

# Water Policy Briefing

Issue 27

Putting research knowledge into action



## Rethinking Tribal Development: Water Management Strategies for Revitalizing Tribal Agriculture in central India

This "Five Percent Farm Pond", promoted by PRADAN, represents 5 percent of the total area of a farmer's land and stores runoff water for use during dry spells.

**IWMI-TATA**  
Water Policy Program

**IWMI**  
International  
Water Management  
Institute

A major drawback of India's agriculture, watershed development and irrigation strategy has been the neglect of relatively wetter catchment areas and the tribal people living therein. Investing in small-scale interventions for improved water control can produce a dramatic impact on the productivity and dependability of tribal livelihood systems.

# Rethinking Tribal Development: Water Management Strategies for Revitalizing Tribal Agriculture in central India

About 8 percent of the Indian population belongs to a category listed as “Scheduled Tribes” enumerated in the Schedule to Article 342 of the Constitution of India. Tribal people have been seen to be strongly associated with the forests, hills and remote areas, practising a unique life style, having a unique set of cultural and religious beliefs. Central Indian tribal homelands, comprising roughly 100 districts and running across the *belly* of the country [Fig. 1], are home to roughly 55 million tribal people, more than 70 percent of India’s tribal population. Notwithstanding the rich vegetation and good rainfall, this belt is home to one of the largest concentrations of rural poverty in the world. For millennia, tribal communities have lived in forests and survived on hunting and gathering. However, with growing population and resource pressure, the region is now witnessing a rise in livelihoods based on settled farming. It offers a unique opportunity for enhancing tribal livelihoods through investments in land and water management.

## Facets of Tribal Deprivation

In spite of favorable resource conditions, tribal regions perform poorly in terms of infrastructure, returns from agriculture and almost all human development indicators [Table 1, Figures 2 and 3]. A large part of this has to do with the lack of irrigation investments in tribal districts. For instance, while for the country as a whole, more than a third of the net sown area is irrigated, less than 15 percent commands irrigation in tribal central India. Admittedly, tribal regions are wetter and that can be an argument to justify the lower investments. However, just as the dry regions have benefited from public investments in irrigation, the wetter non-tribal regions have also benefited from public investments, largely in groundwater provisioning, including electricity subsidies for pumping groundwater to enjoy greater water control. Tribal areas, on the other hand, have remained deprived of such public investments. The impact

Figure 1: Tribal demography in India

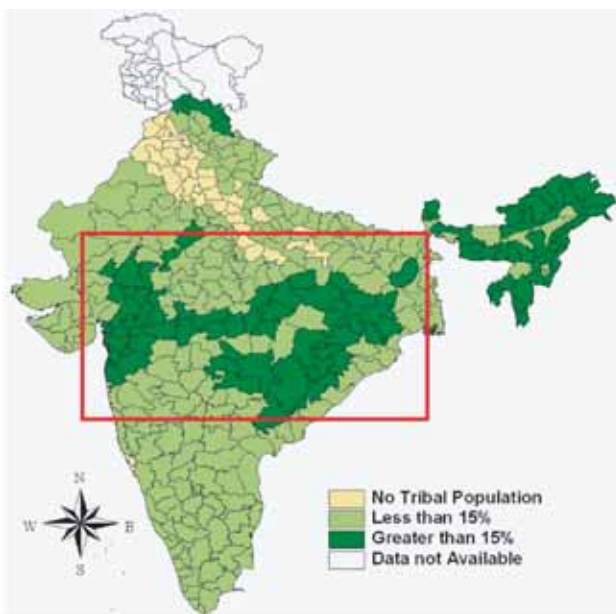
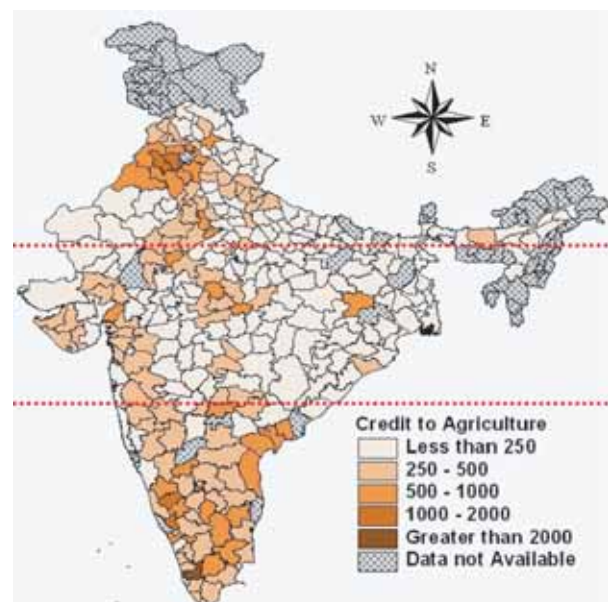


