



Environment

Water Community



## Solution Exchange for the Water Community Consolidated Reply

*Query: Promoting Sustainable Groundwater Development - Experiences*

Compiled by [Nitya Jacob](#), Resource Person and [Sunetra Lala](#), Research Associate

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From [Shrikant Daji Limaye](#), Ground Water Institute, Pune

Posted 27 November 2008

I am Shrikant Daji Limaye, the Project Leader for the UNESCO-IUGS-IGCP Project GROWNET (Ground Water Network for Best Practices in Ground Water Management in Low Income Countries) working with the Ground Water Institute, Pune.

We are working to augment the sustainable development of groundwater in low-income countries. The issues to be considered for ensuring sustainable groundwater management are maintaining the quality of groundwater and yields of wells/bore wells. For sustainable yields, both demand management and supply management are necessary.

Supply management usually rests with government departments; however, NGOs are also active in this field. Demand management is mostly done through the rapport between NGO and villagers. At the same time, farmers have a sense of ownership over groundwater available under their farms and would like to pump as much groundwater as available from the well/bore well, without necessarily considering the contribution of their farm to the total groundwater resources in the watershed.

The main problem seems to be the need to sensitize villagers towards soil and water conservation activities in watershed areas, and promote recharge of groundwater so as to ensure drinking water and irrigational supply for at least two crops per year (supply management).

Once this is achieved, the Gram Sabhas generally give directions regarding the use of the augmented groundwater reservoir.

Given the above, I would request members to please share the following:

- What experiences have there been with villagers voluntarily participating in government schemes for soil and water conservation, forestry, etc. designed to augment groundwater recharge?
- Are there any examples of self-regulation on pumping of groundwater (for example bore wells to be used exclusively for drinking water supply and only dug wells to be used for irrigation)?
- Are there any examples of villagers or Gram Sabhas voluntarily imposing a ban on irrigating water-intensive crops (such as bananas, sugarcane, etc) and reducing the area under irrigation when required?

We will use member's inputs to collect and verify the best practices in groundwater resource development and management in low-income countries and post them on the GROWNET website: [www.igcp-grownet.org](http://www.igcp-grownet.org). Selected contributions, along with the contributor's name as collaborator of GROWNET, will be posted for global dissemination on our website.

We hope this will assist us in our endeavour to achieve sustainable groundwater development through internet as an effective tool for global dissemination of information on local actions.

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## Responses were received, with thanks, from

1. [Sacchidananda Mukherjee](#), World Wide Fund for Nature-India (WWF), New Delhi
2. [S. C. Jain](#), Action For Food Production (AFPRO), New Delhi
3. [Ramakrishna Nallathiga](#), Centre for Good Governance, Hyderabad
4. [Arun Jindal](#), Society for Sustainable Development, Karauli
5. [Biplab Paul](#), Lokvikas, Ahmedabad
6. [Debasish De](#), Society for Natural Resource Management and Community Development, Ghaziabad
7. [Rachna Sarkar](#), Uttar Pradesh Water Sector Restructuring Project, Lucknow
8. [Asit Nema](#), Foundation for Greentech Environmental Systems, New Delhi
9. [A. J. James](#), Pragmatix Research and Advisory Services Pvt. Ltd., Gurgaon
10. [Atul Rawat](#), DMV Business and Market Research Pvt., Ltd, Hyderabad
11. Arunabha Majumder, Jadavpur University, Kolkata ([Response 1](#); [Response 2](#))
12. [A. L. Khan](#), Uttar Pradesh Irrigation Department, Lucknow
13. [Abhishek Mendiratta](#), Independent Consultant, New Delhi
14. [Vinod Kumar P.](#), Maithri, Kerala
15. [Sunil Kumar](#), WaterAid India - Regional Office North, Lucknow
16. [K. A. S. Mani](#), Andhra Pradesh Farmer Managed Groundwater System, Hyderabad
17. [Nitya Jacob](#), United Nations Children's Fund (UNICEF), New Delhi
18. [R. Jagadiswara Rao](#), Sri Venkateswara University, Tirupati
19. [Neelima Garg](#), Uttarakhand Jal Sansthan, Dehradun
20. [Sunil Vishwakarma](#), Catholic Relief Services, Hyderabad

*Further contributions are welcome!*

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## Summary of Responses

Community mobilization is necessary to manage groundwater sustainably; this is best achieved by involving and educating Panchayati Raj Institution (PRI) members about aquifers and groundwater resources. The discussion demonstrated the importance of a community-based, decentralized approach to managing precious groundwater resources as against the conventional top-down centralized model of development.

Most large programmes for groundwater management have adopted a participatory approach, involving the local farmers at various stages of planning or implementation. The programmes have either built on existing village institutions or created new ones comprising farmers and other stakeholders. The other

strategy is to adopt an aquifer approach rather than administrative boundaries of panchayats. Many institutions have promoted recharge structures like check-dams and excavation of village tanks.

Action for Food Production (AFPRO) has implemented a pilot community-based groundwater management project in Jalgaon, [Maharashtra](#), where it used a combination of these strategies. These have controlled groundwater extraction, cropping patterns, trade in groundwater and encouraged restoration of village tanks and ponds. There are many other examples in Maharashtra such [Hiware Bazaar](#) and Ralegaon Sidhi. In Hiware Bazaar, the sarpanch Popat Pawar has led the village's revival by water harvesting, groundwater management, crop pattern changes and controlling tree felling and grazing on village commons.

In **Andhra Pradesh**, the [AP Farmers Managed Groundwater Systems](#) (APFAMGS) project, executed over 650 villages in seven districts, has demonstrated the efficacy of self-regulation. Farmers have increased the overall efficiency of agriculture and reduced groundwater extraction. In Anantapur, the Satya Sai Foundation is rehabilitating tanks to replenish groundwater and augment surface water availability, as this is a fluoride-affected area.

In [Gujarat](#), community involvement in the Sardar Patel Jal Yatra Scheme has been greater than in the Khet Talwadi scheme, and this is why the former is more viable than the latter. Elsewhere in the state, self-help groups (SHGs) have influenced the panchayats on water management; they have persuaded the panchayats in their villages to ban the use of tank water for irrigation.

In **Uttarakhand's** Rudraprayag district, people have participated in tree plantation programmes of the forest department that have helped conserve soil moisture. Under the Uttarakhand Rural Water Supply and Sanitation Project, the government has adopted a sector-wide approach to ensure decentralization and a greater role for PRIs. Village communities also have a larger role in planning and implementation of schemes. In [Karakatta](#) village, the village Water and Supply Committee dug a well for drinking water, and maintains the water supply system for the village.

In the Purulia district of [West Bengal](#) people contributed 50% of the cost of tank restoration as labour, while the other half was paid for by the implementing organization. In both cases, community mobilization was extremely successful. Across the state, Joint Forest Management is central to groundwater management efforts and communities carry out soil and water conservation work it.

Regarding village-level initiatives to control groundwater extraction, members said in [Uttar Pradesh](#), under the Water Sector Restructuring Project, water user associations were set up in each minor canal command. The project promotes conjunctive use of water in command areas to balance the amount of water available through the canal system with what farmers get at different points in the system. In many villages of Maharashtra and Gujarat, several panchayats have reportedly banned drilling beyond a certain depth to preserve deep aquifers. A World Bank funded initiative in Andhra Pradesh called the [AP Drought Adaptation Initiative](#), builds the drought-resistance capacity of various socio-economic groups.

There are several examples from **Kerala** where, under the Jananidhi project, panchayats have implemented community managed water supply schemes. In [Palakkad District](#), the project encouraged villagers to switch from bore wells to dug wells for regular use (only using bore wells if there is a severe scarcity). Some panchayats in coastal areas of [Malapurram District](#) developed ways to tap fresh water available underground. In the [Vadakarapathy gram panchayat](#), farmers changed their cropping patterns to match water availability.

In [Rajasthan](#), an NGO revived gram sabhas (village assemblies) as the vehicle for social mobilisation to improve water availability. Members of the sabhas plan and implement their own water management plans that include soil and water conservation, crop changes and controls on groundwater extraction.

Members also sounded a note of caution on using wells for groundwater recharge. In [Srilahasti](#), Andhra Pradesh, wells have become garbage dumps and receptacles for untreated sewage; this is also the case in many Indian towns. Municipalities and companies use abandoned bore wells to dispose off their untreated waste, irreparably damaging aquifers. The authorities have to check this as it is very expensive to restore aquifers damaged in this way.

The examples shared in the responses clearly demonstrate the success of groundwater management initiatives is directly proportional to the degree of community involvement. Members shared a wealth of information on examples where communities and panchayats have either led, or played a significant role in groundwater management.

