable water usage. The integration of aquaculture with irrigation reinforces sustainable practices by optimizing the use of limited water.

It has been seen in preliminary survey that aquaculture practices were done in one or two ponds in Behrawal village, these people have doubled their income by fish farming. If the community will adopt aquaculture practices across all available ponds, it could significantly enhance local income levels, food security and promote small scale aquaculture production in Madhya Pradesh. Expanding these practices will optimize the use of water resources while providing a sustainable source of protein for the community and economic growth through increasing fish production and sales.

"Aquaculture practices where farming operations are modest in scale, typically characterized by low capital investment, labor-intensive practices, and the use of locally available resources. Small-scale aquaculture is usually aimed at providing food, income, and livelihood security to rural communities, rather than for large-scale commercial production." **(FAO)**



What we do in this Area

As a part of institutional responsibility, we propose to prepare a detailed action plan for aquaculture development in this area covering these farm ponds and other rural waterbodies. A proper documentation of this area will be done in a detailed manner by partnering with local people, local government, and NGOs for the effective management and development of aquaculture practices in Behrawal village, by which we will be facilitate better decision making and resource management.

Encouraging more villagers to adopt aquaculture could further enhance income levels and resource use efficiency.

Training and Resources: Providing training in aquaculture techniques This report underscores the value of combining traditional water harvesting methods with modern economic activities, serving as a blueprint for other rural areas seeking to balance resource management with income generation.

Fish farming has proved economically viable, contributing to food security and adding to the livelihoods of local farmers.

As Institutional responsibility we proposed to prepare a detailed action plan for aquaculture practices in these area-

Outline of Action Plan for Enhancing Aquaculture Practices in Behrawal Village

1. Documentation -

Documentation of a detailed record of a farm pond, i.e. Size, depth, water holding capacity, seasonality etc in this area.

2. Aptitude of Owner

The owner's understanding about the aquaculture practices is essential for success integration of aquaculture in farm ponds.

3.Conduct Training Workshops

Organize workshops to educate villagers on sustainable Best Aquaculture Practices could optimize fish yield and profitability.

4. Develop a Monitoring System

Establish a monitoring system to track pond health, water quality, fish growth, and harvesting practices.

5. Community Engagement Meetings

Facilitate regular community meetings to discuss findings from documented data, share experiences, and collaboratively identify challenges and solutions.

6. Diversification of Pond Use

Encourage the exploration of multiple uses for ponds, such as integrating livestock watering or creating recreational areas alongside aquaculture.

7. Documentation and Feedback Loop

Continue to document aquaculture practices and outcomes, creating a feedback loop that informs ongoing training and adjustments to practices.

8. Promote Ecological Awareness

Educate the community on the ecological benefits of diverse pond utilization, promoting sustainable practices that protect local biodiversity.

9. Evaluate and Adapt

Conduct regular evaluations of the implemented practices and adapt strategies based on performance, community feedback, and changing environmental conditions.

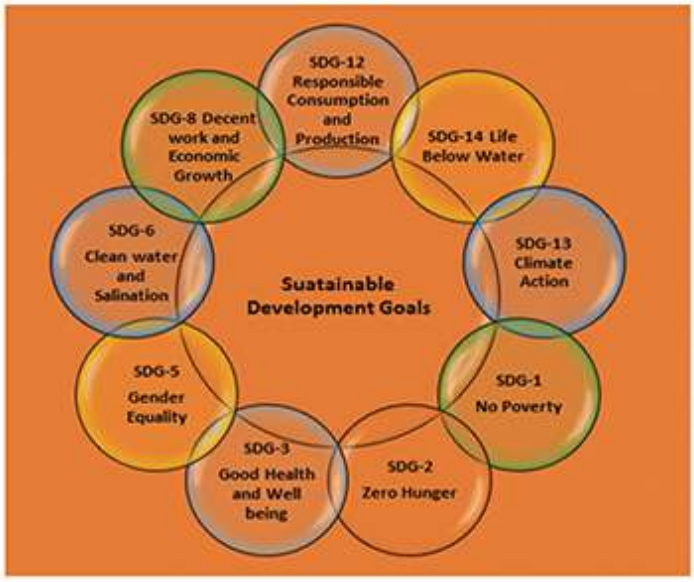
10.Replication in Similar Villages :

This model of dual-purpose ponds could be replicated in other villages facing similar water and economic challenges.

Conclusion :

This approach to water resource management through rainwater harvesting ponds is a model of sustainable development. By allocating these ponds for aquaculture, the village will successfully blend environmental stewardship with economic advancement. This practice not only ensures water availability for agriculture but also creates an additional revenue stream, benefiting the community and encouraging further adoption of sustainable practices.

The **Agri - Aqua Food System** is an innovative approach to sustainable food production that directly contributes to achieving multiple **Sustainable Development Goals (SDGs).**



References :

FAO. (2013). Report: The state of world fisheries and aquaculture 2022. Rome, Italy. 226p.

Bondad-Reantaso, M.G. and Subasinghe, R.P., eds. Enhancing the contribution of small-scale aquaculture to food security, poverty alleviation and socio-economic development 2013. FAO Fisheries and Aquaculture Proceedings No. 31. Rome. FAO. 255 pp.

The development of the Climate-Smart Agriculture Sourcebook - Second Edition 2017.