



Environment

Water & Environmental Sanitation Network



Food and Nutrition Security Community

Solution Exchange for WES-Net India and Food & Nutrition Security Community Consolidated Reply

*Query: Improving access to irrigation by small farmers / from
Krishi Bharati, Lucknow / Comparative Experiences*

Compiled by Preeti Soni and Gopi Ghosh, Resource Persons; research by Ramya Gopalan and Shavika Gupta, Research Associates
23 September 2005

Original Query: Sanjeev Kumar, Krishi Bharati, Lucknow
Posted: 7 September 2005

Eastern UP, home to a large number of poor, is characterized by high population density and fragmented agricultural holdings leading to low agricultural output, poor food availability and chronic hunger. In the districts of eastern UP, availability of food is often restricted for the poor farming families due to their inability to access irrigation water.

In this area, groundwater is easily available at 35-50 ft. The small and poor farmers often have small landholdings fragmented into two-three plots (typical plot sizes 1/8-1/10 ha). The usual mode of irrigation is bore-wells fitted with mobile pump sets run on diesel. The poor farmers generally have two options:

- a) Install a bore well in their plot and rent a pump-set for two hours or more - which is unviable for small plots
- b) Buy water from a neighbour with a bore-well through a flexible PVC pipe

Mostly the farmers opt for the second option- facing further the following problems:

- a) Irrigation is delayed as the bore owner's own crop fields get priority for watering. It also, many times, depends on the convenience as well as the whims and fancies of the bore-well owner
- b) The time and hassle involved in transporting the equipments and then fitting a pump-set to a bore-well, often makes it unviable for irrigating smaller plots
- c) The pump-set/ bore-well owners also try to exploit the poor farmer by demanding some free unpaid work in lieu of the 'favour' of selling irrigation water to him (at the usual market rates).

Members may kindly share their knowledge and experiences of different options that have been introduced for small farmers under such situations. I would also like to know what can be done more generally to increase the access to irrigation for the poor farmers, which is essential to increase their farm productivity and income - therefore contributing towards greater food security for their families.

Responses were received with thanks from:

1. [Tushaar Shah](#), International Water Management Institute (IWMI), Gujarat
2. [Avani Mohan Singh](#), Haritika, Uttar Pradesh
3. [Kiran Kulkarni](#), Institute of Rural Credit & Entrepreneurship Development (IRCED), Maharashtra
4. [Allen Mukherjee](#), US Agency for International Development (USAID), New Delhi
5. [Jasveen Jairath](#), CapnetSA Regional Secretariat, Hyderabad
6. [Shirish Sinha](#), International Water Management Institute (IWMI), New Delhi
7. [B R Phukan](#), Indian Institute of Forest Management (IIFM), Bhopal

Further contributions are welcome!

Summary of Responses

The query has raised a practical and relevant issue of access to irrigation water particularly for small and marginal farmers. The irrigation facilities for small farmers need to be affordable, easy to install, operate and maintain with local resources. An issue prevalent here is that of *'rent seeking'* behaviour of the large farmers or local bodies while providing/selling water to the smaller farmers. In this regard, suggestions provided by the Network members and obtained from desk research include:

Use of Treadle Pumps: These are low cost, foot-operated systems for pumping water from shallow aquifers or water bodies. These include bamboo and metallic versions. They have found good acceptance amongst small and marginal farmers in the parts of **eastern India - Bihar, Orissa and Assam, Uttar Pradesh, Nepal and Bangladesh**, as they are (a) easy to install and operate, (b) efficient relative to diesel pumps and traditionally used manual systems, (c) cost less than diesel pumps, and (d) users are able to grow a wide variety of crops. However, if the plots holdings by the farmers are fragmented and not contiguous, then this may not be an attractive and economical option for the farmers.

Formation of User Groups: Farmers may form user groups to share water (by using treadle pumps, open bore wells, farm ponds, and/or irrigation canal system), and/or sell water amongst themselves. However, there may be issues of ownership and risks related to water allocation, water price and use of energy input (especially if diesel is the main source, then variation in water prices may occur due to fluctuation in diesel prices). Examples of user groups have been cited from **North Bihar, Chattisgarh, Madhya Pradesh, Maharashtra**.

Other: Other suggestions from the Network members include:

- Creation of **farm ponds on slopes** for collection of water through gravitational force,
- **Lining of ponds** with plastic and thermocol sheets to reduce water loss through seepage and evaporation,

- **Joint management** of any public water source by creating an **irrigation canal system**
- Diversification and appropriate **changes in the crops patters**, for example by shifting to less water intensive crops, organic farming and use of vermi compost, and
- Use of appropriate **micro irrigation systems** such as sprinkler system, centre pivot (by sharing of equipment), micro and drip irrigation, flood irrigation, short furrow or furrow basin flood irrigation (however, these may require technical support).

