Pro-poor Interventions in Irrigated Agriculture

Issues, Options and Proposed Actions

India

India's economy has grown considerably since the early 1970s. Irrigation development strongly contributed to this, improving productivity and ensuring the country is self-sufficient in food. But, issues such as the inequitable distribution of land in several states and the poor management of irrigation systems all over urgently need to be addressed. As a new phase of reforms begins, future policy needs to target issues of land and water equity, as well as the needs of the poor.

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Pro-poor Interventions in Irrigated Agriculture in India:

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Introduction

Reducing poverty is a major development goal. But to achieve this, we need to answer some basic questions. What contribution does irrigated agriculture make to reducing poverty? How does the performance of irrigation systems impact upon poor men and women? Have recent irrigation reforms improved access to water and lifted the poor out of poverty? And, what practical actions will give the best return on investment in terms of alleviating poverty?

This briefing answers those questions in the context of India. It is one of a series produced by the project 'Pro-poor Intervention Strategies in Irrigated Agriculture in Asia', which took a holistic approach to understanding poverty, in order to identify practical, pro-poor interventions. In-depth, multidisciplinary studies were carried out in each of six Asian countries, and primary data was collected from 5,408 households in 26 irrigation systems using a standard set of methods, to provide new insights that are valuable contributions to the fight against poverty.

Overview:
Context and Country-specific Issues

Agriculture in India as a whole has progressed remarkably over the last three decades. Before the 1970s—in the period following Independence in 1947—agriculture was hit hard by droughts and floods and the country suffered mass famines. Yet today the country is not only self-sufficient in food—it has a store of nearly 44 million tonnes of food grain.

During the 1990s, agriculture, forestry and fishing together grew by 3.9% per year, on average. In fact, the general economy improved. As a natural result of development, the contribution agriculture made to the country's GDP fell from 55% in 1950 to 26% in 1999. Despite this, however, around 60% of India's rural population is still employed in agriculture.

Rural poverty rates vary among states. The latest official statistics show falling rates of poverty in some states, such as Andhra Pradesh. Generally, poverty incidence is low (less than 15%) in states such as Punjab and Haryana, which have a high proportion (more than 80%) of their area under irrigation.

These improvements resulted from investments made in canal irrigation, and impotantly, from development of groundwater irrigation. So, now India irrigates around 59 million hectares—a vast area, which accounts for over 30% of the total area irrigated in Asia.

Specifically, irrigation investment increased both agricultural production and the adoption of modern farm technologies—which led to lower food prices in real terms. Income generation also increased, as irrigated farming is more labor-intensive than rainfed farming and so provides new employment opportunities. So, even though no special pro-poor programs or policies were implemented in irrigated agriculture, poverty in irrigated areas is generally lower than in rainfed areas.

But despite these achievements, the tail ends of many state-managed irrigation systems still suffer low productivity and high poverty rates because of low, inequitable, and unreliable water supplies. The root cause of the problem is poor system performance, as operation and maintenance (O&M) and water allocation both leave much to be desired.

As a result, the benefits of irrigation development are often distributed in a very unequal way. Irrigation Management Transfer (IMT) [also referred to as Participatory Irrigation Management (PIM) in India], was seen as the way forward, as it was felt that decentralizing management and devolving power to the users would ensure equable water distribution and improve cost recovery and O&M.

Building on lessons learned from pilot irrigation-management programs run in the 1970s and 1980s, IMT reforms were introduced in two states: Andhra Pradesh (AP; in 1997), and Madhya Pradesh (MP; in 1999).

Different tiers of management were created in the different-sized schemes. But in all schemes, Water User Associations (WUAs) are the basic management unit:

- Minor[1] schemes: WUAs only
- Medium schemes: WUAs and a Distributary Committee (DC)—a federation of WUAs from one or more distributaries
- Major schemes: WUAs, DCs, and a Project Committee (PC)—a federation of DCs.