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## Comparative Experiences

### Andhra Pradesh

From [A. J. James](#), *Pragmatix Research & Advisory Services Pvt. Ltd., Gurgaon*

#### **Panchayati Resolutions Lead to Banning Borewells and Enhanced Groundwater Reserves**

Panchayats in some water-stressed villages in the northern part of the state have passed resolutions banning further borewells, drilling beyond a certain depth (e.g., 200 metres) of existing borewells, and even summer irrigated agriculture. These measures have led to augmented groundwater reserves in this area. Read [more](#)

#### **Andhra Pradesh Drought Adaptation Initiative Reduces Borewell Usage**

The World Bank funded Andhra Pradesh Drought Adaptation Initiative (APDAI), has been piloting several activities to build the drought-resistance capacity of the rural poor. These include collectivizing groundwater use by linking several borewells via pipes to provide a protective kharif irrigation to un-irrigated land. This has led to formal agreements between farmers who agree not to drill new bore wells and share water according to a schedule. Read [more](#)

#### **Groundwater Replenishment Aided Through Soil and Water Conservation, Anantapur District**

(from [Ramakrishna Nallathiga](#), *Centre for Good Governance, Hyderabad*)

The Satya Sai Foundation has been working with local communities on soil and water conservation and tank repair/rehabilitation in the district. The community contributed labour for the construction of structures and advice on the local topographic and other variations of water flow. This joint effort has helped replenish/augment groundwater and restore surface water. It also helped mitigate the effects of the fluoride contamination in the groundwater. Read [more](#)

#### **Andhra Pradesh Farmer Managed Groundwater System Helps Regulate Groundwater Use**

(from [K.A.S. Mani](#), *Andhra Pradesh Farmer Managed Groundwater System, Hyderabad*)

The Andhra Pradesh Farmer Managed Groundwater System (APFAMGS) project is working in groundwater stressed areas of the state. They help farmers regulate their extraction of groundwater. The project is being implemented in 650 villages across 7 districts and guiding thousands of farmers to voluntarily reduce their level of groundwater pumping. Through this initiative farmers have overcome problems of groundwater depletion and also maintained agricultural productivity.. Read [more](#)

#### **Over-Extraction Leads to Groundwater Pollution, Srilahasti Village, Chittoor District** (from [R. Jagadiswara Rao](#), *Sri Venkateswara University, Tirupati*)

Srikalahasti village is located on the Swarnamukhi river where groundwater can be found in sand deposits. People obtained high-quality water from shallow wells in the sand deposits. With the availability of good-quality piped water, the local wells have been abandoned. These are being used as sanitary sinks

to dump solid and liquid effluents, polluting the ground water. Now, the town requires water from canals from a distant source.

## Gujarat

From [Biplab Paul](#), Lokvikas, Ahmedabad

### **Khet Talawadi Programme Not Able to Save Groundwater**

The State Government of Gujarat initiated a programme called "Khet Talawadi" where farmers created ponds on their own land to help recharge groundwater. This worked well in some drought-affected areas and people developed their own models of well construction to suit their needs. However, despite individual benefits the programme was not an overall success. This was because not all the residents volunteered for the programme. Read [more](#)

### **Sardar Patel Jal Yatra Scheme Leads to Community Participation in Water Conservation, Saurashtra Region**

The State government's "Sardar Patel Jal Yatra Scheme" for soil and water conservation, involved construction of check dams to assist in groundwater recharge. The government covered 60% of the total cost for constructing the dams and the remaining 40% came from the community. This resulted in better community participation and the scheme has been successful in conserving groundwater. Read [more](#)

### **Women SHGs Show the Way in Water Conservation, Mubarakpura Village, Sami Block, Patan District**

Lokvikas promoted 78 women self-help groups (SHGs), which have now formed a cluster. The SHGs persuaded the Gram Panchayats not to sell village tank water for irrigation, because the community needed the water for essential activities, like drinking. The women SHG members conducted house-to-house visits and documented their opposition to the plan in writing. They were successful in influencing the panchayats to restrict use of tank water and thereby conserving water resources. Read [more](#)

## Kerala

From [Vinod Kumar P](#), Maithri, Palakkad

### **Dug Wells Lead to Water Conservation, Erimayur Gram Panchayat, Palakkad District**

Under the Janani Project 120 Gram Panchayats in the district implemented about 3,000 community-managed water supply schemes. They opted for dug open wells instead of bore wells and augmented the dug wells with existing or new bore wells if there is a severe water scarcity. Since 2002, many communities have followed this practice, conserving valuable groundwater resources in the area. Read [more](#)

### **Water Withdrawal Monitoring Conserves Fresh Water, Vettom Gram Panchayat, Malappuram District**

Communities in this coastal district through the Janani Project worked out an innovative way to extract fresh water that floats over saline water aquifers because of the difference in density. The water can slowly be extracted using low powered pumps. About 25 community water supply schemes were initiated where communities daily monitor the pumping. Almost 90% of schemes are still working five years after commissioning, resulting in the conservation of freshwater. Read [more](#)

### **Switching Crops Lead to Water Savings, Vadakarapathy Gram Panchayat**

In this drought-prone area with an annual rainfall of 1,100 mm, community-based natural resource management was introduced as part of the CapDeck project. As part of the project, the panchayat initiated a participatory planning process to manage the community's natural resources. This process led

to a number of communities switching from sugarcane (a water intensive crop) to other crops and introduced drip irrigation crops, resulting in a significant increase in the groundwater table. Read [more](#)

## Maharashtra

### **AFPRO Project Leads to Aquifer Management by Community, Yawal Taluka, District Jalgaon** *(from [S. C. Jain](#), Action For Food Production (AFPRO), New Delhi)*

AFPRO launched a pilot community-based groundwater management project supported by the Government of Maharashtra. The project was implemented in 30 villages based on the technical rationales of aquifer boundaries, not administrative ones. As a result of this project, community members have evolved self-regulatory norms for recharge and withdrawal of groundwater. Read [more](#)

*From [Nitya Jacob](#), United Nations Children's Fund (UNICEF), New Delhi*

### **Sarpanch Shows the Way for Water Groundwater Conservation, Hiware Bazaar Village, Ahmednagar District**

The village Sarpanch Popat Pawar successfully implemented a Panchayat resolution that dictated that no borewells could be used for irrigation. He also revived shallow dug wells for irrigation, rejuvenating them through upper catchment treatment. Villagers dynamited the bedrock to create fissures and allow water to percolate into the aquifers, leading to enhanced groundwater percolation and conservation. Consultations among the gram sabha (village assembly) were the key to his success. Read [more](#)

## Rajasthan

### **Water Parliament Established by Tarun Bharat Sangh Leads to Community-Driven Water Conservation, Alwar District**

Tarun Bharat Sangh established a Water Parliament in the Arvari river basin. People from 72 villages in the basin are represented in the parliament, which encourages soil and water conservation, decides cropping patterns and the amount of water withdrawals, it also raises funds for maintaining water bodies that have been restored in each village. The river system has become perennial again (before the intervention it was only seasonal) and groundwater levels have risen substantially. Read [more](#)

## Uttarakhand

### **Jalswarajya Programme Helps Solve Water Scarcity Problems, Karakatta Village** *(from [Abhishek Mendiratta](#), Independent Consultant, New Delhi)*

The village received the 'Nirmal Gram Puruskar' award, but lacked adequate safe water. Under the Jalswarajya programme, a well was dug to provide water for the village. Water is pumped to a storage tank, which it is distributed to all the households. The Village Water and Supply Committee (50:50 male/female) is responsible for pumping, cleaning and maintaining the well. It employs a trained mason to manage the well. Through this initiative the village overcame its water scarcity problem. Read [more](#)

## Uttar Pradesh

### **Uttar Pradesh Water Sector Restructuring Project Limits Groundwater Withdrawal** *(from [Rachna Sarkar](#), Uttar Pradesh Water Sector Restructuring Project, Lucknow)*

The UP Water Sector Restructuring Project is being implemented in the sub-basins of the Gomti and Sai rivers in each minor canal command. The project is promoting the conjunctive use of surface and groundwater available. It has led to the formation of Ground Water Groups of farmers. Around 46,000 groups have set up and are being sensitized on "conjunctive use" of water for irrigation. Through this over extraction of groundwater is being limited, thereby also promoting recharge. Read [more](#)

## West Bengal

**Community Tank Provides Water for Irrigation, Arsa Block, Purulia District** (from [Debasish De](#), Society for Natural Resource Management & Community Development, Ghaziabad)

