RESEARCH REPORT

61

Poverty Dimensions of Irrigation Management Transfer in Large-Scale Canal Irrigation in Andra Pradesh and Gujarat, India

Barbara van Koppen, R. Parthasarathy and Constantina Safiliou

International Water Management Institute

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Summary

The need for a pro-poor mode of irrigation management transfer (IMT) has arisen due to the observed tendency of IMT to aggravate rural poverty. This research, centered on large scale canal irrigation schemes in India, seeks to: a) examine ways to measure relative income poverty within large-scale irrigation schemes, b) examine the validity of the common assumption that both poor and non-poor farmers of the same irrigation scheme have equal access to canal water, and c) assess the differential impacts of IMT programs on poor and non-poor farmers in Andra Pradesh and Gujarat, India. Two different IMT programs—the state-wide program under the Andra Pradesh Farmers' Management of Irrigation Systems Act of 1999 (APFMIS) and the pilot program under the Participatory Irrigation Management Resolution in Gujarat of 1995 (PIM)—were selected for this study. Seven hundred land owning and tenant farmers from 7 water users' associations (WUAs) constituted the sample of "small farmers" and "larger farmers" with operational holdings of less than one hectare and one hectare or more, respectively.

Relative farm size was found to be a valid indicator of relative income, as many features characteristic of the farm size exert a determining influence on income. Moreover, the ready availability of data on farm size makes it a practical indicator. In Andra Pradesh a higher proportion of small farmers depend on canal water but the concentration of their plots, mainly in the tail ends, poses a disadvantage regarding canal water accessibility. In contrast, no differences in water accessibility exist between small farmers and larger farmers in Gujarat. Therefore, IMT that improves access to canal water is pro-poor per se in Andra Pradesh and equally beneficial to both small and larger farmers in Gujarat.

Farmer participation in WUA activities is rather low in both states and most small farmers are unaware of WUAs. While small farmers often participate in repair and rehabilitation work, the larger farmers involve themselves in meetings, committees, etc. Such inequity in participation undermines the equitable distribution of benefits from IMT and also the viability of WUAs that depend heavily on the labor contribution of small farmers. It is recommended that a one-farm one-vote right, irrespective of farm size, stipulated by APFMIS, be concretized through awareness raising.

The impacts observed are from 5 years of program implementation in Gujarat and 2 years in Andra Pradesh. The findings of this research underscore the necessity for monitoring farm-size related differences as a prerequisite for ensuring pro-poor IMT.

Poverty Dimensions of Irrigation Management Transfer in Large-Scale Canal Irrigation in Andra Pradesh and Gujarat, India

Barbara van Koppen, R. Parthasarathy and Constantina Safiliou

Justification and Research Design

Justification

Poverty alleviation has always been an important aim of the governments of developing countries when investing in the construction and operation of large-scale canal irrigation infrastructure. Among the expected impacts are benefits for poor net food producers from more intensive cropping of higher-yielding varieties during a longer period of the year, including the lean period. Urban and rural poor net food buyers benefit from higher agricultural output and lower food prices. New wage employment in irrigated agriculture, construction work and the increase of local demand for goods and services as spin-off of irrigation development would further benefit the rural poor.

These plausible, and partly verified, positive impacts of irrigation on the income-poor are realized when new schemes start functioning and effecting a shift from rain-fed agriculture to irrigated agriculture, one crop per year to more crops, a low-value crop to a high-value crop, etc. Therefore, targeted measures to ensure that especially poor people are reached and gain from irrigation investments are also on the agenda at the earliest stages of scheme development. Targeting the poor by selecting their lands for improvement or land redistribution in the new command area and allocating new land primarily to the poor, are two possible measures and they are essentially arranged before construction (Chambers 1984; Jazairy et al. 1992). Prevention of poor people's loss of land and water rights without proper compensation is equally negotiated at the very beginning. Another regulation that determines poor people's relative benefits, and is typically decided upon in the early phases, is the allocation of water rights. Allocation of such rights in proportion to land size rather than, for example, on the basis of an equal quantity of water to every farm household, reproduces the inequities of land distribution in the distribution of water and water-created wealth. Allocation proportional to land size is widespread in countries like India, which is the focus of the present research.[1]

[1]In India, the proportionality of water rights to land size (and crops) is strong in formal and local law, like *warabandi* (a system of rotational turns through which each shareholder in a watercourse obtains his or her water supply). This reproduces the skewed distribution of land in water use and the distribution of wealth created with water. This proportionality is rarely questioned except for a few often-cited micro-scale experiments in which the rightful quantity of water was disconnected from land size, for example in the Pani Panchayats in Pune (Chambers 1994), and sometimes even from landownership, as in Sukhomajri (Sarin 1996). In the present research, the quantity of water was disconnected from land size in Gujarat WUA1 during a short period of severe water scarcity, with support from an NGO.

If the early phases of scheme development are most critical to realize poverty alleviation impacts, the question is, whether there are irrigation policy-related poverty issues in the use phase. Irrigation agencies concerned with poverty may, during the use phase, simply concentrate on ensuring that the scheme functions well and realizes its potential, while water is allocated equitably. It is true that localized measures during the use phase, such as rehabilitation or drainage and salinization management, may still be targeted at sites in the scheme where a high proportion of poor people depend upon irrigation. However, in general, the working hypothesis that once a scheme functions, the scheme operation and maintenance equally affects poor and non-poor farmers and that inequities related to farm size (and hence poverty) are a given which irrigation agencies cannot change anymore seems justified. An incidentally verified common assumption that the poor are concentrated in the tail ends as a consequence of poverty cannot easily be changed either. It only underlines the urgency to address the general, scheme-level head-tail inequities in water use in order to reduce water scarcity which, in turn, tends to become an additional cause of poverty in the tail ends. Even if sociopolitical and economic power relations among farmers are found to play a role in irrigation management at all levels (Mollinga 1998) including negotiations for water at farm level (Jairath 1999a; Raju 2000), they seem less relevant than general scheme problems, unless social inequities are huge, as in feudal societies. The lack of tools to monitor poverty dimensions in large-scale canal irrigation schemes during the use phase undoubtedly perpetuates the silence on poverty—once schemes have started functioning.