New laws ensured that these farmer organizations (FOs) were given water rights, guidelines for scheme operation and administration. They were also made legally responsible for the preparation of O&M plans, conflict resolution and system maintenance. Irrigation Department (ID) officials were made accountable to FOs, whose decisions they had to implement. Funds were either supposed to be raised by the FOs themselves, or provided by the government as a percentage of water fees collected from users.

Various payments were made by state governments to the WUAs, to cover set-up and administration costs. As a result, MP now has 1,470 WUAs and AP 10,292 WUAs and 174 DCs. In AP, large-scale training programs have also begun for farmers and ID staff.

These state-wide initiatives are in line with the 1987 National Water Policy. Revised in 2002, this has key pro-equity and pro-poor dimensions. But, IMT's effects on the efficiency and equity of water use are not yet clear—especially with regard to poverty. In fact, the links between irrigation performance, management reform and poverty alleviation have hardly been assessed. To fill this gap, IWMI and the national partners critically reviewed the performance of four different transferred irrigation systems in AP and MP (see Box and Figure 1), and interviewed 1,097 households in 2001-2002.

Figure 1. Map of India showing locations of Andhra Pradesh and Madhya Pradesh

[1]'Minor' projects: cultivable command area less than 2,000 hectares; 'major' projects: more than 10,000 hectares; 'medium' projects: 2,000-10,000 hectares.

Box 1. Characteristics of irrigation systems studied.

	NSLC[1]	KDS[2]	Halali	Harsi
State	AP	AP	MP	MP
Construction date	1955	1852	1973	1925
Size (hectares)	246,000	508,000	23,500	41,500
Annual rainfall (mm)	750	900	1,050	850
Climatic zone	Semi-arid	Sub-humid	Sub-humid	Sub-humid
Main crops grown	Rice, groundnut	Rice, pulses, vegetables	Wheat, soybean, pulses	Wheat, rice, gram
Source of water	Mainly surface water	Mainly surface water	Surface water	Surface and ground water
Water availability	Water-short	Adequate	Water-short	Water-short
Average farm size (hectares)	3.03	1.31	2.9	2.1
Poverty line (per capita per month[3])	Rs 263	Rs 263	Rs 311	Rs 311
Poverty line (per capita per day[4])	US$1.11	US$1.11	US$1.31	US$1.31
Percentage of people in poverty	33	16	73	62

[1]Nagarjuna Sagar Left Canal (upper reaches of Krishna river)
[2]Krishna Delta System (lower reaches of Krishna river)
[3]1 US$ = 49.11 rupees
[4]In purchasing power parity terms

Key Study Findings and Outcomes

Agriculture, Irrigation and Poverty

A high percentage of households were landless in the study areas. But, the percentage was greater in the AP systems (51% in NSLC, and 60% in KDS) than in the MP systems (12% in Harsi, and 27% in Halali).

Land was also found to be very inequitably distributed (Figure 2). The Gini coefficient for landholdings (where a value of 0 indicates that all households have equal areas of land, and 1 indicates that one household owns all the land) was therefore high (0.53 on average). In fact, Gini coefficients for each system ranged from 0.25 in NSLC (greatest equity) to 0.58 in Halali (greatest inequity).

Households with small landholdings were much more likely to be poor (living below the poverty line, see Box1) than those with large landholdings. Indeed, the landholdings of the poor were around half the size of those of non-poor households—except for Halali, where they were only one-fifth the size.