In one village the people excavated a tank on their farm to provide irrigation water. The Society for Natural Resource Management and Community Development provided with half the necessary funds, under the condition that community members would contribute the rest in the form of physical labour. The tank now supplies enough irrigation water for the villager's crop and aids in water percolation and conservation. Read [more](#)

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## Related Resources

### Recommended Documentation

**Factors Influencing Farmers' Willingness to Protect Groundwater from Non-point Sources of Pollution in the Lower Bhavani River Basin, Tamil Nadu, India** (from [Sacchidananda Mukherjee](#), World Wide Fund for Nature-India (WWF-India), New Delhi)

Paper and Presentation; by Sacchidananda Mukherjee; WWF-India; Water Environment Partnership in Asia (WEPA); Malaysia; October 2008

Available at <http://www.wepa-db.net/pdf/0810forum/presentation26.pdf> (PDF, Size: 567 KB) and <http://www.wepa-db.net/pdf/0810forum/paper26.pdf> (PDF, Size: 55 KB)

*Describes how farmers' perceptions about groundwater determines their willingness to protect groundwater from nonpoint sources of pollution*

From [A. J. James](#), Pragmatix Research & Advisory Services Pvt. Ltd., Gurgaon

### Approaches to Water Resource Management

Report; by A. J. James; Pragmatix Research & Advisory Services Pvt. Ltd.; New Delhi; December 2005

Available at <http://www.solutionexchange-un.net.in/environment/cr/res-27110801.zip> (DOC, Size: 208 KB)

*Analyses the approaches to community managed groundwater management systems to ensure improved water service delivery at the household and village levels*

### Addressing Vulnerability to Climate Variability and Climate Change through an Assessment of Mitigation Issues and Options

Report; Pragmatix Research and Advisory Services Private Ltd; New Delhi; December 2008

Available at <http://www.solutionexchange-un.net.in/environment/cr/res-27110802.zip> (DOC, Size: 972 KB)

*Using climate change and agricultural system modeling it assesses the impact of climate variability on groundwater availability in the states of Maharashtra, Orissa, etc*

From [K. A. S. Mani](#), Andhra Pradesh Farmer Managed Groundwater System, Hyderabad

### Andhra Pradesh Farmer Managed Groundwater Systems - Evaluation Report

Report; Andhra Pradesh Farmer Managed Groundwater System; Hyderabad; November 2008

Available at <http://www.apfamgs.org/upload/PDF/GCPIND175NET-APFAMGS-eva-final.pdf> (PDF, Size: 450 KB)

*Explains farmers' understanding of the seasonal distribution of groundwater in their habitations and how they are able to estimate seasonal recharge, draft and balance*

### Andhra Pradesh Farmer Managed Groundwater Systems

Brochure; Andhra Pradesh Farmer Managed Groundwater Systems; Hyderabad; 2008

Available at <http://www.apfamgs.org/upload/PDF/Brochure-2008.pdf> (PDF, Size: 5.6 MB)

*Describes the objective of the project, which is to equip groundwater farmer users with the necessary data and skills to manage groundwater available to them sustainably*

**Hiware Bazaar: Community Stewardship of Water Resources** (from [Nitya Jacob](#), United Nations Children's Fund (UNICEF), New Delhi)

Article; Nikhil Anand; India Water Portal; Maharashtra; July 2007

Available at [http://www.indiawaterportal.org/tt/wbr/case/seed\\_watr.pdf](http://www.indiawaterportal.org/tt/wbr/case/seed_watr.pdf); (PDF, Size: 344KB)

*Describes how community participation and stewardship through community imposed regulations lead to groundwater conservation and recharge in the drought-affected area*

### **Recommended Contacts and Experts**

**Sarpanch, Popat Powar, Maharashtra** (from [Nitya Jacob](#), United Nations Children's Fund (UNICEF), New Delhi)

Hiware Bazaar, Maharashtra; Tel: 91-9420752525; [popatpowar@hiwarebazar.org](mailto:popatpowar@hiwarebazar.org)

*Under his leadership villagers agreed on a ban on grazing on village commons and water-intensive crops and also initiated groundwater recharge for the area*

### **Recommended Organizations and Programmes**

From [S. C. Jain](#), Action For Food Production (AFPRO), New Delhi

**Action for Food Production (AFP), New Delhi**

25/1-A Pankha Road, D-Block, Janakpuri, New Delhi 110058; Tel: 91-11-28525452; Fax: 91-11-28520343  
[afprodel@afpro.org](mailto:afprodel@afpro.org); <http://www.afpro.org/services.htm>; Contact S. C. Jain; Programme Coordinator; Tel: 91-11-28525412; [scjain@afpro.org](mailto:scjain@afpro.org)

*Has been supporting community based groundwater management practices, including promoting integrated watershed development programmes*

**Groundwater Surveys Development Agency, Maharashtra**

Agriculture College Campus, Wakdewadi Road, Shivajinagar, Pune 411005, Maharashtra; Tel: 91-20-25513716; Fax: 91-20-25533108; [dirgsda@vsnl.com](mailto:dirgsda@vsnl.com); <http://gsda.maharashtra.gov.in/gsda/web/Proj-Details.html>

*Engaged in the exploration, development and augmentation of groundwater resources in the state of Maharashtra, includes, drilling of bore wells/tube wells, etc*

From [Biplab Paul](#), Lokvikas, Ahmedabad

**Khet Talawadi Yojana, Gandhinagar**

Commissionerate of Rural Development, Gandhinagar 382010, Gujarat; Tel: 91-79-23253477; Fax: 91-79-23259806; <http://www.ruraldev.gujarat.gov.in/successSGRY.html>

*Low-cost groundwater recharge scheme introduced by the Rural Development Department as a result of which crop production has increased by 40%*

**Sardar Patel Sahabhagi Jal Sanchaya Yojana, Gandhinagar**

Department of Conservator of Forest, CRD, Gandhinagar 382010, Gujarat; Tel: 91-79-23253477; Fax: 91-79-23259806; <http://ruraldev.gujarat.gov.in/wds.html>

*Under this scheme to revive watersheds, the state government has constructed 43,000 check dams across the state, which has also augmented groundwater resources*

**Lokvikas, Ahmedabad**

Saket House, 1, Panchsheel Society, Usmanpura, Ahmedabad 380013, Gujarat; Tel: 91-79-7551931; [teamleader@lokvikas.org](mailto:teamleader@lokvikas.org); <http://lokvikas.org/Case%20Studies/water.htm>

*A community-based volunteer organisation working towards conservation of groundwater resources in Gujarat and other environmental issues*

From [Debasish De](#), Society for Natural Resource Management & Community Development, Ghaziabad

**National Afforestation and Eco-Development Board, New Delhi**

Ministry of Environment & Forests, Paryawaran Bhawan CGO Complex, Lodi Road, New Delhi 110 003; Tel: 91-11-24361669; [naeb@envfor.delhi.nic.in](mailto:naeb@envfor.delhi.nic.in); <http://envfor.nic.in/naeb/naeb.html>;

*It is responsible for promoting afforestation, tree planting and eco-development activities through which groundwater conservation activities have also been taken up*

**Society for Natural Resource Management and Community Development, Ghaziabad**

C-30, Divine Park View Apartment, Abhaykhand-III, Indirapuram, Ghaziabad; 91-120-4160161; [snrmcd@gmail.com](mailto:snrmcd@gmail.com);

*NGO working on issues of soil and water conservation and forestry, has done extensive research on issues of community based groundwater recharge across the country*

**Uttar Pradesh Water Sector Restructuring Project, Lucknow** (from [Rachna Sarkar](#))

Department of Irrigation, Government of Uttar Pradesh, Lucknow; Tel: 91-522-2238088; Fax: 91-522-2235364; [http://irrigation.up.nic.in/state\\_water\\_policy.htm](http://irrigation.up.nic.in/state_water_policy.htm)

*Provides institutional and policy framework for water sector reform for integrated water resources management and has led to groundwater conservation by communities*

From [A. J. James](#), Pragmatix Research & Advisory Services Pvt. Ltd., Gurgaon

**Water Households and Rural Livelihoods, Andhra Pradesh**

Anantapur, Andhra Pradesh; Tel: 91-8554-246660; [actionf@sancharnet.in](mailto:actionf@sancharnet.in); [http://www.nri.org/projects/WSS-IWRM/proj\\_news.htm](http://www.nri.org/projects/WSS-IWRM/proj_news.htm)

*Promotes access for the poor to sustainable groundwater supplies for domestic and productive uses in areas of the state where there is water scarcity*

**Andhra Pradesh Drought Adaptation Initiative (APDAI), Secunderabad**

H. No. 12-13-450, Street No. 1, Secunderabad 500017, Andhra Pradesh; Tel: 91-40-27015295; Fax: 91-40-27018581; [wassan@eth.net](mailto:wassan@eth.net); <http://www.wassan.org/apdai/apdai.htm>