Figure 2: District-wise credit to agriculture (INRs/Capita)



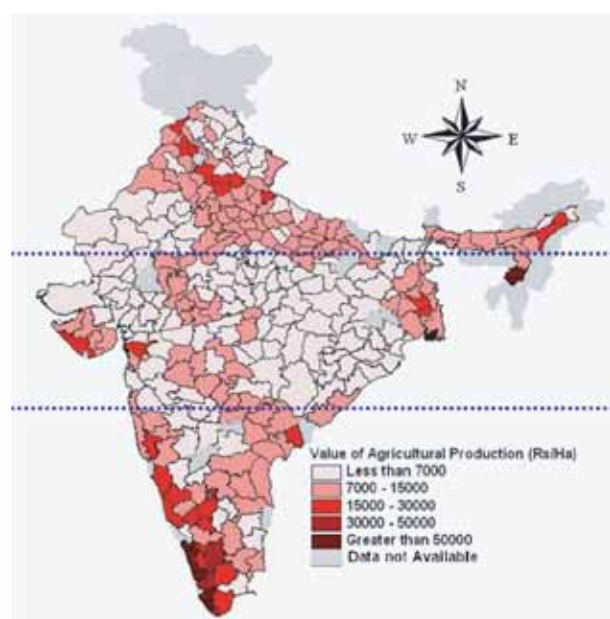
This Water Policy Briefing is based on research presented in the book titled *Mainstreaming the Margins: Water-centric Livelihood Strategies for Revitalizing Tribal Agriculture in Central India*, 2005, Angus & Grapher, New Delhi; and the paper titled *Improved water control as strategy for enhancing tribal livelihoods* [Economic and Political Weekly, Review of Agriculture, Vol. XXXIX, No 31, July 31 2004, pp: 3469-3476] both by Sanjiv Phansalkar and Shilp Verma.

**Table 1: Facets of tribal deprivation**

Parameter	Average for central Indian Tribal Districts	All-India Average
<b>RESOURCE CONDITIONS</b>		
Population density	200.23	324.00
Mean rainfall precipitation (mm)	1190.67	1117.19
<b>INFRASTRUCTURE</b>		
Average CMIE's index of development*	84.09	100.00
% Net irrigated area (NIA) to Net sown area (NSA)** #	14.98	33.59
% Net area irrigated by major irrigation systems** #	3.66	9.89
% Net area irrigated by minor irrigation** #	16.83	42.28
Groundwater**	11.32	24.28
Surface lift irrigation**	5.51	18.00
<b>PERFORMANCE OF AGRICULTURE</b>		
Value of agricultural output (InRs/ha)**	2697.55	8578.00
Value of agricultural output (InRs/capita)**	769.11	1899.00
<b>HUMAN DEVELOPMENT INDICATORS</b>		
Population below poverty line (percent)*	42.67	26.00
Extent of hunger (% households going hungry)*	5.63	2.96
Infant mortality rate* (per thousand births)	81.78	72.77

**Notes:** \* Average for Districts in central India based on data from 70 most Tribal Districts  
 \*\* Average for Districts in central India based on data from 30 most Tribal Districts  
 # Based on data from 282 districts in 11 states where the last Minor Irrigation Census was conducted.  
**Source:** Phansalkar and Verma (2005)

**Figure 3: District-wise value of agricultural production (InRs/Ha)**



of this paucity of water control is evident in the performance of agriculture. The mean value of agricultural output per hectare in the tribal districts of central India is less than a third of the national average.

Tables 1 and 2 only represent district-level aggregates. However, there are no districts in central India which are completely tribal. Even within these worse-off tribal districts, tribal farmers fare much worse than their non-tribal counterparts. A primary survey of more than 800 tribal and non-tribal households living in seven tribal

districts across this region reveals that tribal farmers derive much less returns from agriculture. They make much smaller investments (in absolute terms) in agricultural assets while the proportion of their capital investments devoted to agriculture is much higher, perhaps indicating their desire and willingness to increase the productivity of their agriculture. Their access to agricultural technology and inputs is much weaker and the dependence of tribal people on income from seasonal migration, often under distress, is twice as high as that for non-tribal people living in the same districts [Table 3, overleaf].