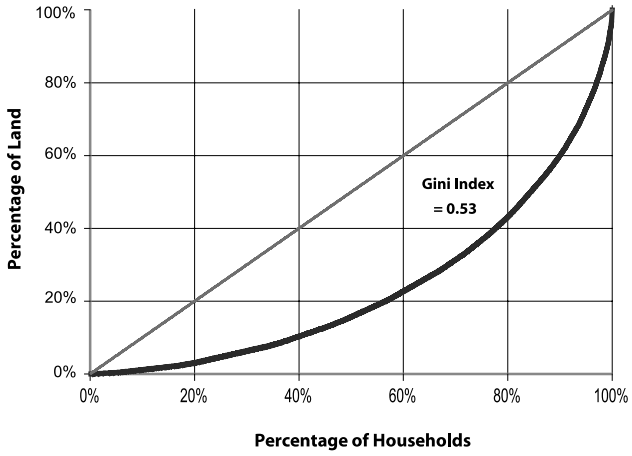

Figure 2. Distribution of land in the study areas (curve), compared with a completely equitable distribution (straight line).

Per hectare, the net values of crops produced varied widely—from around US$108 in both Harsi and Halali, to US$485 in NSLC and US$690 in KDS. Researchers also compared the net values of crops produced in irrigated

plots with those produced in rainfed plots without groundwater irrigation (to calculate the net benefits of irrigation). Productivity was always higher in the irrigated plots, with irrigation benefits ranging from US$35 per hectare in Halali to US$194 in KDS (Figure 3), as a result of variations in access to water, production inputs, and cropping patterns.

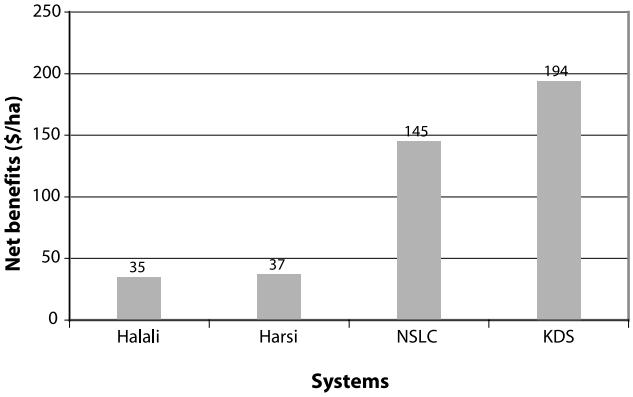

Figure 3. Net benefits of irrigated farming over rainfed farming, in terms of net crop values (US$/hectare). Benefits in Halali and Harsi are much lower because water supplies during the dry season are extremely limited.

In reaches where water is abundant, all farmers—irrespective of farm size—grow crops which use a lot of water, such as rice. But, in tail ends, poor farmers tend to grow local varieties rather than high-yielding varieties (HYVs), because they often don't receive enough water to grow HYVs and can't afford the inputs necessary. Consequently, the poor earn less per hectare from their crops.

Poverty levels are higher in the systems in MP (the poorer state) than in AP. Levels also differed between the systems within the states. So, in AP poverty is markedly lower in KDS (16%) than in NSLC (33%). In MP, poverty rates are lower in Harsi (62%) than in Halali (73%). This is probably because KDS and Harsi were established before NSLC and Halali, which means that households in those systems have had access to irrigation water for longer.

Clearly, access to irrigation can reduce poverty. In each system studied, the poverty rate was always higher in the rainfed area than in the irrigated area. So, for example, poverty rates in rainfed villages outside NSLC were almost double those within it (Figure 4). But in rainfed areas surrounding the other systems studied, non-farm income, larger landholdings and groundwater use all reduced poverty levels to some extent.

Low productivity most influenced whether or not a household was poor. Indeed, in KDS the productivity levels of non-poor households were three times higher than those of poor households. But, various other factors also had an influence. So, poverty levels were lower among households with smaller families, larger landholdings, and more diverse sources of income, as well as among those located in the middle reaches of the systems.