*Promotes appropriate farming systems and natural resource management for better adaptation of the communities to ensure sustainable groundwater availability*

**Community Management of Groundwater Resources in Rural India (COMMAN), United Kingdom**

British Geological Survey, Natural History Museum, Cromwell Road, London SW7 5BD, United Kingdom; Tel: 44-20-75894090; Fax: 44-20-75848270; [enquiries@bgs.ac.uk](mailto:enquiries@bgs.ac.uk);

<http://www.bgs.ac.uk/hydrogeology/comman/home.html>

*Assesses the feasibility of applying local, user-based approaches to groundwater management as a means of mitigating groundwater depletion problems in rural areas of India*

From [Atul Rawat](#), DMV Business and Market Research Pvt, Ltd, Hyderabad

**Gramin Vikas Vigyan Samiti (GRAVIS), Jodhpur**

3/458, 3/437, MM Colony, Jodhpur 342008, Rajasthan; Tel: 91-291-2785317; Fax: 91-291-2785116; [gravis@datainfosys.net](mailto:gravis@datainfosys.net); <http://gravis.org.in/content/view/19/39/>

*Works toward the rehabilitation of drought-affected and marginalized rural communities, enabling village ownership and control over groundwater and other natural resources*

**Household Energy Network, United Kingdom**

PO Box 900, London, Bromley, BR1 9FF, United Kingdom; [grant@hedon.org](mailto:grant@hedon.org);  
<http://www.hedon.info/Category:India>

*Has been working to provide water security in the Thar region of Rajasthan, including management of groundwater resources in the area by communities*

**Joint Forest Management Programme, Ministry of Environment and Forests, New Delhi (from Arunabha Majumder, Jadavpur University, Kolkata, [response1](#))**

Paryawaran Bhawan CGO Complex, Lodi Road, New Delhi 110003; Tel: 91-11-24361669;  
[envisect@nic.in](mailto:envisect@nic.in); <http://envfor.nic.in/divisions/forprt/jfm/html/joint.htm>

*Under this programme soil and groundwater conservation is promoted through a participatory approach in many parts of the country, including West Bengal, etc*

From [Abhishek Mendiratta](#), Independent Consultant, New Delhi

**Nirmal Gram Puraskar, New Delhi**

9th Floor, Paryavarn Bhawan, CGO Complex, Lodhi Road, New Delhi 110003; Tel: 91-11-24366372; Fax: 91-11-24364113; [nirmalgrampuraskar@nic.in](mailto:nirmalgrampuraskar@nic.in);  
<http://nirmalgrampuraskar.nic.in/nirmalgrampuraskar/index.jsp>

*An incentive scheme for fully sanitized and open defecation free Gram Panchayats, Blocks, and Districts, which has led to better groundwater management by communities*

From [Vinod Kumar. P.](#), Maithri, Kerala

**Jalanidhi, Thiruvananthapuram**

PTC Towers, SS Kovil Road, Thampanoor, Thiruvananthapuram 695001, Kerala; Tel: 91-471-233700; Fax: 91-471-2337004; [mis@jalanidhi.com](mailto:mis@jalanidhi.com); <http://jalanidhi.com/decentralization.htm>

*State-level project assisted by the World Bank to provide water and sanitation services, and augment groundwater resources in the state*

**Western Ghat Development Programme, Bangalore**

7<sup>th</sup> Floor, KHB Complex, Kaveri Bhavan, Bangalore 560009, Karnataka; Tel: 91-80-22129601;  
[watershed@vsnl.net](mailto:watershed@vsnl.net); <http://watershed.kar.nic.in/wesghatdevprg.htm>

*A water supply scheme for communities where 10 to 50% of the total cost for implementing the schemes is supported by Grama Panchayats and has helped in groundwater recharge*

**Swiss Agency for Development and Cooperation- Capacity building for Decentralisation in Kerala (SDC CapDeck Project), Kerala**

3<sup>rd</sup> Floor, Sona Buildings, Pattom, Thiruvananthapuram 695 004, Kerala; Tel: 91-471-2543392; Fax: 91-471-2543391; [capdeck@md5.vsnl.net.in](mailto:capdeck@md5.vsnl.net.in);

*Promotes decentralized management of resources in Kerala and has been involved in community based management of groundwater resources*

**Tarun Bharat Sangh, Rajasthan (from [Nitya Jacob](#), United Nations Children's Fund (UNICEF), New Delhi)**

Tarun Ashram, Bhikampura, Kishoree, Via Thangazi, District Alwar 301022, Rajasthan; Tel: 91-1465-225043; <http://www.tarunbharatsangh.org/programs/programs.htm>

*Promotes sustainable groundwater management in communities and has been involved in promoting rainwater harvesting to augment groundwater resources*

**Uttarakhand Rural Water Supply and Sanitation Project, Dehradun (from [Neelima Garg](#), Uttarakhand Jal Sansthan, Dehradun)**

Maharani Bagh, G. M. S. Road, Dehradun 248006, Uttarakhand; Tel: 91-135-2763508; Fax: 91-135-2763507; [pmu\\_uttaranchal@rediffmail.com](mailto:pmu_uttaranchal@rediffmail.com); <http://gov.ua.nic.in/swajal/index.htm>

*Delivers health benefits to rural populations, through improvements in water supply and sanitation services for communities, and addresses groundwater conservation issues as well*

**Andhra Pradesh Farmer Managed Groundwater Systems (APFAMGS) Project, Hyderabad**  
(from [K. A. S. Mani](#))

Block No. A-2(c), First Floor, Huda Commercial Complex, Tarnaka Hyderabad 500007 Andhra Pradesh; Tel: 91-40-27014730; Fax: 91-40-27014937; [plapfamgs@sify.com](mailto:plapfamgs@sify.com);

<http://www.apfamgs.org/Default.aspx>; Contact K. A. S. Mani; Project Leader; Tel: 91-40-27014730; [info@apfamgs.org](mailto:info@apfamgs.org)

*Launched in July 2003, the APFAMGS project is a partnership with farmers for implementing Demand Side Groundwater Management concept*

**The Sathya Sai Foundation, United States** (from [Ramakrishna Nallathiga](#), Centre for Good Governance, Hyderabad)

3491 Clover Oak Drive, San Jose, CA 95148, USA; <http://www.thesaifoundation.org/saiJoomlaProd/>

*Has worked on soil and groundwater conservation programme as well as tank repair/rehabilitation in Anantapur district of Andhra Pradesh*

### **Recommended Portals and Information Bases**

**World Prout Assembly, Kolkata** (from [Nitya Jacob](#), United Nations Children's Fund (UNICEF), New Delhi)

[http://www.worldproutassembly.org/archives/2007/12/the\\_laboratory.html](http://www.worldproutassembly.org/archives/2007/12/the_laboratory.html)

*Portal contains information how on community ownership and sustainable groundwater management practices were initiated in Hiware Bazar, Maharashtra*

### **Related Consolidated Replies**

**Community Participation in Groundwater Management, from A. J. James, Pragmatix, Gurgaon (Experiences)**. Water Community, Solution Exchange, India, Issued 8 November 2005

Available at <http://www.solutionexchange-un.net.in/environment/cr/cr-se-wes-08110501.htm>

*Identifies documented cases of local community level water management practices in the context of ground water management*

**Roof Water Harvesting in Urban Areas for Groundwater Recharge, from Mihir Maitra, India-Canada Environment Facility (ICEF), New Delhi (Experiences)**. Water Community, Solution Exchange, India, Issued 22 August 2006

Available at <http://www.solutionexchange-un.net.in/environment/cr/cr-se-wes-22080601.htm>

*Discusses the challenges, and available mechanisms/systems through various experiences of roof water harvesting to recharge groundwater*

**Paradigm Shift in Groundwater Governance, from K. A. S. Mani, Andhra Pradesh Farmer Managed Groundwater Project (APFAMGS), Hyderabad (Discussion)**. Water Community, Solution Exchange, India, Issued 9 August 2008

Available at <http://www.solutionexchange-un.net.in/environment/cr/cr-se-wes-food-12030801.pdf> (PDF, Size: 400 KB)

*Presents issues concerning community-managed models, suggestions for scaling up, and instances where communities have adopted or evolved groundwater regulation.*

**Participatory Well Recharge Programme – Mazhapolima, from Kurian Baby, Government of Kerala, Thrissur (Experiences)**. Water Community, Solution Exchange, India, Issued 21 October 2008

Available at <http://www.solutionexchange-un.net.in/environment/cr/cr-se-wes-21100801.pdf> (PDF, Size: 360 KB)

*Contains additional resources on methods of well recharge using rainwater and other sources, ensuring community participation.. It carries inputs from the query poser.*

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## Responses in Full

### **Sacchidananda Mukherjee, World Wide Fund for Nature-India (WWF-India), New Delhi**

In response to the query on experiences relating to promoting sustainable groundwater development I am pasting an abstract of my paper, titled, "*Factors Influencing Farmers' Willingness to Protect Groundwater from Nonpoint Sources of Pollution in the Lower Bhavani River Basin, Tamil Nadu, India*", which I presented at the Third Water Environment Partnership in Asia (WEPA) Forum on "Water Environmental Governance in Asia", October 23-24, 2008 at Putrajaya, Malaysia. This paper is based on my doctoral thesis on "Economics of Agricultural Nonpoint Source Water Pollution: A Case Study of Groundwater Nitrate Pollution in the Lower Bhavani River Basin, Tamil Nadu, India".