### Why Tribal India Lags Behind

Having inherited a predominantly agrarian economy, successive governments in independent India invested significantly in irrigation, agriculture and rural development to ensure India's food security and to bring the rural population out of poverty. However, the policy largely remained driven by hydraulic and agrarian opportunity rather than by concern for spatial equity. The Intensive Agricultural Development Program (IADP) of the 1960s—designed to make India self-sufficient in food production through intensive use of 'green revolution' technologies in selected districts—further intensified this colonial bias. An overwhelming majority of public investments in agriculture was dedicated to building dams and canals—an irrigation mode ill-suited to tribal people and upper catchments of river basins. Even when India invested in improving rain-fed farming, much attention and investments focused on

**Table 2:** A typical tribal (Mandla) and non-tribal (Hoshangabad) district in Madhya Pradesh (MP)

Attributes	Year	MP	Mandla (Tribal)	Hoshangabad (Non-Tribal)
<b>RESOURCE CONDITIONS</b>				
Population density (per sq. km.)	1991	149.24	97.31	126.25
Urban population (percent)	1991	23.18	7.67	27.34
<b>INFRASTRUCTURE</b>				
CMIE's infra. devt. index	1993	86.66	70.51	90.39
Credit to agriculture (Rs./capita)	1995	192.00	59.00	376.00
<b>PERFORMANCE OF AGRICULTURE</b>				
GIA (as % of GCA)	1995	22.53	3.66	43.05
Value of production (Rs./ha.)	1995	6371.00	3245.00	5851.00
Value of agri. production (Rs./capita)	1995	2140.00	1232.00	2899.00
<b>HUMAN DEVELOPMENT INDICATORS</b>				
% Population below poverty line	1991	35.52	60.20	37.70
Infant Mortality Rate (per 1000 births)	1991	98.65	100.00	81.00

**Notes:** GIA: Gross Irrigated Area; GCA: Gross Cropped Area; GSA: Gross Sown Area; TRA: Total Reported Area

**Source:** Phansalkar and Verma (2005)

**Table 3:** Tribal people, agriculture and water control

PARAMETER	T-TB	T-NTB	NT-TB	NT-NTB
<b>CENTRALITY OF AGRICULTURE</b>				
% Share of agriculture-based income	66.24	71.20	80.18	82.43
% Share of migration-based income	15.57	17.43	5.00	5.57
% Share of forest-based income	6.14	2.29	2.11	0.43
% Share of income from other sources	12.05	9.09	12.43	11.39
<b>FACETS ABOUT AGRICULTURE</b>				
Average size of land holding (acres)	5.48	3.63	7.91	8.58
Net returns from agriculture (Rs./acre)	4656.98	4493.51	6662.93	25031.61
% Rain-fed area	71.80	77.79	53.56	57.59
<b>FACETS ABOUT CAPITAL INVESTMENTS</b>				
Average capital investment (InRs/capita)	9599.32	4878.74	33281.98	33333.33
% Going to agriculture	89.64	89.36	64.79	81.23

**Notes:** \* Includes lift-irrigation from canals

**Source:** Phansalkar and Verma (2005)

India's drylands where skilled farmers were constrained by lack of water resources and other agricultural inputs. The relatively water-abundant regions of tribal India, where the need was to develop a culture of settled farming, remained neglected. In addition, tribal highlands repeatedly bear the brunt of valley-focused development projects—dams, mining as well as industries.

The Constitution of India vows to bring the historically deprived tribal regions and people at par with the rest of the country through a policy of progressive assimilation. It entrusts the State with the responsibility of ensuring that they are not taken advantage of by others, can enjoy the same rights as other citizens and have the same opportunities for improving their conditions, while at the same time, protecting their unique culture and identity. However, public attention has remained largely confined to measures pertaining to curative health care, the public distribution system and schools. While important, these initiatives did little to attend to the livelihoods of tribal people.

Tribal people depend heavily on forests for their sustenance. However, over time, this resource and their access to it has declined. In the absence of appropriate policy action to support agriculture development, tribal communities have increasingly been obliged to evolve a lifestyle of low productivity rainfed farming followed by distress migration. While India's public irrigation systems have left these regions by the wayside, there is immense scope for dramatically improving tribal agriculture through appropriate investments in small-scale water control interventions.