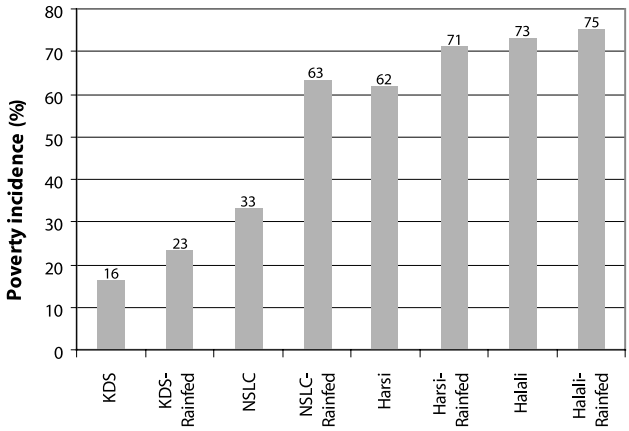

Figure 4. Percentage of people in irrigated and rainfed areas living below the poverty line (Rs[2]263/month in KDS and NSLC, Rs 311/month in Harsi and Halali).

[2] 1 US$ = 49.11 rupees.

Poverty is also related to water availability—which reflects an irrigation system's performance. So, the overall poverty rate in the water-short NSLC system was higher than in KDS, where water supplies are adequate. It was also noted that, within systems, the poor generally receive less irrigation water in the dry season than the non-poor (Figure 5)—the only exception being KDS.

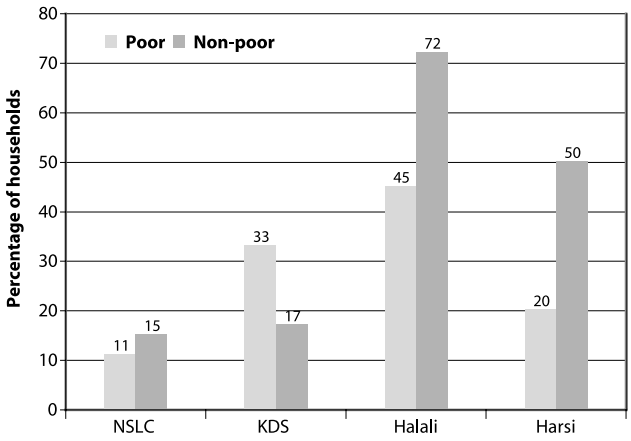

Figure 5. Percentage of poor and non-poor households receiving canal water in the dry season.

In Halali, for example, only 45% of poor households received irrigation water in the dry season, as opposed to 72% of non-poor households. In Harsi, 20% of the poor, and 50% of the non-poor received water during the dry season. There were also differences during the wet season, with 35% of the poor and 60% of the non-poor receiving water. Except in KDS, a significantly lower percentage of poor farm households have access to canal water.

Overall, because the tail-ends of systems lack water, poverty rates are higher there than in the middle reaches (where productivity is high). Importantly, contrary to common perception, poverty rates are not necessarily lower in the head reaches, even though they are nearer to the water source (Figure 6).

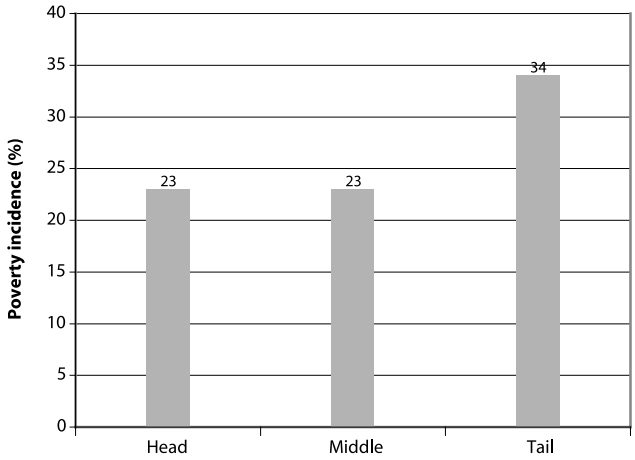

Figure 6. Percentage of people living in poverty in the head, middle and tail reaches of irrigation systems. Poverty incidence is 11 percentage points higher in water-short tail reaches than in other reaches.