#### **Abstract**

*Farmers' perceptions about groundwater and drinking water quality are important, which influence their willingness to adopt protection measures either individually or collectively. This study attempts to capture the factors influencing farmers' perceptions and their willingness to protect groundwater from nonpoint sources of pollution, and their willingness to support the local government to supply drinking water through alternative arrangements. Six villages are identified in the Lower Bhavani River Basin, Tamil Nadu, India on the basis of their long-term groundwater nitrate concentrations and sources of irrigation. A pre-structured questionnaire survey (face-to-face interviews) has been administered to 395 farm-households across six villages during June-July, 2006. Results show that farmers' perceptions of risks related to groundwater nitrate pollution vary across the villages, and mimic the actual groundwater nitrate situation. Estimated results of binary choice Probit models show that farmers from comparatively high groundwater nitrate contaminated villages are willing to protect groundwater as compared to farmers from less affected villages. Demand for safe drinking water varies across the villages, based on the variations of socio-economic characteristics of the sample households and groundwater quality of the villages.*

A short version of the paper and presentation can be downloaded from the following links: <http://www.wepa-db.net/pdf/0810forum/presentation26.pdf> (Size: 567 KB) and <http://www.wepa-db.net/pdf/0810forum/paper26.pdf> (Size: 55 KB).

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### **S. C. Jain, Action for Food Production (AFPRO), New Delhi**

Ground water management by communities is the necessity of today; this is the result of not being balance in exploration, development and efficiently utilising the resources. The focus of agencies engage in water resource management mainly remained on supply side management and realisation of demand management has come at later stage.

In the absence of knowledge of resource availability at different level and not having the proper regulatory framework, we have been pushed to the situation where demand side management need to be given priority and that too at community level. In the given situation, the ground water legislation and act can only provide broad framework to operate. The self regulatory norms at community level with proper institutional arrangement are the best way to manage the resources.

AFPRO has got opportunity to work actively on both the sides. In the initial stage during 1970s and 80s the focus of our work was to create infrastructure to meet the requirement of drinking water supply and irrigation. At that time, it was necessary to provide safe drinking water and enhance food production. By

realising that the approach is leading towards depletion of ground water resources, an integrated watershed development programme was promoted and basin-wide studies carried out in different locations.

The recent pilot project where AFPRO has worked as support organisation is the example of community based ground water management. This project is supported by the Govt. of Maharashtra on the theme "Aquifer Water Management by Community" in 30 villages of Yawal taluka, District Jalgaon which are the part of Tapi river basin categorised as the TE-11 watershed by Ground Water Survey and Development Agency (GSDA).

This project was planned to organize technical rationales of aquifer boundaries and not on administrative ones so that the community manages the ground water resources to meet the requirement of water supply and irrigation through an informed decision making process. The role of AFPRO was to demystify the science of ground water dynamics, educate community, create institutions like VWSC (Village Water and Sanitation Committee), Aquifer Water Management Sabha (AQWMS) and Aquifer Water Management Association (AWMA), conduct capacity building exercises on water resource management and facilitated the process of evolving self regulatory norms for recharge and withdrawal of ground water.

The aquifer boundaries are delineated by GSDA and trend of water level depletion was studied. This information along with water budgeting exercises at the village level with community representatives and appropriate IEC strategies helped in sensitizing the community to manage ground water. Institutions like AQWMS and AWMA played crucial role in studying the legal aspects and deliberated during the formulation of norms for ground water management. Given below are the norms evolved

- The Census of water sources available in the project villages should be prepared by respective VWSC and registered with the Association.
- There should be only one open well/tube well in each Gat/Survey number. The association has to make the assessment of available water resources with help of technical group and also consult the people before giving the approval for creation of new bore well/ open well. Therefore, the request for new well or tube well may be considered by AWMA based on the advice from the technical group and response from people in the village.
- Pump installed on the well / tube well should have maximum of 10 HP.
- To control the density of well / tube well, one source well is recommended to cover 15 acres for irrigation.
- Irrigation systems like drip and sprinkler technique should be encouraged for perennial horticulture crops.
- The ground water transportation will not be allowed from one village to other for agriculture and industrial purposes. The transportation is only allowed for the drinking water requirement of neighbouring villages.
- Private water supply connections should have taps fitted; the free flow of water from drinking water connection will invite fine.
- To control the water marketing the village land cannot be sold to the people those have intension to transport ground water.
- Water Tariff for drinking purpose should be collected by VWSC and tariff of irrigation water should be collected by Gram panchayat.
- Water tariff of irrigation water should be collected based on the capacity of the pump. The collected revenue should be used for water conservation activities.
- Private irrigation Well / tube well, which are in the radius of 500 m of drinking water source of village, should have water conservation measures to maintain the water level in the area. New water source will not be allowed to construct as well as existing defunct sources will not be allowed to revive for irrigation purpose in the radius of 500m of drinking water sources.
- Area covered under perennial crop (like Banana, Sugarcane etc.) should have recharge measures as compulsory for managing the ground water balance.

- Permission for construction of new building/house shall be granted only when plan of building will have toilet and roof water harvesting.

This project was implemented during 2005 – 06. The village plan for implementation of various soil and water conservation measures was developed for each village. Further follow up, monitoring on self regulation and strengthening of created institutions are found to be important aspects to sustain the interest of people and develop the linkages with other stakeholders who do have interest in the area like market for banana crop.

The need of constant dialogue with community, demystification of technical information and knowledge building is the key to success of community based water management approach.

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### **Ramakrishna Nallathiga, Centre for Good Governance, Hyderabad**

I remember that the Satya Sai Foundation was doing some major work with reference to soil and water conservation programme as well as tank repair/rehabilitation in Anantapur district to replenish/augment ground water and store surface water. Anantapur is located in dry part of Andhra Pradesh and suffers from the fluoride contamination of ground water (due to the fluoride bearing rocks in the deeper stratum).

This is accentuated by the withdrawal of ground water using pumps. The replenishment of ground water and harvesting of surface water was planned through a series of water harvesting structures and rehabilitation of existing tanks. The community was involved in this process by contributing labour for the construction of structures and advising on local topographic and other variations of water flow. Also, several NGOs worked on the same issue.

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### **Arun Jindal, Society for Sustainable Development, Karauli**

In semi arid India, people contribute labour for soil and water conservation activities for ground water recharge. In Rajasthan, farmers/villagers work to create rainfall storage structures in fields or deepen village ponds. In eastern Rajasthan, villagers of the "Dangs" area conserve rainwater in pokhers for agriculture and cattle. These pokhers also assist in seepage of water to recharge ground water. The same happens in western Rajasthan where "Tankas" are used to store rain water and recharge ground water.

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### **Biplab Paul, Lokvikas, Ahmedabad**

Excellent query and I was expecting a good number of honest admissions from NGOs. Some of my observations are as follows:

1. What experiences have there been with villagers voluntarily recharging groundwater?

In Gujarat, the state government programme of "Khet Talawadi" (farm pond creation on own land) for soil water conservation has been described as very successful experience. It has worked well in drought affected areas and in many a cases people have innovated their own models. But despite peoples' knowledge of its great positive impact, 100% voluntary effort was missing (despite its individualistic benefits). This implies some lacking in peoples' participation.

Contrary to that, another government scheme named "Sardar Patel Jal Yatra scheme" (meant for soil and water conservation through check dams in undulating areas of Saurashtra) where the government pays 60% of the total financial cost and the remaining 40% comes from community for a community asset such as check dams can be described as more successful. There is a need to study the contrasting performance of these government programme and we can easily pinpoint the pivotal factor.