There is also a need for awareness creation, capacity building and technical and financial support in order to improve access to irrigation to the small farmers. Irrigated agriculture contributes to improved farm productivity, food security and rural prosperity. However, irrigated agriculture cannot function alone and requires an integrated package of infrastructure and services to support farm growth.

Comparative Experiences

Formation of user groups for selling water (from [Shirish Sinha](#), IWMI, New Delhi)

- **North Bihar:** By formation of user groups, water was being sold as services to small and marginal farmers in Bihar.
- **Chattisgarh:** Water user groups manage ponds for water allocation, with clear guidelines for allocation of water (per crop) and water prices vary according to the choice of crop grown by the farmer.

Formation of user groups to share water (from [Avani Mohan Singh](#), Haritika, Uttar Pradesh)

- **Nowgong block in Chhtarpur district, Madhya Pradesh:** Under the district poverty initiative project, group owned community dug well/tube wells have been set up with investment from a common interest group of the marginal farmers.

Initiatives in Atpadi taluka, Sangli district, Maharashtra (from [Kiran Kulkarni](#), IRCED, Maharashtra)

The initiatives undertaken by IRCED include: (a) organic farming and using vermi compost in place of urea (has reduced water requirement by half), (b) new crop pattern is practiced to face water shortage (e.g. drumstick plantation), and (c) farm ponds are dug on the slope of farms by farmers so that water can be collected with gravitational force.

Community water resource development (from [Shavika Gupta](#), Research Associate)

- **Dag block in Jhalawar Rajasthan:** N M Sadguru Water and Development Foundation has initiated irrigation development through lift irrigation and promoting small-scale water resources development program through the construction of check dams. (For more information see [Community water resource development](#) below)

Irrigated Agriculture in Eastern Plateau Region (from [Shavika Gupta](#), Research Associate)

Under the Irrigated Agriculture Programme, PRADAN (an NGO) has assisted in installing over 650 irrigation systems in twelve districts across four states – **Jharkhand, West Bengal, Orissa, and Chhatisgarh**. These can irrigate over 24,000 acres for cultivating wheat during *rabi*; about 16,000 acres in summer; and approximately 30,000 acres of land in case of an indifferent monsoon. (For more information see [Irrigated Agriculture Programme](#) below)

Related Resources

Recommended Documentation

Pedaling out of Poverty: Social Impact of a Manual Irrigation Technology in South Asia (From [Tushar Shah](#), IWMI, Gujarat, and [Shirish Sinha](#), IWMI, New Delhi)

Tushar Shah et al. (2000). Research Report 45. IWMI Research Report Publication Series <http://www.iwmi.cgiar.org/pubs/Pub045/RR045.htm> available at www.iwmi.cgiar.org

This paper offers an assessment of the social impact of treadle pump technology for manual irrigation in South Asia's "poverty square"

Alternatives to Micro Irrigation: Evaluation of the Treadle Pump (From [Shirish Sinha](#), IWMI, New Delhi)

Srinivas, S.N., Jalajakshi C.K (2004). Economic and Political Weekly. Volume 39, Number 38, September 18 - 24, 2004.

<http://www.solutionexchange-un.net.in/environment/cr/res16090502.pdf> (size: 194 KB), available at www.epw.org.in

This paper published in the EPW reports on a survey evaluating the performance of treadle pumps vis-a-vis other similar options in the villages of UP, Bihar and Orissa.

Microirrigation for Income Generation in Asia (Identified by [Preeti Soni](#), Resource Person) Michael Roberts. in Water and Poverty - The Realities: Experience from the field. ADB (2004). Chapter 8 (pages 110-120)

http://www.adb.org/Documents/Books/Water_for_All_Series/Water_Poverty_Realities/Microirrigation.pdf available

Drawing from IDE experience, the chapter provides a case for action-oriented approach to reduce poverty through integration of smallholders into markets, with micro-irrigation as an entry point.

Identified by [Ramya Gopalan](#), Research Associate

Applying Micro Irrigation in the Himalaya: A Case Study on IDE's Experience

Behr, C and G. Naik (1999)

<http://www.mtnforum.org/resources/library/behxr99a.htm> available at Mountain Forum Online Library www.mtnforum.org (Mountain Forum is an international collaboration promoting sustainable mountain development in Nepal)

This paper elaborates on IDE's experience in micro-irrigation product development and promotion in India and Nepal and outlines the scope for expansion elsewhere.

How irrigation can benefit people in South Asia, ID21

Brabben, T; Angood, C; Skutsch, J; and L. Smith (2004).

<http://www.id21.org/society/r1tb1q1.html> available at www.id21.org (a website enabled by DFID and provided by Institute of Development Studies in the UK).