Irrigation Charges and Costs

India's irrigation charges are not linked to the amount or quality of the water supplied. So, there is no incentive to use water efficiently. Charges are also not linked to farm income, productivity, or O&M costs. All fees collected go directly into general government funds. In most cases, a budget is then simply allocated to each system. But, since February 2001, the AP government has given 50% of the water fee collected directly to the farmer organizations.

In the Harsi, Halali, and NSLC systems collection rates are low (21%, 33%, and 45%, respectively). This is partly because farmers are charged a flat-rate fee, irrespective of the amount of water they receive. Unsurprisingly, farmers who receive little water are reluctant to pay. In KDS, however, the collection rate ranges from 30% to 82%, probably because farmers there are feeling the benefits of O&M work conducted by the WUAs, which has greatly improved access to water and a strong establishment of customs over a long period.

In fact, the systems are far from financially self-sufficient. Annual spending on O&M in Halali and Harsi is Rs 29 and Rs 31 million, respectively, most of which is spent on salaries and overheads. Even a 100% fee-collection rate would only cover 25% of total O&M costs—even if only Rs 50/hectare (US$1/hectare) were spent on canal maintenance, as is currently the case. Yet, engineers estimate that at least ten times that (Rs 500/hectare) should be spent on canal O&M per year. In AP, therefore, the decision was recently made to raise charges from Rs 100-150/ha to Rs 500/ha (US$10/hectare).

Although WUAs are supposed to collect water charges, this is not yet the case in either state. In AP, the ID and WUAs have begun to jointly assess water charges—but, WUAs are not willing to accept full responsibility for assessment, collection and enforcement because socially sensitive issues are involved.

Impacts of Irrigation Reforms

PIM reforms had been in place for 5 years in AP, and around 3 years in MP at the time of the study. Assessments of the early impacts of PIM show that the reform's outcomes are mixed. Irrigation system performance has improved in both states. So, larger areas of the lower reaches now receive irrigation water, which also now reaches them more quickly. These benefits were greater in AP, where WUAs undertook a lot of canal maintenance and repair work. In KDS, for example, tail-end farmers used to wait 2-3 months for water to reach them while farmers in the upper reaches used the available supplies for their rice crops. Now, the wait has been cut to 1-1.5 months—a pro-poor benefit of reform.

In AP, the reforms have also increased the productivity of major crops such as rice, maize and sugarcane (by 20%, 18% and 11%, respectively). This was largely due to better drainage, more water for early sowing, and more reliable water supplies. This has particularly benefited small farmers, who mainly rely on canal water as the cheapest option.

In both states, the overall quality and cost-effectiveness of O&M work have improved, partly because now farmers participate in O&M. What's more, post-IMT O&M has generally benefited small landholders more than large farmers, by creating more

opportunities for agricultural wage earning. Plus, in all systems, it was found in focus group discussions that the number of disputes related to water distribution has fallen by at least 15%. This is helped by the fact that many of the small farmers interviewed now feel that they have forum in which to address any inequities they face.

Problems were identified, however. WUAs have been focusing on maintenance, rather than on improving water-use efficiency and productivity, creating allocation plans, and ensuring equitable supplies of water, for example. In fact, public-sector bureaucracies still control water allocation.

Almost none of the WUAs have been able to generate additional funds from the water users (as planned). The only exceptions are in KDS, where tail-end WUAs (and some DCs) have collected money to supplement the funds allocated to them by the government to clear drains. Importantly, although empowered to do so, no WUA has fined members for defaulting on their water-fee payments.

Also, gaps are obvious in planning and implementation, as Project Committees have not yet been formed in major irrigation schemes in either state. Gender equity is also an issue, as in both states poor farmers and women are very poorly represented on WUA management committees. And, the landless (who often rely on irrigated agriculture for wage labor) are not represented at all. In fact, higher castes tend to dominate these management committees, with some WUA and DC presidents operating more like contractors and colluding with irrigation officials for personal gain.