2. Are there any examples of self-regulation be used for irrigation?

Yes there are examples of self-regulation – not for deep tube well but in the form of village regulating drinking water from common tanks.

There is one example in our project area village of Mubarakpura of the drought-affected Sami block in Patan district. We have promoted nearly 78 women SHGs in the block and these SHGs have now formed their cluster. In Mubarakpura village, the SHGs made it a point that they will not allow the Gram Panchayat to sell village tank water for irrigation as this water is needed for their own survival as well as drinking. When Gram Panchayat was adamant they conducted house-to-house visits and developed their opposition in writing. This was initiated by the women SHG members of Mubarakpura but subsequently got support from all the women SHGs from other villages.

3. Are there any examples of villagers imposing a ban on irrigation when required?

This has not happened till date. There is actually a need for a sowing policy which we are lacking till date.

I will love to share more and I feel we badly need a sowing policy otherwise our farmers as well as the rural groundwater scenario will be in a deprived state for good.

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**Debasish De, Society for Natural Resource Management and Community Development, Ghaziabad**

As an evaluator of different forestry and plantation schemes of National Afforestation and Ecodevelopment Board (NAEB), Ministry of Environment & Forests, Government of India, I have seen many examples of people voluntarily participating in the government schemes for conservation of soil, ground water, and plantation activities. Also there are many cases where I have seen the community imposed a ban on overusing ground water for irrigation. I am giving some of them in the below.

In the Rudra Prayag district of Uttarakhand, people of the Jakholi block have participated in plantation activities voluntarily conducted by the Local Forest Department. Large pines fall down in the hill slopes due to soil erosion during the monsoon months. Gap filling is necessary for greening the slopes, else there will be more occurrence of the deforestation due to natural causes. People have collected saplings from the forest department and planted them on the slopes. This was done practically free of cost, and people were provided only refreshments. It is also interesting to note that a large number of women and children have also participated in this activity.

In the Madhubani district of Bihar, people have collected saplings from the Forest Department and planted in their courtyards and on the bunds of their agricultural fields. This activity was completely voluntary.

In Ranchi, Jharkhand, I was evaluating a centrally sponsored scheme of Grant-in-Aid to NGOs of NAEB. The NGO was supposed to raise a nursery for 1 lakh saplings to be distributed among the villagers who have their own land. I have seen in the distant Maoist- infested areas that people acted voluntarily and collected saplings from the NGO to plant in the non-agricultural land and pastures.

In the Puruliya district of West Bengal, people of the Arsa block have dug out a tank in the middle of their farms as there was absolutely no water for irrigation and most of the rabi crops like winter vegetables, sugarcane, corn, mustard, etc., were damaged due to the unavailability of water. I took the initiative as Project Director to help them on a 50:50 basis. I told them that I would reimburse 50 percent of the cost and the people would give the other 50 percent through physical labour to excavate the tank. This

physical labour was voluntary and they issued an order in the village by the headman that one member, either male or female, from one household will contribute his/her labour for one day in a month. The village has 120 households and at least four members per day contribute their physical labour for the community tank. Later on, the villagers voluntarily planted saplings to check soil erosion on the banks of the tank. This tank supplies enough irrigation water for their rabi crop and aids in water percolation.

Therefore, voluntary community involvement in these kinds of activities is more than satisfactory in the rural areas. We need a better connection with them and right gestures to motivate them for the community service.

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**[Rachna Sarkar](#), Uttar Pradesh Water Sector Restructuring Project, Lucknow**

As stated said by Shrikantji, I also opine that unless we involve and sensitize the community for conservation of water it would't be possible to sustain ground water. In above reference I would like to share the experience of the Uttar Pradesh Water Sector Restructuring Project. This is a Participatory Irrigation Management Project Which is being implemented in the sub-basins of the Gomti and Sai rivers with the assistance of Water User Associations formed in each minor canal command.

The project does not only emphasise the irrigation water management but also works towards conjunctive use of surface and ground water available in the command area.

It was found the farmers of head canal command area mostly used canal water to irrigate their field while the tail farmers generally do not get canal water. The cuttings of canal at the head and middle part of minor command restrict water to reach at the tail. The reason simply is much cheaper canal water than the ground water. This practice is damaging the soil of their agricultural land due to seepage and excessive water stagnation at the head of canal resulting in high water table, acidity of soil and less production of crops.

The Project has envisaged the formation of Ground Water Groups of resident farmers each with four hectares of land. Around 46,000 Ground Water Groups have been made and being sensitized to use the maximum irrigation by pumping the ground water at the head reach. Although the difficulties are their due to costly affair of ground water use but frequent sensitization towards soil conservation and receiving higher yield they have now started coming up to purchase pumping sets for use. They have also started keeping the data of ground water use in their command.

It is a challenging opportunity still we hope to achieve the target of balanced use of surface and ground water to increase the agricultural production thereby reducing the poverty level of the command farmers along with soil and water sustainability thus giving a relief to the tail-end farmers too.

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**[Asit Nema](#), Foundation for Greentech Environmental Systems, New Delhi**

I would like to draw your attention to an aberration in the methods of ground water recharge, which is observed in some parts of the country. Some grassroots agencies are promoting open wells/dug wells as the recharge structures and they are constructing such wells within existing ponds or within the flood plains of rivulets. These village ponds and rivulets are seasonal, and during the dry season, they are used as open defecation grounds.

The risk of ground water contamination arises when the first runoff in the monsoon laden with faecal matter directly enters such recharge wells. Besides the pathogens, the runoff would also carry pesticides, fertilizers, other chemical pollutants and a large load of sediments. In urban areas also where this practice is observed, the runoff can carry still more complex and refractory pollutants of industrial origin,

hydrocarbons, phenols, etc. By adopting such an indiscriminate practice, the aquifer, which should be considered sacrosanct, is exposed to severe and irremediable contamination.

In contracts, in most cases the natural seepage through the top soil prevents transfer of pollutants to the aquifers. It is from this consideration that in well-designed recharge structures a filter bed of sand, aggregates and charcoal is provided. In one of the most advanced recharge works that I came across in London (North London Artificial Recharge System), the agency is required to treat river water to drinking water standards and then only it is allowed to inject it into the aquifer through a large diameter bore well. Apparently, the local laws there do not allow untreated water to be used in such a method of groundwater recharge.

In India while we have a number of agencies offering guidelines on construction of recharge works, there appears to be lack of safeguards to prevent the indiscriminate practice of groundwater recharge through open wells. In this regard, there is a need for developing a regulatory mechanism/ordinance under the Environmental (Protection) Act, 1986 or under the applicable groundwater acts.

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**[A. J. James](#), Pragmatix Research and Advisory Services Pvt. Ltd., Gurgaon**

I have been working on groundwater issues for nearly 10 years now, on different projects in different parts of semi-arid India. I have also been looking for successful community-based groundwater management practices, following the rather negative findings of the DFID-supported Community Management of Groundwater (COMMAN) Project, AGRAR and WHIRL Projects and the poor response to the AP Water Land and Trees Act and the MP Groundwater Act. The examples I have managed to glean so far are the following:

1. Hivare Bazaar: Sarpanch Popat Rao Pawar has successfully implemented a Panchayat Resolution that none of the existing borewells should be used for irrigation, and instead has revived the use of shallow dug wells for irrigation, rejuvenated through upper catchment treatment using a national watershed programme. According to Mr. Sudhir Thakre, then in charge of the Jalaswarajya programme (and now Special Secretary to the Chief Minister, Government of Maharashtra), there are many such examples in Maharashtra, but I have not come across any - besides Ralegaon Siddhi of course.

2. Pani Panchayats: You must be aware of this rather controversial scheme, which broke down after running successfully in the initial years under the guidance of Shri. Vilasrao Salunkhe. Attempts were being made to revive it, and you could get more details about it from Dr. Himanshu Kulkarni of ACWADAM in Pune itself.

3. MC Thanda and other APWELL/APFAMGS villages in AP: Both the Dutch-supported AP WELL programme and the FAO-supported AP Farmer Managed Groundwater Systems projects in AP have educated farmers on groundwater issues and these villages have subsequently banned the digging of new borewells, formed farmers into groups sharing bore wells, and facilitated farmers to plan cropping patterns and ground water allocations at the beginning of the rabi season. In an innovative move, the farmer group in MC Thanda have paid for and thus control the electricity connection for irrigation in the village – which allows them to (1) cut off electricity to farmers who break cooperative water using arrangements and (2) restrict new borewells unless sanctioned by the committee.