The working hypothesis that the interests of the poor sufficiently overlap the general scheme interests may have been valid in the past. However, this could drastically change under irrigation reform and IMT. Since the mid-1980s, hand-over of managerial and financial responsibilities of the public schemes to newly established water users associations (WUAs) in return for stronger rights for farmers over water, and in some cases also ownership of infrastructure, has been intensified worldwide (Vermillion, 1997). Evaluations of the early experiences of IMT increasingly indicate that the current mode of IMT only works in respect of non-poor, market-oriented, large-scale and business-like agriculture (Shah et al. 2002). This is the case in countries like the USA and New Zealand or on large farms in South Africa, Mexico and Turkey. In schemes in the middle- and low-income countries with a heterogeneous composition of farmers in the command areas, IMT succeeds only where farmers with the largest holdings become the "champions," for example, in Colombia (Ramirez and Vargas 1999) or Sudan (Narayanamurthy et al. 1997). For poorer farmers in Sudan, and indeed in many smallholder irrigation schemes, especially in sub-Saharan Africa, withdrawal of state support led to partial or full collapse of the scheme, with negative consequences on both productivity and poverty. That pattern was similar in Kenya (Kabutha and Mutero 2001), Zimbabwe (Manzungu et al. 1999) and South Africa (Shah et al. 2002). Many current modes of IMT aggravate rural poverty and jeopardize original government goals of irrigation investments.

Governments continue IMT in pursuit of the originally expected goals of removing the inefficiencies of costly state bureaucracies (or just saving state funds) and intentions of better tapping local farmer knowledge, entrepreneurial skills and their keen motivation to ensure adequate water services. This is also the policy and practice of the government of India (Brewer et al. 1999; Hooja and Joshi 2000). Hence, the question is how future irrigation management transfer can be done in a "pro-poor" mode resulting in benefits to poor farmers, while benefiting non-poor farmers equally or

perhaps to a lesser degree. The present research addresses this issue.

Research Questions

First, the research aims to contribute to the development of a poverty indicator appropriate not only for use in the present research but also for use by the government staff, WUAs and researchers for routine monitoring of poverty dimensions in large-scale canal irrigation schemes under IMT. An indicator should facilitate the comparison of differential impacts on poor and non-poor farmers within a particular scheme at a certain moment and identification of trends overtime. Existing data and registers should be used optimally. Farm size fits these criteria best. This research further examines the relationship between farm size and other intra-scheme variables that affect farm incomes and income-poverty in order to validate and improve an indicator based on farm size. These are the location of plots at head or tail ends, crop choice, cropping intensity and the role of other income sources in farm households.

Second, the research empirically tests the above-mentioned hypothesis that irrigation affairs in functioning large-scale canal irrigation schemes, in particular access to water, affect poor and non-poor farmers in the same scheme alike, given land distribution, plot locations in head or tail, and water allocation proportional to farm size. Both canal water and water from other irrigation sources, such as wells and mechanized pumps, are considered. Where systematic differences between poor and non-poor farmers in their access to water are found to exist, plausible implications for IMT are traced.

Last, as the core of the research, differential impacts of irrigation management transfer programs in Andra Pradesh and Gujarat on poor and non-poor farmers are examined. Impacts of IMT with regard to access to water, crop choice, newly irrigated area production and incomes are analyzed and equities and inequities of participation in the new WUAs are assessed.

Methodology

The research questions are addressed for schemes under two different IMT programs, the Andra Pradesh Farmers Management of Irrigation Systems Act of 1997 (APFMIS) and the Government of Gujarat Resolution on Participatory Irrigation Management 1995(PIM). Worldwide, the innovative "big-bang" approach of APFMIS is seen as the most effective mode of IMT. The approach taken in Gujarat represents the more conventional, step-by-step pilot method, which has also been applied elsewhere in India and other countries (Parthasarathy 2000; Brewer et al. 1999). Both programs are still young , only 2 years in Andra Pradesh and 5 years in Gujarat. Hence, effects have not crystallized as yet, especially in Andra Pradesh and the findings at this stage serve rather as a baseline for continued impact monitoring. More importantly, the assessment of early impacts informs policy makers on time about poverty impacts so that recommendations to render the mode of IMT more 'pro-poor', if needed, can still be implemented.

Seven newly established WUAs were selected from the main agro-ecological regions in Andra Pradesh and Gujarat. The three WUAs in Andra Pradesh (Andra Pradesh WUA1, Andra Pradesh WUA2 and Andra Pradesh WUA3) are from the Telangana, Coastal and Rayalseema regions respectively, and were chosen randomly from the largest schemes in these regions. In Gujarat, two WUAs were selected randomly from the pilot PIM schemes in the dry north Gujarat region (Gujarat WUA1 and Gujarat WUA2) and two from the central south region (Gujarat WUA3 and Gujarat WUA4). NGOs are the implementing agencies of the two Northern

WUAs while the governmental irrigation department (ID) supports the southern WUAs. The main characteristics of these WUAs are listed in the annex.

The total sample consists of 700 farm households operating holdings in the command area of these WUAs during the year 1998–1999. Further, in each WUA, committee members totaling 67 were interviewed. The selection of the 700 farm households was stratified and included landowners of four size classes of operational holdings: less than 0.5 ha, from 0.5–1 ha, from 1–2.5 ha and above 2.5 ha. A fifth category consisted of owner-cum-tenants or tenants who cultivated leased-in land in the command area and whose operational landholding did not exceed one ha.[2] Female-headed households were purposively included in the study.[3] This sample allows identifying farm-size-related patterns. As relevant, the findings are either presented for all farm classes or for two main classes: the smallest three classes of owners and tenants operating less than 1 ha each are regrouped as "small farmers" (totaling 490) and the two categories with operational holdings above 1 ha are regrouped into the category of "larger farmers" (totaling 210).