This is not simply a problem of the powerful grabbing the key roles. In MP, farmers have deliberately elected powerful farmers from tail-end reaches as WUA presidents—to ensure that water reaches them. In fact, in both states, farmers often strategically elect influential people as presidents—because they want strong presidents who can negotiate with the ID and outsiders. It's also believed that such people generally have the capacity to spend money on organizing meetings, receiving outsiders, and traveling—to represent farmers' concerns to the authorities.

Recommendations and Interventions

Improve Head–tail Equity in Water Distribution

The tail reaches of irrigation systems suffer low productivity and high poverty rates. This is partly because farmers in the upper reaches use more than their allocation of water, to illegally irrigate land not originally included in the system. Inadequate planning and design have contributed to this problem—because of pressure to meet targets and include large areas within the project. What's more, poorly maintained canals cannot deliver enough water to the tail ends. Excess water withdrawals by head-end farmers therefore urgently need to be addressed, and canal maintenance and design improved.

Encourage Crop Diversification

Farmers prefer to grow rice, which consumes a lot of water. This, and a lack of water regulations, means that head-end farmers use more water than they should—leaving less for the water-scarce reaches lower in the system and contributing to the low yields obtained there. Encouraging farmers to diversify and grow less rice could address this. But, this requires sustained efforts at all levels of management and policy.

Improve Institutional Arrangements

Water is distributed most equitably in the older irrigation systems studied (KDS and Harsi). Plus, wages there are higher, as are the outputs per hectare obtained by tail-end farmers. Consequently, poverty levels are lower. Caste issues are also not so strongly apparent. These benefits result from the fact that the institutions in these systems are better developed and function more efficiently. They have also quickly adapted to reform, embracing farmer management and

WUA formation, for example. Efforts should therefore be made to develop the management institutions in place in India's other irrigation systems—to benefit users directly and speed the reform process.

Improve Rate-setting and Fee-collection Mechanisms

Despite reforms intended to increase farmers' involvement in irrigation systems, water charges are still fixed and collected by the government. Even in AP, where provision has been made to revise water rates periodically, procedures have not been clearly defined. Equitable rate setting could have significant pro-poor benefits. Clearly defining procedures would help address this.

Fee-collection mechanisms also need to be improved, as collection rates are very poor. The fact that funds, when collected, are being misappropriated also urgently requires action. To encourage users to pay, the service delivered needs to be improved and the charges applied made more transparent. Key problems include a lack of clear-cut water-delivery schedules, the fact that the volumes of water used are not measured, and the fact that water allocation plans are not drawn up before each agricultural season.

Build the Management Capacity of System Officials

Irrigation officials and farmers need to be trained, to help them address and implement the various aspects of irrigation-sector reforms. These groups also need to be taught to work together efficiently. However, mechanisms for this are lacking. Appropriate policy support should therefore be provided, to help build capacity and improve the operation of institutions, and ensure devolution of powers from irrigation departments to WUAs, DCs and establishing effective project committees.

Combat Land Degradation

Land degradation is an increasing problem in irrigated areas, as salt levels are increasing and waterlogging is becoming more common. Signs of waterlogging, for example, are now apparent in the head ends of both KDS and Harsi. This issue needs to be addressed, both by revising policy and by direct action by WUAs.

Increase the Number of Women Managers in WUAs

Steps need to be taken to increase women's participation in WUA management. A few women have made a substantial contribution to the functioning of WUAs in MP and AP. But, most simply act as proxies for their husbands, or are 'present' only to secure aid from the government.

Implement Legal Reforms to Protect Vulnerable Groups

IMT's institutional changes have had positive impacts. However, many of the issues facing the poor and the landless are not dealt with by India's PIM Acts. Legal provision needs to be made, especially with regard to water rights, to protect these vulnerable groups and allow them to benefit from reform.

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Full references for the information presented in this briefing can be found in the above reports.

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