The article highlights contributions of irrigated agriculture for small farmers showcasing evidences in Asia.

Promotion of low-cost and water saving technologies for small scale irrigation

M. De Lange. MBB Consulting Engineers, South Africa

<http://www.fao.org/docrep/W7314E/w7314e0p.htm> available at www.fao.org

The paper, available at the FAO website, examines the various technologies available and feasible in the promotion of small-scale irrigation in the South African context.

Identified by [Gopi Ghosh](#), Resource Person

India's Management Transfer Scheme Begins Irrigation Reforms

Hussain, I (2005). Synthesis Final Report.

<http://www.adb.org/water/actions/IND/irrigation-reforms.asp#study> available at www.adb.org

The IWMI implemented study financed by ADB used a holistic approach to understand rural poverty and identify practical interventions for irrigated agriculture in Asia.

Community water resource development

<http://www.nmsadguru.org/CommunityWaterResourceDevelopment.html> available at N M

Sadguru Water and Development Foundation www.nmsadguru.org

Describes the Foundation's initiative for irrigation development and small-scale water resources development program through the lift irrigation and checkdams as in Dag block, Rajasthan.

Irrigated Agriculture Programme

<http://www.pradan.net/index.php?option=displaypage&Itemid=119&op=page&mmenu=2>

available at www.pradan.net

Describes the PRADAN model, developed to increase the income levels of poor households by improving the irrigation potential in the Eastern plateau region.

Rent Seeking in Irrigated Agriculture: Institutional Problem Areas in Operation and Maintenance

Renger, J, and Birgitta Wolff (2000). Rural Development Division, GTZ, Germany

<http://www.edcnews.se/Research/RentseekingIrrigation.html#Distributors>; abstract available at <http://www2.gtz.de/maintain/publication.html>

The article analyzes issues and cases in rent seeking in irrigated agriculture

Sub-regional workshop on Irrigation Technology Transfer in support of food security

Ministry of Agriculture, Government of Zimbabwe, Harare, Zimbabwe, April 1997

<http://www.fao.org/docrep/W7314E/w7314e04.htm#TopOfPage> available at www.fao.org

The document recommends strategies for smallholder irrigation development and action oriented programmes on effective technologies, local water resources and capacity building.

Recommended Websites

International Development Enterprises, India (From [Shirish Sinha](#), IWMI, New Delhi)

<http://www.ide-india.org/ide/treadlepump.shtml> available at www.ide-india.org

IDEI is an Indian not-for-profit enterprise involved in providing long-term solutions to poverty and hunger. Website provides case studies, reports and information on treadle pump technology.

International Development Enterprises, USA (From [Preeti Soni](#), Resource Person)

<http://www.ide-international.org/page.asp?navid=209>

IDE develops technology to enhance smallholder productivity and works for market-based rural development. Site provides technical information and cases of interventions in different countries.

Recommended Organizations

Acumen Fund, New York (from [Ramya Gopalan](#), Research Associate)

<http://www.acumenfund.org/Work/WaterInnovations/Investments.asp>

The Acumen Fund, a global non-profit venture fund, provides projects and investment plans, such as for drip irrigation, for improving quality of life of the poor.

Recommended Contacts

Dr. RK Singh, Indian Institute of Forest Management (IIFM), Bhopal. rksingh@iifm.a.c.in (From [Dr. BR Phukan](#), IIFM, Bhopal)

Professor Singh is presently executing a project on capacity building on collaborative management of natural resources, including water management through Water User Association.

Related Past Consolidated Replies

Consolidated Reply: Considerations for sharing of catchment pond water resources/ from Jal Bhagirathi Foundation, Rajasthan/ Advice

<http://www.solutionexchange-un.net.in/environment/cr/cr-se-wes-28060501.doc>

It offered technical, economic, social and behavioural considerations for resolving water resource security concerns for a village, and dealt with the issue of common property resources.

Responses in Full

[Tushaar Shah](#), IWMI-TATA, New Delhi

Why don't you try treadle pumps that IDE markets? See "Pedaling out of Poverty" from IWMI website.

[Avani Mohan Singh](#), Haritika, Uttar Pradesh

We have experience of providing irrigation facility to the marginal farmers in Nowgong block of District Chhatarpur under Madhya Pradesh district poverty initiative project. The land distributed to SC/ST communities by Sri. Digvijay Singh govt. does not have irrigation facilities lying fallow from last 50 years. We have formed a common interest group of the marginal farmers and set up group owned community dug well/tube wells by providing them money for capital investment. You can try to form a group-based approach to tackle that problem, like we solved this in Bundelkhand region.