Farm-size-related differences in access to irrigation water were measured, first, by assessing access to canal water and other sources of irrigation by farm size. Second, the number of waterings received from canals or other irrigation sources for main crops in a scheme were compared. In Andra Pradesh, access to water was assessed for the *kharif* (summer season) 1998–1999. In this state, the irrigated area is generally the largest during this season. In one WUA in the sample, there is no irrigation at all in *rabi* (winter season). The major crops found in the study of WUAs were paddy and maize as predominant food crops and cotton, chili and groundnut as cash crops. In Gujarat, rabi (winter season) is the most important season for irrigation; so the rabi of 1998–1999 was analyzed. The major crops are wheat and the cash crops, mustard and tobacco. Access to water was studied for the 910 plots in both states with these eight main crops. For the assessment of effects of IMT on access to water, other aspects such as the quantities of water, timeliness and reliability of water services as well as perceived changes in productivity and incomes, for any of the plots, were also included.

Poverty and Farm Size

The relationship between income poverty and lack of land is well established and continues to lead to poverty-focused land reforms (Sobhan 1993; Dev et al. 1994; World Bank 2000). Hence, in an agriculture-based rural economy, farm size is a valid proxy for income. It is also a proxy for which data are available in many rrigation schemes in India where land registers already exist. Farm size is especially a valid proxy for relative income and income poverty within localized irrigation schemes where relative farm size is a proxy for relative incomes and relative poverty. Farmers in the same scheme are more or less equally affected

[2]These farm sizes fall within the relatively small farm sizes, for example, in Andra Pradesh where 97% of all irrigated farms are below 5 ha (FAO-INPIM 2000).

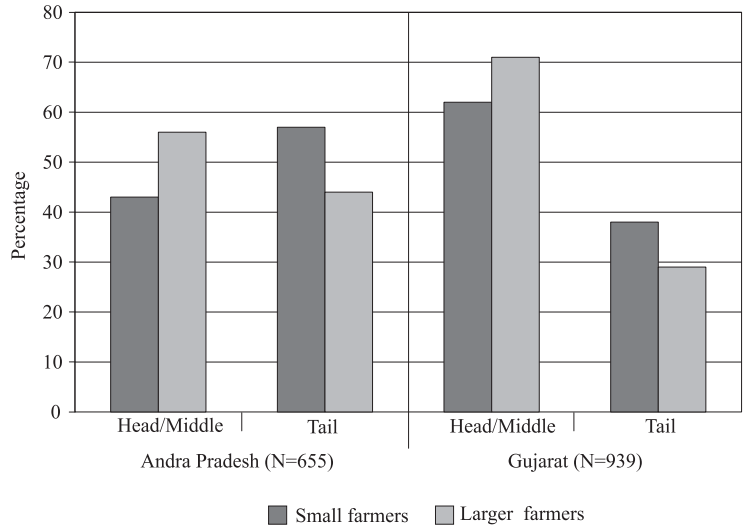
[3]Results of the analysis of the gender aspects are reported elsewhere (van Koppen et al. 2000).

by other important variables that determine incomes, such as access to markets, off-farm employment opportunities, climate, etc. So, farm size is the most appropriate and the only currently available indicator for routine monitoring of poverty dimensions in irrigation schemes. The question is whether and, if possible, how the indicator can be further improved. Therefore, we examined important factors that influence the relationship between farm size and income that may vary highly within WUAs, such as location of the plot in the head or tail and related land value, cropping intensity, value of crops grown, and last but not least, other household income sources than irrigated agriculture. The assessment of whether there is a positive, negative or neutral relationship between farm size and these variables led to the following conclusions.

Plot Location

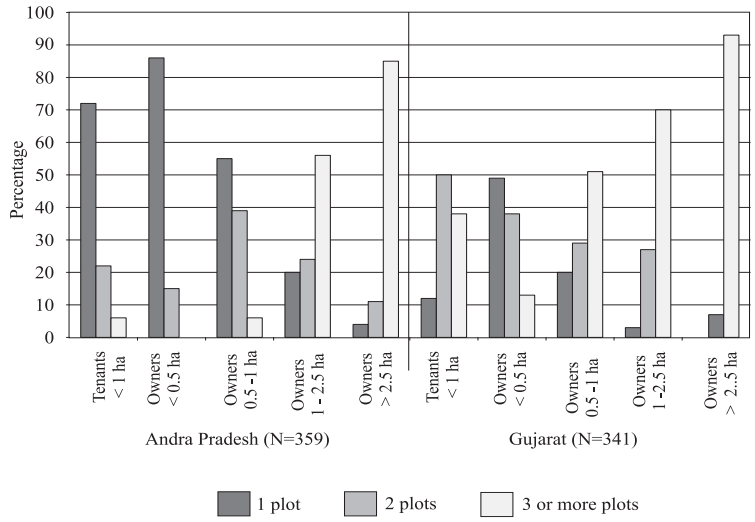
Plots of small and larger farmers are not scattered randomly throughout the command area. Larger farmers appear to be systematically more successful in occupying the head and middle reaches and in avoiding tail ends than small farmers. Tail ends are generally assumed to be more disadvantageous. Figure 1 shows that, out of all plots belonging to small farmers in Andra Pradesh, most (57%) are in the tail ends, while the corresponding value for larger farmers is 44 percent. A similar bias is observed in Gujarat where the plots of small and larger farmers in the tail end are 38 percent and 29 percent, respectively. This difference is even more relevant because small farmers more often depend only on one or two plots. As figure 2 indicates, in Andra Pradesh, the large majority of the smallest farmers, with holdings of less than 0.5 ha (86%) have only one plot each. In Gujarat, where plots are generally smaller, the risk of having only one plot in the tail end is less—half of even the smallest farmers with less than 0.5 ha, each have two plots or more. Thus, small farm size is related to location in the tail. This makes the relationship between farm size and income stronger and farm size more valid as a proxy. Head-tail inequities in

Figure 1.
Proportion of plots by location and farm size.



Notes: Significance χ^2
Andra Pradesh: Significant at 0.005 level.
Gujarat: Significant at 0.005 level.

