

MARVI – Capture and recharge water at the village and Gram Panchayat levels for sustainable use and improved livelihoods while keeping in view regional and basin level sustainability.

Background

About 60% of irrigation water for crop production and 80% of drinking water in India is sourced from groundwater supplies. Groundwater is a hidden, common pool resource and practices to promote collective action to ensure sustainable management are poorly understood. For this reason, State efforts to regulate groundwater use by individual well owners to date have achieved little success. This, along with easy availability of submersible pumps and subsidised electricity has led to groundwater use far in excess of the average annual monsoon recharge. As a result, the average depth to watertable in many parts of India has dropped from 5 -15 m during 1960s to 25 – 60 m now. Farmers continue to drill tubewells to 100 m depth or more in search of water.

The future of viable agriculture and food security in India is closely linked to groundwater sustainability. The challenges here are not only technical but they have important social, economic, institutional and policy dimensions. The critical question we now have to ask is “how do we bring together cross disciplinary aspects to achieve sustainable groundwater use while realising improved livelihood outcomes for village communities?”

MARVI

Managing Aquifer Recharge and Groundwater Use through Village-level Intervention

About MARVI

The MARVI project is focused on developing a village level participatory approach, models and tools to assist in improving groundwater supplies and reducing its demand through the direct involvement of farmers and other affected stakeholders.

A unique feature of MARVI is the use of scientific measurements by citizens through the engagement of Bhujal Jankaars (BJs), a Hindi word meaning ‘groundwater informed’ volunteers. With appropriate training and capacity building, BJs monitor groundwater levels and quality, making sense from a village perspective of what is happening to village groundwater availability. BJs convey this information to farmers and others in their own language.

Groundwater level represents the integration of recharge, pumping and flow processes and is a direct measure of groundwater availability and the success of any collective management practices. BJs are an effective, trusted and valuable interface between village communities and government agencies, NGOs and researchers.



Key Partners

* Western Sydney University * CSIRO Land & Water
* International Water Management Institute * Development Support Centre
* Arid Communities and Technologies * Maharana Pratap University of
Agriculture and Technology
* Vidhya Bhawan Krishi Vigyan Kendra

Other Partners

* Carnegie Mellon University * Mekong Region Futures Institute



BJs may not have formal qualifications but they have life skills and practical experiences. When appropriately trained and supported, they can monitor watertable fluctuations and water quality around their villages and can collect reliable data for sustainable groundwater management.



BJs use a float and measuring tape to monitor watertable depth every week. This not only provides local watertable data but also gives villagers the ownership of the project and helps to create awareness about local groundwater issues and initiate dialogue on groundwater management options.

The MARVI approach

- Engage farmers, local communities, government agencies and policy makers;
- Understand hydrologic, social, economic, governance and livelihood aspects that connect with groundwater management, including recharge enhancement and water use restraints; and
- Empower farmers to self-manage groundwater sustainably at the village and Gram Panchayat levels.

What did the MARVI project do?

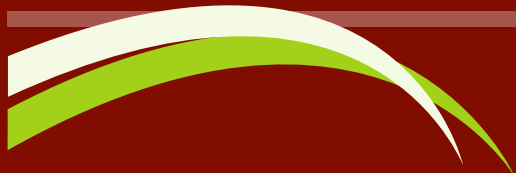
The research in MARVI project focused on two multi-village watersheds, the Dharta watershed in Rajasthan and the Meghraj watershed in Gujarat. Both watersheds have hardrock aquifers.

The main aims were: (i) enable local villagers to monitor groundwater (ii) design participatory processes to assist village level discovery and implementation of solutions for sustaining groundwater use and improved livelihoods; (iii) establish a comprehensive database about groundwater level fluctuations, availability and river bed structures to augment recharge (iv) advance groundwater knowledge and understanding of farmers, local communities (including schools) and decision makers; and (v) provide tools for estimating annual groundwater recharge, water availability and crop demand. Overall, the focus is to improve cooperative decision making for sustainable groundwater use.

Watertable fluctuations in 250 dug wells in the Dharta watershed and 110 wells in the Meghraj watershed were monitored by BJs and groundwater sensors over four years. A number of checkdams were monitored to understand their recharge performance and effects on groundwater availability on nearby wells.

An SMS based data collection system and a smart phone app called MyWell, for both Android and iOS platforms, was developed to assist in the easy collection of watertable depth and rainfall data and to visualise data and make them available on the web.

A detailed socio-economic study, alongwith crop demonstrations, engagement through PhotoVoice and community forums, was conducted to understand farmers' needs and capacities and explore what changes will work for future groundwater management strategies.





BJs play an important role in village scale groundwater monitoring and management programs. They need to be nurtured and supported through capacity building and reflective learning.



Groundwater management is complex, and therefore we need wider community support for it to succeed. In MARVI, we facilitated dialogue with a range of stakeholders, including women.



Groundwater literacy is important for a meaningful dialogue and to build capacity of future local leaders to deal with water issues.

Key achievements

An approach for community based, participatory groundwater monitoring and management has been developed through a close collaboration with research and development agencies and village communities.

Watertable data monitored by both BJs and sensors have enabled the estimation of local hydro-geologic parameters and the development of a simple groundwater balance. The monitoring of rainfall and water levels in checkdams has led to partition of aquifer recharge due to checkdams and natural recharge in relation to subsequent groundwater use.

The SMS system and MyWell App developed will help in easy collection of watertable, rainfall and checkdam water level data from any location in India and making those data available on the web.

BJs are proving to be significant change agents and through their scientific measurement, understanding and communication in the two watersheds. They are also an important interface between researchers and village communities.

As result of the effective engagement of village communities and evidence shown through local data collected over the last four years, there is an indication that farmers now have started to understand their local groundwater system, accept that groundwater is limited and that the falling watertable is a village level issue and it needs to be tackled at the village level.

The work through MARVI has strengthened the farmers' view that individual effort alone will not work to solve their groundwater problem. The groundwater level data reveals that deepening wells or installing deeper tubewells is like snatching each others' groundwater, and overall no extra water is to be gained by drilling deeper. They have already taken measures to stop deeper drilling, to remove sediment from recharge structures, to determine rabi crop areas from post-monsoon groundwater levels and to improve mulching and water use efficiency, and diversify crop types.

The farming community in the two watersheds is now debating the concept of sharing groundwater through '**village groundwater cooperatives**' (VGC). The concept of water productivity, rather than crop productivity, is gaining momentum among the farmers. These are important outcomes from MARVI.

The Future

The MARVI approach developed has been tested in two watersheds in Rajasthan and Gujarat over four years, and it is now ready for upscaling to other areas in the two states and beyond. Future investments are required to nurture, refine and adapt the approach to local conditions in other parts of India.

Groundwater Sustainability = Recharge + Reduce + Regulate + Respect

“The experience from the MARVI project indicates that a transdisciplinary approach is likely to be more effective in enabling farmers, other village community members and NGOs to work together with researchers and government agencies to understand the groundwater situation and design interventions that are holistic and have wider ownership at the village and Gram Panchayat levels. Also, such an approach is expected to deliver longer-term sustainability of groundwater at a regional or basin scale, when all villages in a basin are supported and networked.”



Contact us:



Phone: +61 2 45701235
Email: info@marvi.org.in ;
Web: www.westernsydney.edu.au/marvi



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