[Kiran Kulkarni](#), Institute of Rural Credit & Entrepreneurship Development (IRCED), Maharashtra

IRCED is working in drought prone area of Sangli district in Maharashtra state. In our Atpadi taluka this year we have received only 57 mm rain as against the normal rainfall of 250 mm. Even 2 years back the rainfall was less than 150 mm. we are working with small & marginal farmers. To increase the water availability in the land we have introduced organic farming in the area. Now farmers are using vermi compost in place of urea and DAP. With this replacement our water requirement has come down to 50%. Also we have introduced new crop pattern to face the water shortage. Drumstick plantation is very useful in this matter.

The third thing can be done by the farmers themselves is that they can dig farm ponds on the slope of their land, so that water can be collected in that pond with gravitational force. If all the farmers in the contiguous area do this then the water availability and accessibility will increase for the benefit of the small farmers. we have experience of digging these ponds and we have seen the results.

The food security of these farming communities can be developed by establishing grain banks for them. We have established such Grain banks in drought prone areas.

You can try these solutions. If you need any training in this matter please send your people to our area.

Aleen Mukherjee, USAID, New Delhi

The major issue is access of irrigation water by small farmers who are exploited by large ones while buying irrigation water from them.

Help create Water User Group (WSG) with farmers having preferably contiguous land, who can group together for couple of options

Option 1- as ground water is available within 35-45 ft, they should try digging plot by plot (collectively thus saving labor cost) open bore wells and use treddle pump or similar system to irrigate their land.

Option 2 - The same WSG can create public ponds within their land (if contiguous) and share the water amongst them

Option 3 - The same WSG or joint management for any public water source by creating irrigation canal system may be also useful.

Hope this helps and stimulates more discussions on the issue raised.

Jasveen Jairath, CapnetSA Regional Secretariat, Hyderabad

Farm ponds created and managed by small contiguous farmers is good idea. It adds to their efficiency. The ponds could be lined with plastic and have thermocol sheets thrown on top of water surface, which minimizes water loss through seepage and evaporation. Rainwater can be collected and will be accessible for longer time duration.

Shirish Sinha, International Water Management Institute (IWMI), New Delhi

As already indicated in other responses, you can explore two options:

1. As mentioned by Dr Shah, treadle pumps provide one option. These are low cost systems and have found good acceptance amongst small and marginal farmers in eastern India. However, if the plots holdings by the farmers are fragmented and not contiguous, then this may not be an attractive and economical option for the farmers.

You can access the IWMI report (Research Report 45 under publications) "Pedaling out of poverty" from <http://www.iwmi.cgiar.org/pubs/Pub045/RR045.htm>. In addition there is wealth of

information on treadle pumps on the IDE website including case studies and reports (www.ide-india.org). There is also a paper on evaluation of treadle pumps by S N Srinivas and C K Jalajakshi in EPW, which I am enclosing (<http://www.solutionexchange-un.net.in/environment/cr/res16090502.pdf>).

[Moderators please note that at times downloading report from IWMI website is slow]

2. Since the farmers are used to buying water, the option could be to help create a user group of the farmers and sell water amongst themselves. The difference would be in terms of the ownership. It has certain risks related to water allocation, water price and use of energy input (especially if diesel is the main source, then the group would have to understand the variation in water prices due to fluctuation in diesel prices). There are some experience of similar work in north Bihar, where water was being sold as services to small and marginal farmers. Similar experience in Chattisgarh shows that water user groups manage ponds for water allocation, with clear guidelines for allocation of water (per crop) and water prices vary according to the choice of crop grown by the farmer.

B R Phukan, Indian Institute of Forest Management (IIFM), Bhopal

I visited few villages of eastern UP in 2000-2001 for a UPFD/World Bank project on farm forestry. I would say that fragmented crop land is one of the major limiting factors for modernizing agriculture, particularly for irrigation management when disparity in term of land holdings is very high. It is more of a management problem in nature. To fight against odd situations as you listed, I would like to add consolidation of land holdings, though it is not an easy task. Considering your mission, your organization may help poor to increase their negotiating skill to achieve a win-win situation. Is there any possibility to organize poor farmers for consolidation of their crop land at least up to minimum feasible size for a bore-well and collaborative management? I assume the customary rules in eastern UP are not as strong as in tribal society, particularly tribes of north eastern states. So strategy to increase negotiating capacity of poor, even in the grass root level democratic process may be of helpful to a great extent in equitable distribution of irrigation water. Dr. RK Singh Professor of Indian Institute of Forest Management, Bhopal is presently executing a project on capacity building on collaborative management of natural resources. Better water management through Water User Association (WUA) is one of the components in his research.

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 WES-Net at se-wes@groups.solutionexchange-un.net.in and Food and Nutrition Security Community in India at se-food@groups.solutionexchange-un.net.in with the subject heading "Re: [se-food] [se-wes] Query: Improving access to irrigation by small farmers/ from Krishi Bharati, Lucknow/ Comparative Experiences".

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