FIGURE 2.
Proportion of households by number of plots and farm size and tenancy status.

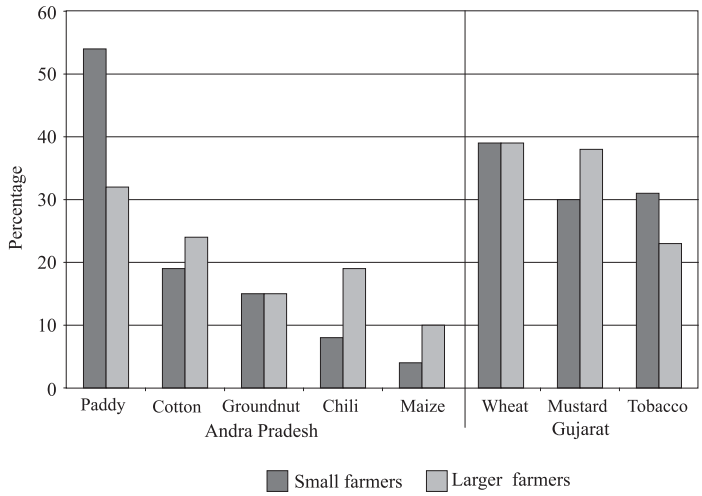


water delivery are not just a general scheme problem but they are a problem that affects poorer farmers more than larger farmers. As a consequence, in the WUAs of both states, IMT that leads to better provision of canal water to the tails would be "pro-poor" in itself as it disproportionately benefits small farmers.

Crop Choice[4]

Systematic farm-size related differences related to crop choice were found in Andra Pradesh. As figure 3 shows, a significantly higher proportion of plots operated by small farmers (54%) are cultivated with the low-value paddy crop, used

FIGURE 3.
Proportion of plots by major crop and farm size.



Notes: Significance χ^2
Andra Pradesh: Paddy, among all crops: Significant at 0.005 level
Chili, among cash crops: Significant at 0.01 level.
Gujarat: Not significant.

[4]Differential yields per unit of land and cropping intensities are not further considered here. The latter is of limited importance, because in six WUAs the irrigated areas in the two irrigation seasons are comparable for both seasons. In one scheme there is only one kharif.

for family consumption and for the market, than the plots cultivated by larger farmers (32%). As for high-value cash crops, larger farmers cultivate chili more often than small farmers (19% versus 8%, respectively). In Gujarat, no systematic relationships were found between holding size and crop choice (wheat, mustard, tobacco). This means that farm size is even more strongly related to income in Andra Pradesh but not in Gujarat.

Other Income Sources

Figure 4 highlights that the irrigated plots are rarely the only income source, especially among the smallest farmers. Even though the majority of the farmers with holdings above 2.5 ha also have more income sources, this finding implies that caution is needed in equaling differences in farm size to differences in income. Additional information on the relative and absolute contribution of these other income sources to total income and income poverty would improve the indicator.

Insight into the source of other incomes clarifies whether additional income is from irrigated agriculture and hence indirectly related to IMT, or not. Figure 5 shows that agriculture and allied activities such as agricultural wage labor and livestock, are the primary income source for 91 percent of the sample households in Andra Pradesh. In Gujarat, the rural economy is less agriculture-based and off-farm employment has become an important primary income source. Among the households operating holdings of less than 0.5 ha, 46 percent find their major income outside agriculture, in regular (non-agricultural) wage labor and self-employment, and in trades such as diamond-cutting in areas like Visnagar, Surat.

The importance of agriculture in Andra Pradesh is also reflected in the finding that laborer is the main activity status of a significant proportion of all members of the poorest households in Andra Pradesh. Thus, 49 percent of all working women and 33 percent of the men in small tenants' households are reported to be active as casual agricultural wage laborers. Wage labor provides the primary source of household income in 33 per cent of all households and the secondary source of income of another

FIGURE 4.
Proportion of households with only one income source by farm size.

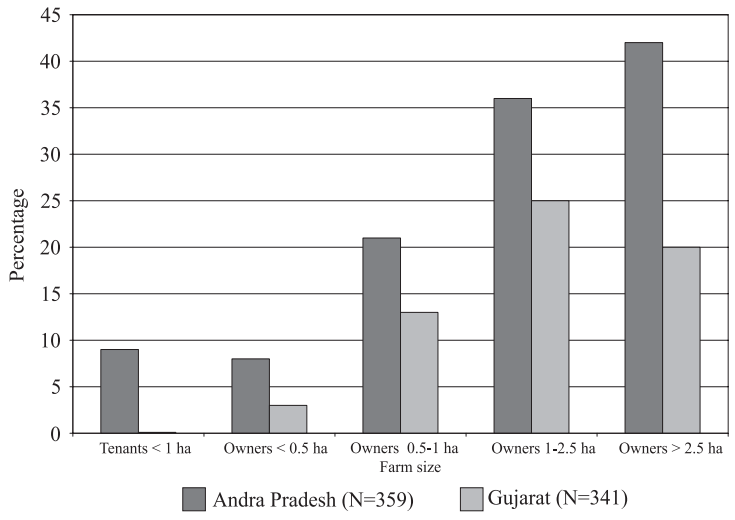
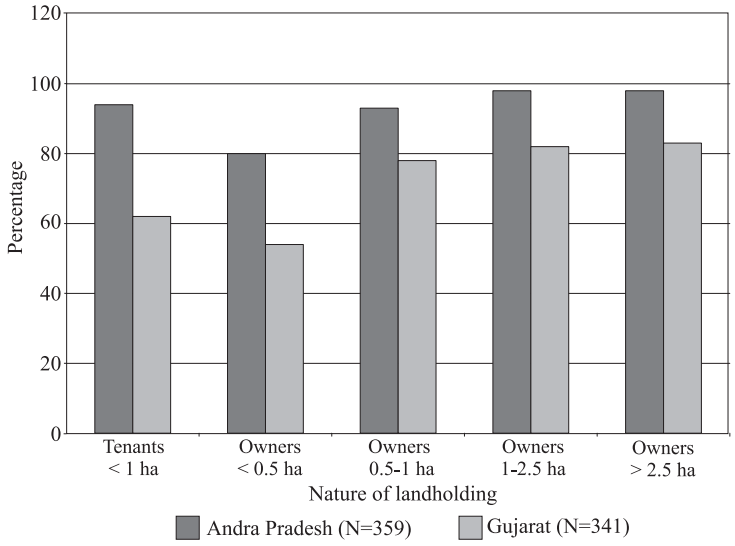


FIGURE 5.
Proportion of households with major income from agriculture.