4. Villages in north AP, south Maharashtra, north Gujarat (Mehsana): According to films made by the DFID supported Water Households and Rural Livelihoods (WHIRL) and conversations with NGOs in the area, there are villages where panchayats have passed resolutions banning further borewells, drilling beyond a certain depth (e.g., 200 metres) of existing borewells, and even summer irrigated agriculture. But, unfortunately, I have not yet managed to get hard evidence of these resolutions yet.

5. AP Drought Adaptation Initiative (APDAI): A World-Bank funded initiative, APDAI has been piloting a

range of activities to build drought-resistance capacity of various livelihood groups of the rural poor. One of these is to collectivize groundwater use by linking several borewells by pipes to provide protective kharif irrigation to a even un-irrigated land. This is accomplished by facilitating discussions and formal agreements between farmers who agree not to drill new bore wells and to share water according to a worked out schedule. There are plans to add this initiative to existing national watershed management programmes, to provide for the pipes and the facilitation costs.

Since groundwater is usually used to produce either money or food, demand management of groundwater depends on how successful are alternative measures to provide both these. This requires a basket of approaches ensuring farmers:

- (1) higher profits per drop of water (through lower input prices and higher output prices)
- (2) better off-farm (and non-water-using) employment - e.g., wholesale marketing of a range of products by SHG women
- (3) use of water saving technologies like drips and sprinklers
- (4) use of less water-intensive crops like SRI paddy
- (5) good quality and targeted foodgrain supply (e.g., through an approach like the Rice Credit Line, pioneered by the Centre of Environmental Concerns, Hyderabad, and taken up on a large scale by Velugu, the Andhra Pradesh Rural Poverty Reduction Programme).

This is of course in addition to all available supply augmenting options. Finally, a key ingredient is supportive government policy - in fact the inclusion of jowar into the public procurement system - as advocated by WASSAN of Hyderabad. This would go a long way to altering the balance between irrigated and rainfed cropping, which has major implications for groundwater (over)use.

I attach two documents you may find useful in this context: (1) a report on Water Resource Management submitted to UNICEF India (<http://www.solutionexchange-un.net.in/environment/cr/res-27110801.zip>) and (2) a report to the World Bank as part of its project on Adaptation to Climate Change Variability (<http://www.solutionexchange-un.net.in/environment/cr/res-27110802.zip>).

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**[Atul Rawat](#), DMV Business and Market Research Pvt., Ltd, Hyderabad**

I have found two organizations (GRAVIS and HEDON) working for providing water security in the Thar region of Rajasthan (this is the desert region of the state).

GRAVIS is more focused on implementation of rainwater harvesting at grassroots levels while HEDCON does the vital job of advocacy of sustainable water security through local solutions.

GRAVIS has been using three local traditional structures for harvesting rainwater for drinking water: beri, taanka and naadi. It is getting valuable support from its beneficiaries.

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**[Arunabha Majumder](#), Jadavpur University, Kolkata (response 1)**

Under Joint Forest Management programme, soil and water conservation through a participatory approach have been taken up in many places in the country. This has upgraded the soil-moisture content and improved the scope for better cultivation of crops.

In West Bengal, deep borewells attached to hand-pumps are exclusively used for domestic purposes. Shallow bore wells attached with pumps are used for irrigation. As per the existing law, a person has to take permission from authority concerned for abstraction of groundwater, before sinking a borewell.

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**[A. L. Khan](#), Uttar Pradesh Irrigation Department, Lucknow**

I feel all irrigation structures like dams, reservoirs and barrages are a good means of recharging groundwater. The earthen channels of canals in irrigation systems are another good source for groundwater recharge. Similarly, the water supplied for irrigation, used in fields, also helps to recharge groundwater.

In northeastern Uttar Pradesh, farmers construct bundhs (check dams) across natural drains (nallahs) to collect water for irrigation. This water also percolates into aquifers and recharges them. People also construct irrigation tanks called pokharas that trap and store rainwater for irrigation; these tanks are another source of recharge.

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**Abhishek Mendiratta, Independent Consultant, New Delhi**

Karkatta is a village which has received the 'Nirmal Gram Puraskar'. However, adequate safe water supply was a problem for the village. With the help of the Jalswarajya programme, the village has been able to overcome this problem and will very shortly have good water supply.

The Jalswarajya scheme was implemented as the water was insufficient. One new well was dug to provide water. A wall of 6ft. was constructed to prevent pollution. All the 253 households were covered in the scheme, which can be extended. Water is pumped daily for 30 minutes to the storage tank, from which it is distributed to the households. The worker employed by the Village Water and Supply Committee (VWSC) is trained and responsible for pumping, cleaning and maintenance of the scheme. The Committee, which consists of 50% women, supervises the scheme. There is 100% collection of water tax. Due to previous pending expenses, the income and expenditure under the scheme shows slight deficit.

Lessons learnt -

This village is an example where it has been observed that in a drought prone area. if the villagers come together and imaginatively design a strategy, they can overcome the water scarcity problem. The planning for the source has been an important aspect of their strategy. This village has shown that if the source is adequate, household water supply connection will be a distinct advantage for the change in life style of the village. From the existing scheme, it is felt that quality issues need to be given more attention. Now, the village will have adequate quantity of water supply. With the enthusiasm that the village has shown it is felt that the village will progress in the direction of quality also.

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**Arunabha Majumdar, Jadavpur University, Kolkata (response 2)**

I can refer to the integrated afforestation and eco-development project (a Centrally-sponsored scheme). In all projects, NGOs, Panchayats, Zilla Parishads, village communities, etc., are associated as far as possible. Joint Forest Management (JFM) is central to all projects. A watershed/catchment area approach is generally followed wherever possible. The minimum area of the compact block should not be less than 20 ha, as far as possible. The project area should be confined mainly to recorded forest land and may be extended to adjoining areas, excluding private lands. JFM remains the central and integral part of all plantation projects. The projects include the following activities:

In-situ soil and moisture conservation measures like contour furrows, staggered trenches, mulching, box trenches, bench terracing and vegetative barriers, etc.

Soil and moisture conservation by construction of small scale engineering structures like gully plugging, check dams, retaining and breast walls, toe walls, spurs, small water harvesting structures including ponds, tanks, and such vegetative measures as may be necessary.

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**Vinod Kumar P., Maithri, Kerala**

There are several watershed programmes run by various agencies in which communities participate in a meaningful manner. I have seen good participation in the Western Ghats Development Project (WGDP) in Kerala. The WGDP is a centrally-sponsored scheme being run in all the Western Ghats states. In Kerala, community is bearing 10 to 50 % of the total cost and implementing the schemes with the support of Grama Panchayats. The Gram Panchayat is also contributing at least 10 % of the project cost. Works worth crores of rupees are implemented in Kerala in this manner in 70 odd watersheds.

In the World Bank sponsored Jananidhi project in Kerala, 120 Gram Panchayats implemented about 3000 community-managed water supply schemes. In Erimayur Gram Panchayat in Palakkad District of Kerala, the community consciously opted for dug open wells instead of bore wells. Then they augmented this supply with the existing public/private bore wells or new bore wells if there was a severe scarcity with a condition that the bore wells will be utilized only when the open well yield decreases during peak summer. Many communities are following this practice for the last six years.

In the same project in Vettom Gram Panchayat in Malappuram District another innovation was attempted. This Gram Panchayat is a coastal one. Fresh water is available in this area as the rain water floats over the saline water because of the sand banks and difference in density. This water can be extracted using low powered pumps in a slow manner; otherwise saline water will intrude in to fresh water. About 25 community water supply schemes were initiated where communities have to closely monitor the pumping on a daily basis. Almost 90 % of schemes are working after five years of commissioning.

In Vadakarapathy Gram Panchayat, a drought-prone area with an annual rainfall of 1100 mm, when the community based natural resource management was introduced as part of SDC CapDecK project, the Gram Panchayat initiated a participatory planning process for natural resource management and several discussions were held with the community. As a result a number of communities decided to stop sugarcane cultivation and switched over to other crops and introduced drip irrigation to existing tree crops. The best example may be the Devarayan Kotta community near Menon Para.

All of these examples show that if community is empowered in an appropriate manner meaningful participation in groundwater management can be achieved.

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**Sunil Kumar, WaterAid India - Regional Office North, Lucknow**

I visited a village in the Rohtas district of Bihar, India. It was surprising to notice that many household had bore well into which they were directly diverting wastewater from the households. There was no filtration system before putting the water in the bore wells. To my understanding, groundwater will be diluted in this process and consequently result in other deadly consequences.

When I discussed this issue was them it was really sad to know that most of them were not aware of the consequences and were not aware of the losses they would suffer in future. No NGOs were working in that village.

We should think about how to prevent such practices and educate them about the importance of groundwater, including its pollution and its recharge.