## The CInI Paradigm

In 2002, the IWMI-Tata Water Policy Program (ITP), Sadguru Foundation and PRADAN led a collaborative initiative called the Central India Initiative (CInI) to evolve, through a coordinated program of applied research, a strategy to use small-scale water-control interventions as the center-pin of tribal agricultural development.

The research argues that there is a need to reorient India's current thinking on tribal affairs. It argues that context specific and innovative small-scale water control interventions can act as a trigger to revitalize tribal livelihoods.

### Capturing Diversity: Tribal Socio-Ecologies

While tribal people across the region of study are in some ways similar, there can be no single 'blueprint' for the vast canvas of agro-ecological contexts, levels of infrastructure development, varying historical experiences, social attributes, degree of exposure to high productivity agrarian systems and the level of market development. A combination of these factors can be used to classify the central Indian tribal belt into four distinct socio-ecologies [Table 4; Figure 4].

Figure 4: Four zones representing distinct tribal socio-ecological contexts in central India



Table 4: Tribal socio-ecologies in central India

	Zone A	Zone B	Zone C	Zone D
<b>CONTEXTUAL FEATURES AND HISTORICAL EXPERIENCE</b>				
Rainfall	****	***	**	*
Vegetative cover	****	****	**	*
Population pressure	*	**	***	****
Agricultural skills	*	**	****	****
Degree of isolation	****	***	**	*
<b>EXTERNAL CONSTRAINTS AND MARKETS</b>				
Road network	*	**	****	****
Electricity supply	*	**	***	***
Access to diesel	*	*	***	***
Market development	*	**	***	***

As is evident from Table 4, each zone faces an inter-connected mesh of contextual features and external constraints which get derived from the historical experience of development. Zones A to D broadly represent regions from the east to west and as we move westwards, population density increases while rainfall and vegetative cover declines. This trend also perhaps explains the higher degree of isolation and less developed agricultural skills among the tribals in the east. The isolation in turn explains the infrastructure development and access to markets as experienced by the tribal people.

The wide canvas this classification attempts to paint is bound to result in some overlaps. It is important therefore that it is viewed in terms of attributes rather than geography to avoid unreasonable stereotyping.

### Correcting the Wrong: Strategies for Transforming Tribal Agriculture

The policy on tribal affairs has given inadequate emphasis to livelihood enhancement and improvement of

economic status of tribals. There has been no concerted effort at improving the access of the tribal people to improved agricultural practices and water control. During the course of our studies, we found numerous cases where sensible investments in land care and water management have the power to transform tribal agrarian systems.

### Promising Technologies and Replicable Interventions

The most critical issue facing much of the eastern tribal region (Zone A and some parts of Zone B; see Fig. 4) is food insecurity arising out of unstable monsoon (*kharif*) paddy crop. Uncertainty of monsoons significantly reduces paddy yields and forces farmers to migrate. Creation of a plethora of decentralized water harvesting structures such as the '5% Farm Pond'<sup>1</sup> [see cover image] will enable farmers to provide protective irrigation during critical periods of moisture stress. Such simple water control mechanisms will not only improve the food security of millions of farmers, it will also reduce their dependence on forced migration and will encourage them to focus on agriculture based livelihoods.

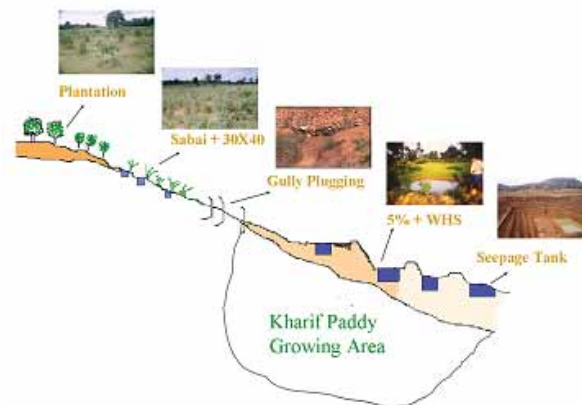
Lifting devices such as low-cost and high-efficiency diesel pumps as well as manually operated treadle pumps need to be encouraged and supported. The region is abundant in streams and rivulets that can be harvested through small-scale lift irrigation projects. At places where wells exist, low cost micro-irrigation systems may be introduced to support women-managed vegetable cultivation on homestead lands. Simultaneously, uplands may be taken up for soil water conservation measures and growing improved grasses, timber, host plants for silkworms/lac and fruit trees. A series of such interventions undertaken together across the local topography [Figure 5] can have a positive impact on tribal livelihoods.