24 percent of all households in Andra Pradesh. In contrast, in farms up to one hectare in Gujarat, less than 14 percent of all male household members and less than 6 percent of all women are agricultural wage laborers.

In Andra Pradesh, landlessness is widespread, which explains not only the high dependence on agricultural wage labor, but also high tenancy rates. In Andra Pradesh WUA3, for example, about 30 percent of the eligible members of the WUA are reportedly tenants.[5] In Gujarat, on the other hand, leasing in of land by poor people is rarely reported. On the contrary, the incidence of reverse tenancy is high, especially in the two WUAs where agriculture is least important as an income base for the small farmers. Farmers with very small smallholdings lease their lands to large landowners.

In Andra Pradesh literacy rates are low. The average percentage of literate persons in the sample households is 49 percent for men and 25 percent for women. In Gujarat, this is much higher—69 percent for men and 43 percent for women.

Conclusion

In both states, small farms are more often located in the tail ends compared to larger farms. In Andra Pradesh, small farm size is also related to the cultivation of low-value crops. These relationships reinforce the validity of farm size as a proxy for income poverty. However, farm size and income diversification are inversely related. Especially in very small holdings, there is more often more than just one income source. Thus, in interpreting the relationships between farm size and other variables that are presented below, one needs to realize that the smallest farms are not necessarily the most income-poor in Gujarat. More research is needed on the importance of other income sources, in respect of poverty (cattle, wage-employment, number of earning male/female household members, casual/ permanent employment, etc.).

Farm size is recommended for the routine monitoring of income poverty dimensions in large-scale canal irrigation schemes. The proxy

[5]In some coastal areas, more than 75% of the land is sharecropped (Raju 2000). The average percentage of tenants in irrigation in Andra Pradesh is 13 according to FAO-INPIM (2000).

would improve if it was specified for variables like location, crop choice, cropping intensity, and, as elaborated in the next sections, access to water and the WUA. However, the indicator would especially improve as a proxy for income poverty if additional information on other income sources were included.

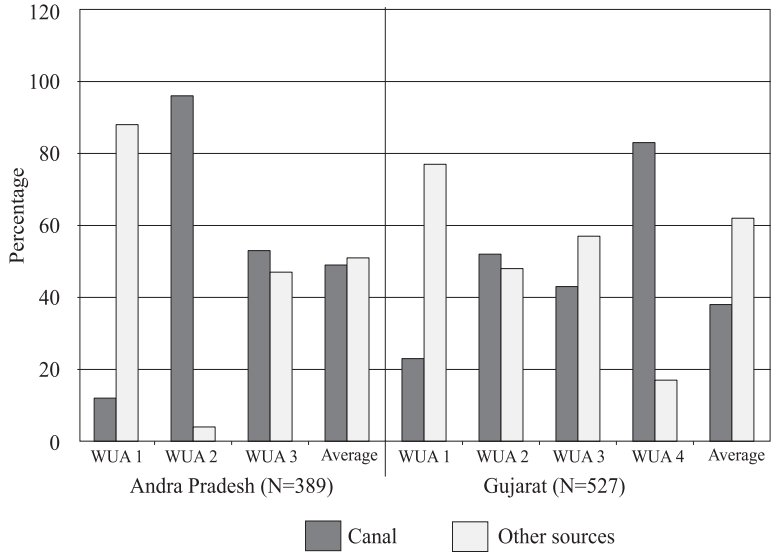
Access to Water

It is commonly assumed that important features of functioning canal irrigation schemes such as access to water in the command area are similar for poor and non-poor farmers, once water allocation proportional to farm size and skewed land distribution are accepted as a given. The findings above already indicate that in the sample WUAs there are systematic differences in variables that indirectly affect access to water, namely the concentration of small farms in the tail ends and, in Andra Pradesh, preference of small farmers for paddy, a water-consuming crop. Other systematic differences in access to water were found as well, at least in Andra Pradesh.

Alternative Irrigation Sources

Before looking into farm-size related differences in access to water, a general picture of the importance of conjunctive use of water from either canals or other sources is given. Of all the sample plots, 51 percent in Andra Pradesh and 62 percent in Gujarat are irrigated by alternative sources of water. However, the pattern strongly varies by WUA. Each state has one WUA that still largely depends on canal water only (figure 6). In Andra Pradesh, alternative sources are shallow large-diameter wells with mechanized pumps and tanks. In Gujarat, they are primarily shallow wells with

FIGURE 6.
Proportion of plots by WUA and source of irrigation.



pumps. Deep tubewells are used only in Gujarat WUA1, in the dry northern part of Gujarat, where as many as 66 percent of the plots surveyed are irrigated by tubewells or a combination of tubewells and canal water. Another 11 percent of plots in this WUA are irrigated by shallow wells alone or in combination with canals. In Gujarat WUA2, the other WUA in the dry north, water provision in 32 percent of the plots is done by both wells and canals (but very few tubewells). Remarkably, less than 7 percent of plots in all five other WUAs are irrigated by a combination of alternative sources and canals. Thus, most plots in the sample depend either on canal water or, more often, on alternative sources of water, but rarely on both.

The location of alternative irrigation sources in the command area varies. In Andra Pradesh, alternative sources are significantly more prevalent in the head and middle reaches, where 64 per cent of the plots depend upon alternative sources. In the tail ends, this is 36 percent. In Gujarat, the alternative sources are more towards the tail ends, where 69 percent of the plots depend upon alternative sources. In the upstream reaches this is less—59 percent of the plots.