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**K. A. S. Mani, Andhra Pradesh Farmer Managed Groundwater System (APFAMGS), Hyderabad**

The Andhra Pradesh Farmer Managed Groundwater System (APFAMGS) project is an enabling intervention for managing groundwater depletion through voluntary self-regulation. Unlike small pilot

programmes the project has demonstrated its impact in 7 districts of Andhra Pradesh spread over 650 villages. Several thousand farmers have voluntarily taken a number of steps to reduce groundwater pumping, to tide over problems of groundwater depletion without sacrificing on the returns, in-fact they have completely avoided risks while improving the over-all efficiency.

The project has attracted the attention of several funding agencies and state governments. Several departments have been deputing their officers to get trained by the farmers on the concept of demand side groundwater management.

The World Bank has undertaken an independent evaluation of the economic impact of the programme. The report is in its advanced stage of completion.

Please visit [www.apfamgs.org](http://www.apfamgs.org) to know more about the project. Members can access the FAO evaluation report at <http://www.apfamgs.org/upload/PDF/GCPIND175NET-APFAMGS-eva-final.pdf>. APFAMG's project brochure link is available at <http://www.apfamgs.org/upload/PDF/Brochure-2008.pdf>

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### **Nitya Jacob, United Nations Children's Fund (UNICEF), New Delhi**

I would like to go into some details about groundwater recharge options mentioned by [A. J. James](#) and others.

Hiware Bazaar in Maharashtra is one of the new success stories where an enlightened leader has taken several steps to improve the quality of life of villagers. From being a den of vice it has become a prosperous village. The first steps were providing water and education to people. Under the sarpanch, Popat Pawar's leadership villagers agreed on a ban on grazing on village commons and water-intensive crops. Instead, they switched to stall feeding their cattle from crop residue, and growing onions and garlic. To increase groundwater recharge in the hard-rock, they dynamited the bedrock to create fissures and water from checkdams located in the hills near the village now percolates into the aquifer. The village wells and handpumps have sweet water, and control on grazing has helped revive forests on the village commons. They have a system of water budgeting where they measure the rainfall and the water level in their observation wells (please see [http://www.worldproutassembly.org/archives/2007/12/the\\_laboratory.html](http://www.worldproutassembly.org/archives/2007/12/the_laboratory.html) for more information) and then decide what crops to sow.

Here, villagers have self-imposed moratoriums on groundwater withdrawals, decided at panchayat meetings. Water is prioritized according to use, drinking water getting the highest priority, followed by water for domestic animals and then agriculture. Here, the gram sabha decides the cropping patterns and area under each crop based on rainfall predictions and current availability. You can contact the sarpanch Popat Pawar on [popatpawar@hiwarebazar.org](mailto:popatpawar@hiwarebazar.org) and 9420752525.

In Rajasthan, Tarun Bharat Sangh has achieved similar success on a larger scale. It has established a Water Parliament in the Arvari river basin, in the Alwar district, that is the culmination of 2 decades of mobilization of villagers. People from 72 villages in the basin are represented on the parliament. At the parliament level, they decide cropping patterns in the river basin, water withdrawals and raising funds for maintaining the check dams and other water bodies that have been restored in each village. At the gram panchayat, village people decide what crops to grow, the area, and the amount of water they can withdraw for different purposes – drinking, animals and agriculture.

Farmers in the region have voluntarily changed crops, from sugarcane and other water-intensive crops to those that need less water. They self-regulate pumping of groundwater and use of pumpsets at the checkdam reservoirs, grazing of cattle and cutting wood in forestlands and collection of fodder. The key to the success of this model is village mobilization that revolves around strengthening the gram sabhas and their decision-making and planning capacity.

The basic principles behind groundwater management are controlling withdrawals for irrigation by building a consensus among farmers (changing crops and acreage based on available rainfall and groundwater levels, stall feeding cattle, mixed cropping), restoring and maintaining water recharge structures (check dams, small water bodies, water retention measures in fields, recharge tubewells), prioritizing water use, more efficient irrigation techniques (drip or sprinkler, used at night/early morning) and conjunctive use of ground and surface water. The role of small water bodies in helping to recharge aquifers is increasingly being recognized, though there is a debate on whether they are the best means to do so as storing water in these bodies may interfere with natural flows, depriving downstream communities of their share of water.

The sustainability of groundwater management depends on taking an integrated approach. Groundwater is one source of water in a river basin and has to be managed and used along with other sources – surface water and rainwater. A stakeholder's committee decides water rights of different users, domestic, agricultural and industrial, usually consensually. These rights determine how much and what quality of water each stakeholder gets, payment, penalties for pollution, and also whether there is any surplus water available in the system for new users. So far, it has been assumed that if surface water is not available, new users can tap groundwater, especially in India, and there are few caps on such access. The paradigm of integrated water resources management treats all water as a single resource, and all users as stakeholders, to work out a system based on water rights.

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**[R. Jagadiswara Rao](#), Sri Venkateswara University, Tirupati**

[Sunil Kumar](#) has described how people from a remote village in Bihar out of ignorance have been contaminating local groundwater by diverting untreated wastewater directly into a bore well. What he has described is also common in several parts around Tirupati, where I live. Let me explain this by taking the example of the famous temple town of Srikalahasti in Chittoor district, Andhra Pradesh.

This town is located on the right bank of the Swarnamukhi river close to a Shiva temple where local groundwater can be found in sand deposits left by the Swarnamukhi river during geological past. The local people used to obtain high-quality water from shallow wells in the sand deposits connected hydraulically with the neighbouring river.

With the availability of good-quality piped water from the infiltration wells constructed in the riverbed, the local wells have been abandoned. It is mandatory in most countries to seal abandoned wells in a scientific way and thereby prevent pollution of groundwater. In the absence of such laws, the abandoned wells of the town have been used as sanitary sinks to dump solid and liquid effluents on a large scale. As a result, the local groundwater is so polluted that it cannot be restored to its original purity.

In course of time, the groundwater beneath the riverbeds also been polluted. People in India believe rivers are sacred because of their ability to clean any pollutant let into them. This belief makes people to use riverbeds for a variety of purposes including defecation, bathing and dumping of untreated solid and liquids wastes of human, animal, agricultural and industrial origin.

It has now become necessary to divert some water from the Kandaleru-Poondi canal meant to convey Krishna river water to Chennai through a balancing reservoir, water treatment plant and pipeline at an exorbitant capital and recurring cost.

What is true with Srikalahasti is true with several other towns and villages, who are in dire need of water by importing river water through long-distance pipelines.

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**[Neelima Garg](#), Uttarakhand Jal Sansthan, Dehradun**

The Uttarakhand Rural Water Supply and Sanitation Project (Sector Programme) funded by the World Bank is based on the principles of a Sector Wide Approach (SWAp). The main objective of the project is to scale up the reforms in the Rural Water Supply and Sanitation Sector. This is a pioneer project of India in which the SWAp principle has been adopted.

The main objective of the project is to ensure decentralization and an increased role of Panchayati Raj Institutions (PRIs) and the rural community in the pre-planning, planning, implementation, operation and maintenance of the schemes as per the 73rd amendment of Constitution.

Under this project, rural local governments in partnership with rural communities, will plan, design, construct, operate, and maintain their water supply and sanitation schemes. This is the first URWSS project, which supports state sector-wide common policies and institutional arrangements for improving service delivery. It is expected to provide better water & sanitation facilities through empowerment of PRIs.

This project aims to support the state's sector reform process by establishing and enhancing its institutional capacity to implement, manage, and sustain the state's sector development programme.

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### **Sunil Vishwakarma, Catholic Relief Services, Hyderabad**

Sunil Kumar has brought out a vital issue of groundwater pollution emanating from manmade causes. It is surprising that village practices are contributing to water pollution. This asks for all to be responsible and to stand up and take immediate action to stop such anti-environmental activities immediately. As a reflection to your response, many related questions open up – Who has told poor villagers to divert groundwater through bore wells? This is very important because, the promotion of such technology is normally initiated by NGOs. If it is promoted by government, why has it not come to the notice of the government where it is showcasing tremendous effort through its DPAP/IWDP/NREGA programmes?

Since this is something very serious, local units of any of national or international organization through it network may immediately contact local governments to take corrective measures and put appropriate filtering measures (reverse filter works well in such situation) in such bore wells which are intruding impure surface water in the ground.

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*Many thanks to all who contributed to this query!*

*If you have further information to share on this topic, please send it to Solution Exchange for the Water Community in India at [se-wes@solutionexchange-un.net.in](mailto:se-wes@solutionexchange-un.net.in) with the subject heading "Re: [se-watr] Query: Promoting Sustainable Groundwater Development - Experiences. Additional Reply."*

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