Innovative paddy management that can reduce the cost of cultivation and boost yields may be particularly well suited to the environment and should be explored. This includes alternative management packages such as SRI (System of Rice Intensification). While the dominant strategy for yield enhancement in the post-green revolution era has focused almost completely on introduction of high yielding varieties of seeds and the application of fertilizers and pesticides, SRI is drawing attention world-wide as a package of paddy cultivation practices that promise to boost paddy yields while reducing the cost of cultivation. SRI is currently being promoted on a pilot scale with poor tribal and non-tribal farmers in Purulia (which lies in zone A). In the eastern Indian tribal homelands—where paddy cultivation is central to rural livelihood systems—the promises of SRI need to be vigorously explored. Initial results from field pilot studies indicate that two factors are critical for the success of SRI—water control and labor availability. This reiterates the centrality of water control strategies in tribal livelihood enhancement efforts.

Agri-horti-forestry, a concept demonstrated in the *Wadi* (farm plus residence) development program of BAIF, the development research foundation, is an integrated land and water management initiative [Fig. 6]. A *wadi* is typically a one acre plot, in most places with a high slope that is difficult to farm. BAIF has promoted plantations in these plots using local water resources. When no external sources of water appear feasible, recourse is taken to creating harvesting-cum-storage structures that capture rainwater. This is done by digging small pits of 4 cubic metres capacity. The water is used to protect standing plants of fruit crops, the core of the *Wadi* model. Farmers are encouraged and helped to take inter-crops of marketable vegetables and other cash crops till the shade created by the tree canopy makes plant growth difficult. This way the tribal families derive some income even during the long gestation period of the *Wadi*, usually between 5 and 7 years.

Harnessing locally available water resources also takes the form of diversion channels or small check-dams which

Figure 5: A series of interventions for paddy stabilization



store rainwater for dry-spell irrigation; recharge groundwater and in some cases, also facilitate second crops. However, one of the biggest initiatives of harnessing the potential of local rivers and streams for tribal welfare can be seen in the work of the NM Sadguru foundation in the western tribal homelands [see back cover image]. These involve relatively large check dams and lift irrigation schemes which typically irrigate around 200 acres through a lift irrigation scheme which is managed by the tribal farmers' cooperative. Besides generating substantial economic and livelihood benefits for poor tribal communities, these schemes have significant multiplier effects in the local economy. Since water availability in this part of tribal India is relatively less, building a large number of such check-dams can lead to upstream-downstream conflicts. However, a major strength of Sadguru's interventions is that they operate at the catchment level and plan each intervention after considering its possible impacts downstream.

Other avenues to uplift tribal agrarian economies from the current low-productivity levels include initiatives of community based irrigation management, market led initiatives, watershed and watershed PLUS programs as well as spontaneous community action based on traditional wisdom. While the methods varied across the diverse socio-ecologies, all of them aimed to reverse the trend of distress migration and helping tribal farmers find their feet in settled agriculture through the provision of improved water control.

### Institutions and Enabling Conditions

The first and foremost need which we realized during the course of CInI stems from the scarce availability of strong and effective community-based livelihoods-promotion organizations in the region. There seems to be an urgent

<sup>1</sup>For more details on 5% farm ponds, visit <http://www.iwmi.cgiar.org/smallholdersolutions/index.asp?id=681>

need to invest in strengthening and institutional building for community-based organisations. The second key question to be addressed relates to intra-household equity. Water control interventions must be supplemented and complemented by suitable interventions in credit and enterprise promotion among women. Another important auxiliary intervention area that needs to be addressed is that of post-harvest support and providing access to markets. Finally, the transformation from kharif-crop followed by migration to a well-settled and improved farming economy is unlikely to be quick. Several tribal communities will, for several reasons, want to continue to depend on income from short-term migration for supplementing incomes from farming during this transition phase. It would be immensely beneficial for such communities if interventions are introduced which aim at broadly three outcomes: [1] Ensuring that the terms of trade during the period of migration are non-discriminatory and that the tribal migrants get fair returns for their services whenever they migrate; [2] Non-migrating members of tribal families are provided viable off-farm livelihoods; and [3] Tribal people are exposed to and provided with skill-improvement programs for activities generally undertaken during the course of migration.

Without such institutional support systems for change, traditional practices such as the practice of *free grazing* of animals after the monsoon season impose an overwhelming externality that discourages farmers from attempting a second crop. Large-scale promotion of *Adgharas* or *Kanji Houses* (simple and low-cost enclosures to keep animals) in blocks of contiguous villages will help to tide over the problems of free-grazing and allow second crop cultivation.