For all crops, plots irrigated by alternative irrigation sources received a higher number of waterings than plots irrigated from canals. Therefore, alternative irrigation sources perform better (but tend to cost more). Expectedly, plots that depend only on canal irrigation face more problems in the tail. For seven out of the eight crops (except wheat in Gujarat) canal-irrigated plots in the tails received less waterings than those at the head. The picture is more mixed if one compares the number of waterings from alternative water sources either in the head, middle or tail. For five of the eight crops, tail enders get more waterings from alternative sources than head enders.

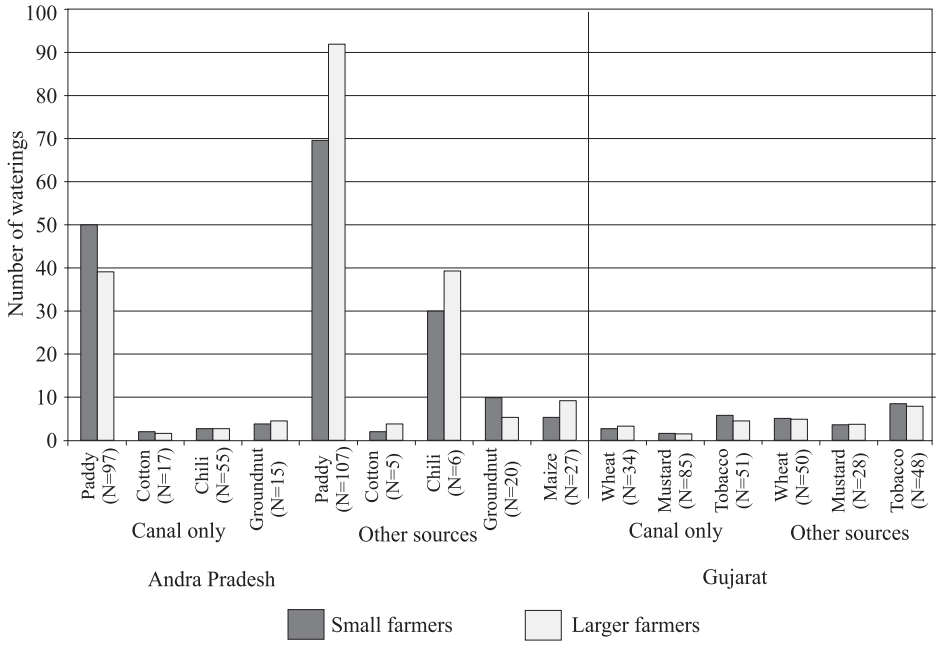
Differential Access to Water

The first aspect of possible systematic differences in access to water between small and larger farmers concerns their access to alternative irrigation sources. In Andra Pradesh a significant bias was found. In this state only 46 percent of the plots of small farmers were irrigated from alternative sources as against 56 percent of plots of larger farmers. In Gujarat, there was no such difference. Among the plots of small and larger farmers, 63 percent and 62 percent respectively were irrigated from alternative sources.[6]

The second aspect analyzed is the number of waterings received by small and larger farmers either from canals or from alternative sources. This highlighted important differences in Andra Pradesh, as shown in figure 7. Those small farmers with access to alternative sources received less waterings from them than larger farmers received for four of the five crops. Remarkably, not only a higher proportion of small farmers use canal water, but they also take more waterings than larger farmers especially for paddy, their preferred crop, and also for cotton. However, differences in the number of waterings for the other cash crops do not exist or point in the opposite direction. Thus, in Andra Pradesh canal irrigation, which is the cheapest water source, is in a sense, a "small farmers' affair." Again, in Gujarat, there are no systematic differences.

[6]No data are available on whether one has access to alternative sources as owner or as water buyer. Water buyers usually pay relatively high water prices. The poor are typically buyers of water, because they cannot afford to buy mechanized irrigation equipment and become water sellers (Shah 1993; Parthasarathy 1999).

FIGURE 7.
Number of waterings received per plot by crop, source of irrigation, and farm size.



Note: "N" indicates the total number of small and larger farmers.

Tenants

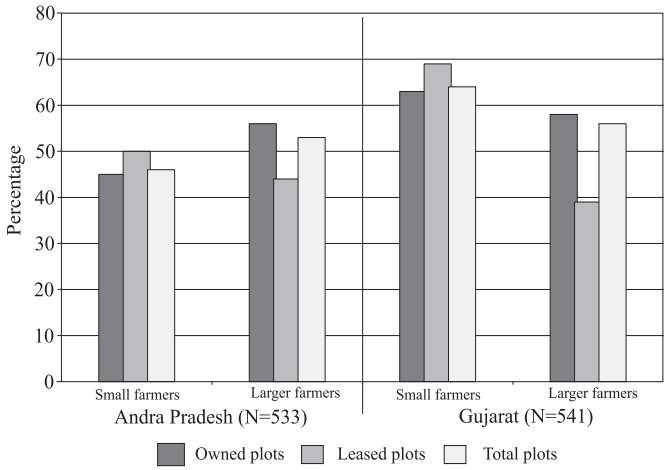
In order to answer the question of whether tenancy status of plots has an effect on access to water, the judgement of farmers on whether they received the number of waterings they had thought was required for their plots was examined—comparing leased-in plots and owned plots. As figure 8 shows, a higher proportion of respondents among small farms in both states are satisfied with water delivery for plots leased-in than for plots owned. This is the reverse for larger farmers. A lower proportion of larger farmers are satisfied for plots leased-in than for owned plots. This may indicate that small tenants are able to choose plots with a satisfactory water supply. Larger farmers, on the other hand, may have other reasons to choose plots, i.e., bordering on their own land.

Whether IMT will negatively affect the current satisfaction of small tenants needs to be monitored. In the Gujarati law, tenants who lack their own land in the command area have no legal status as members of the WUA. In Andra Pradesh the law recognizes them (see below). Here the issue is that tenants may decline to get registered as WUA members as this makes their legal claims under state tenancy laws so strong that owners may stop giving their lands on lease to them.