In addition, while water control strategies help those who have enough land that can produce food fiber, vegetables and fruits for consumption and for the market, these strategies have their limitations in helping marginal land-holders and landless people in any significant manner. Thus, mere adoption or promotion of improved water control strategies does not absolve the policymakers from the task of also working towards supportive and collateral

interventions which will be required to help the process of agrarian transformation as well as improving non-farm livelihood options for the tribal people.

## Ways Ahead

The core argument of the CInI research has been that interventions which are able to offer improved water control for tribal people can reverse the present circle of low productivity farming followed by distress migration into a virtuous one. Since neither the regions nor the tribal communities under study are homogenous, there is no grand blueprint to undertake this task. Therefore the need is to acknowledge the local context and design appropriate interventions. The CInI project represents one model for implementing this development in the diverse cultural and physical environment represented by tribal areas of central India.

### Box 1: The CInI Cell

The Sir Ratan Tata Trust (SRTT), IWMI's key partner in India, decided to adopt CInI as a key component of their grant making program. CInI research is applied to design and guide field projects under its rural livelihoods portfolio. They also support the CInI Cell to act as a knowledge center for tribal livelihoods and to provide technical backstopping to CInI projects.

The CInI Cell is a dedicated unit focussed on central India to act as an advisor on rural livelihood interventions for tribal communities. The cell steers the activities of converting research findings into action plans and testing the recommendations of the research in the field. It supports field experiments and tests ideas through small grants and brings replicable models to the fore. It also supports the Trust's projects in the field by providing inputs in the design of the projects, documenting their progress and drawing lessons for replication and lastly, by coordinating suitable monitoring and feedback mechanisms. The Cell is also working closely with other donors and state governments to translate the research into policy action on the ground.

The longer-term aim of the CInI Cell is to become a nodal agency on tribal issues for the central Indian states. The key roles and responsibilities envisaged are: [a] acting as a networking and coordinating unit between civil society organizations, government agencies and donors working in the central India region; [b] serving as a knowledge bank, which would be a single source for the information related to tribal livelihoods in central India, especially with regard to productive use of water resources; [c] playing a role of an idea incubator, by exploring new ideas in the field by further developing CInI; [d] developing a brand equity for CInI; and [e] monitoring and providing technical support to the organizations in implementing CInI strategies, through regular monitoring missions and field visits.

Figure 6: BAIF's Wadi Development Program





Sadguru's check dams in western India

## Water Policy Briefing Series

The **Water Policy Briefing** Series translates peer-reviewed research findings into useful information for policymakers and planners. It is published several times yearly, with the goal of bringing new and practical approaches to water management and planning into the policy recommendation process. The series is put out by the International Water Management Institute (IWMI) in collaboration with national and international research organizations. It is free of charge to development professionals.

The Water Policy Briefings are also available online: <http://www.iwmi.cgiar.org/waterpolicybriefing/index.asp>

You can sign up to receive the publications by email or post. Comments and questions are welcome. Please send correspondence to:

The Editor, Water Policy Briefing  
International Water Management Institute  
P.O. Box 2075, Colombo, Sri Lanka  
Telephone: 94 11 2787404 Fax: 94 11 2786854  
Email: [waterpolicybriefing@cgiar.org](mailto:waterpolicybriefing@cgiar.org)

## About IWMI

IWMI is a non-profit scientific organization funded by the Consultative Group on International Agricultural Research (CGIAR). IWMI's research agenda is organized around four priority themes covering key issues relating to land, water, livelihoods, health and environment:

- Theme 1: Basin Water Management: *understanding water productivity*
- Theme 2: Land, Water and Livelihoods: *improving livelihoods for the rural poor*
- Theme 3: Agriculture, Water and Cities: *making an asset out of wastewater*
- Theme 4: Water Management and Environment: *balancing water for food and nature*

The Institute concentrates on water and related land management challenges faced by poor rural communities in Africa and Asia. The challenges are those that affect their nutrition, income and health, as well as the integrity of environmental services on which food and livelihood security depends. IWMI works through collaborative research with partners in the North and South, to develop tools and practices to help developing countries eradicate poverty and better manage their water and land resources. The immediate target groups of IWMI's research include the scientific community, policy makers, project implementers and individual farmers.

**For further information see [www.iwmi.org](http://www.iwmi.org)**



Writer: Shilp Verma; Editors: Deborah Bossio and Sharni Jayawardena;  
Design & Layout: Sumith Fernando