Conclusions

In Andra Pradesh, canal irrigation tends to be a "small farmers' affair" in several respects. A slightly higher proportion of small farmers than larger farmers take water from canals, and they take a greater number of waterings than larger farmers, especially for paddy, a preferred crop. The access of small farmers to the generally better-performing alternative

FIGURE 8.
Proportion of plots without difficulties in access to water, by tenancy status and farm size.



Notes: Significance χ^2
Andra Pradesh,owned plots: Significant at 0.05 level. Plots leased-in, total: Not significant.
Gujarat, plots leased-in: Significant at 0.025 level. Owned plots, total: Not significant.

irrigation sources is less frequent than that of larger farmers. Moreover, those small farmers who have access to alternative irrigation sources tend to get less waterings than the larger farmers for most crops. Moreover, small farmers in Andra Pradesh who are concentrated towards the tail ends, face the problem of a lower number of waterings than at the head reaches. Also, access to alternative sources of irrigation is less in the tail end, compared to that of the middle and head reaches. Small farmers probably rely on canal water because it is cheap. They usually lack the capital to invest in infrastructure or to purchase water, even though the net benefits would be higher.

The important implication for IMT is that small farmers would benefit more than larger farmers from improved canal irrigation performance. Their motivation to contribute to this improvement is probably stronger as well, which compounds their already strong stakes in agriculture as a primary source of income. In Andra Pradesh, therefore, any improvement in access to canal water in general would be "pro-poor" in itself and can count on the active support of small farmers. As a corollary, modes of IMT that negatively affect the provision of canal water would particularly hit the poor.

In Gujarat, access to alternative sources and the number of waterings received from alternative sources are generally equally spread among small and larger farmers. Only the irrigation costs from alternative sources may be higher for small farmers. Although small farmers are concentrated in the tail ends in Gujarat, they take equal advantages from alternative sources, which are widespread in the tails, even more than in the other reaches. Accordingly, for the Gujarati WUAs, the assumption that access to water in canal irrigation commands is farm-size neutral, appears valid.

Impact of IMT on Access to Water

Characteristics of IMT in the Two States

The two IMT programs selected for this study are the state-wide project under the Andra Pradesh Farmers Management of Irrigation Systems Act of 1997 (APFMIS) and the scheme under the Government of Gujarat Resolution on Participatory Irrigation Management 1995 (PIM) (Parthasarathy 2000). In Gujarat, either the Irrigation Department (ID) or an NGO acts as the implementing agency in the pilot projects functioning under the schemes. As table 1 summarizes, the populist reform of Andra

TABLE 1.
Main characteristics of IMT programs in Andra Pradesh and Gujarat.

	APFMIS	PIM
Scale	All systems 12,292 WUAs	13 pilot WUAs
Tiers	WUA at lowest tier, Distributary Committees (DCs) at next level, and Project Committee (PC) at main system level	WUA at lowest tier only
Implementer	ID and District Administration	ID or NGO
Membership in command areas	Stipulated in APFMIS Act—all land users and owners, if title is recorded or can be shown[7]	Voluntary—landowners as 'shareholders'; shares at nominal rates
Members' rights	Stipulated in APFMIS Act: one vote per farmer to elect president and one vote to elect territorial committee member; right of recall of president	Cooperative law: if committee elections are held, usually one vote per farmer
Formation of WUAs	Statewide by District Collectors in April 1997, either by election or by consensus-based appointment of presidents and territorial committee, WUA presidents elected DCs Committees in November 1997, PCs not formed yet	Voluntary, upon registration as cooperative
R&R	Statewide, all tiers	13 pilot WUAs
Subsidies R&R	Fixed grants/ha, fivefold increase with IMT to Rs 250/ha,[8] financed by the World Bank	Need-based grants up to Rs 500/ha financed by the state
Identification and implementation of R&R	WUA participates in joint survey, ID authorizes and disburses funds to WUA, WUA implements (no contractor)	WUA participates in joint survey, ID approves, WUA implements
Setting of rates and collection of fees	Rates tripled, revenue department still collects fees as part of land tax, fee recovery and R&R grants will be connected, land tax will be delinked from water fees, so WUA will set, collect and partly manage fees	WUA sets rates, collects fees, and hands 50% of fees over to ID, if paid in time
Water distribution	ID, as before IMT (rotation, below outlet locally), in future stronger accountability of ID staff for water distribution to WUA, DC and PC	Higher tiers: ID and WUA to fill/collect forms (sejhpali). Lowest tier—WUA.

[7]As stipulated in the Amendment through *Andhra Pradesh Legislative Bill no. 32 of November 1998*: "any person who is in lawful possession and enjoyment of the land under a water source, on proof of such possession and enjoyment in a crop year, may claim membership notwithstanding whether he is a recorded landholder or not" (Rao et al. 1999).

[8]In 1998, US$1.00=Indian Rs 40.

Pradesh is unique in its massive scale. It encompasses all irrigation systems in the state and includes all tiers in the schemes. The legal framework has, in one stroke, accommodated all relevant aspects of farmers' empowerment, including quite strong rights for tenants. The organizational structure of the civil service, rather than NGOs or the ID, was and still is used for institution building.[9] Immediately after its adoption, district collectors arranged the election or appointment of committee members for 5 years, statewide. This was accompanied by large publicity campaigns and training programs, with strong political support from the highest levels. The World Bank co-funded a massive operation of repair and rehabilitation (R&R) that started 4 months after the elections (Raju 2000). Funds for construction were directly channeled to the new WUAs avoiding ID staff costs and the costs on contractors. This smart channeling raised the amounts available on the ground even more, and also fostered eagerness of farmers to repair "their" schemes (Raju 2000). Water fees are still set by the government (tripled just before adoption of the Act) and the revenue department continues fee collection, as part of the land tax. The ID continues to handle water distribution, which is by rotation in Andra Pradesh.

In contrast, in the conventional approach in 13 pilot schemes in Gujarat, transfer of water management and cost recovery are already in progress. The new WUAs, formed under the guidance of either an NGO or the ID, are in the process of being empowered to set fees, for other purposes and to distribute water at the lowest tier of their WUA. The new obligations include filling and collecting demand forms, as required in the sejhpali system in Gujarat, and collection of fees and partial handover to the ID. The pilot schemes are scattered and federation with adjacent blocks into higher tiers is neither foreseen nor possible in the short term. In both states, the canals remain government property and major rehabilitation continues to be the responsibility of the IDs in the long run.

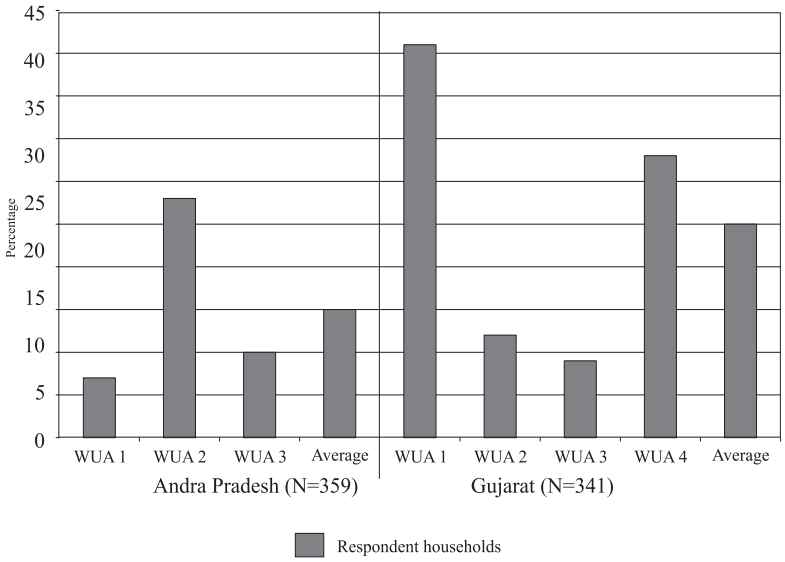
Improved access to water was an important objective of the APFMIS Act and the Gujarat PIM Resolution. Up till now repair and rehabilitation (R&R) work constituted the most important means of reaching this objective in both states. R&R included earth work, removal of shrubs and weeds, desilting and lining of canals, pitching, repair and construction of various structures and placing of pipelines and, in some cases, closing of illegal outlets. Moreover, in Andra Pradesh, access to water could also be improved by the new option, at least in theory, for farmers to communicate with one another through the Distributary Committees and also with the higher ID staff at distributary level. In Gujarat, on the other hand, once irrigation management is handed over, WUAs themselves are entitled only to distribute water that the ID delivers at the intake. Formal handover had taken place in two WUAs of this study, Gujarat WUA1 and Gujarat WUA4.

Access to Water

Figure 9 presents the proportion of households that perceived improvements in access to canal water after IMT. Improved access to water since IMT was reported by both small and larger farmers in tail, middle and head reaches of the command areas. However, the variation between WUAs was strong. The highest proportion of households with a positive evaluation (46%) is in Gujarat WUA1, where the support by an NGO has been exceptionally intensive (Parthasarathy and Iyengar 1998). Mainly it is this exceptional result that renders the average of Gujarat (25%) higher than that of Andra Pradesh (15%). Apparently,

[9]Bruns (1999) highlights the global uniqueness of bypassing the vested interests of the ID by taking the route of regional and local administration.

FIGURE 9.
Proportion of households reporting better access to canal water due to WUA.



implementation by an NGO is not a sufficient reason in itself, because the same NGO was the implementing agency in Gujarat WUA2, where the reported rate of improvement is one but the lowest.

The low improvement in Andra Pradesh WUA1, by only 7 percent as reported, is partly because the main canal was still under construction. Andra Pradesh WUA3 is located in the tail end of a system, where water does not reach, even after R&R. Andra Pradesh WUA2, with the highest improvement reported (28%) lies in the coastal area, where improvements are generally considerable (Raju 2000).

Cropping Pattern, Yields, Incomes

When asked about changes since IMT, none of the respondents reported "higher yields" and "improved incomes," nor reported changes in cropping patterns due to better water availability.

Extension of Irrigated Area

Among all respondents in the sample, 2 percent in Andra Pradesh and 3 percent in Gujarat, reported an increase in the area under cultivation due to R&R work. The average size of land gained was 0.66 ha per farmer in Andra Pradesh and 1.1 ha per farmer in Gujarat. The few newly irrigated plots were both in the head and tail reaches and among both small and larger farmers.

It was difficult to obtain scheme-level aggregate data of extended area in Andra Pradesh because, before APFMIS, the revenue department tended to underreport irrigated areas. When the grants for R&R became proportional to reported irrigated areas, farmers who have better knowledge, often suggested adaptations. For example, the official figure in Andra Pradesh WUA2, which is an increase of 2,000 ha, is probably so high because of these effects. According to the president of Andra Pradesh WUA2, 806 ha out of which 766 ha

belonging to a state agricultural experiment farm, have been added. In Andra Pradesh WUA1, 42 ha were added.[10]

Aggregate data for the whole scheme in the Gujarat WUAs showed small extensions. In Gujarat WUA1, one group of farmers on about 9 ha who had never received water earlier, benefited from the repair of the underground tubewell pipeline. The first R&R work was undertaken in the lands of the high caste Patel community and the next effort involved a significant number of lower caste Thakore farmers. In Gujarat WUA3, earthen canals were cemented but this work was completed only in those parts of the canal where the WUA president and committee members had land. This added 21 ha of irrigable land. Farmers from another distributary strongly complained that they had been left out in the joint survey and that water still failed to reach their plots and also that there was no response to their complaints. These examples highlight inequities intrinsic in the adopted mode of IMT in which setting of priority for R&R work can easily be dominated by the stronger sections of society who secure leadership positions, apparently without much accountability to members.

Higher-tier Negotiations in Andra Pradesh

A distinctive feature of APFMIS is that it facilitates higher-tier organization and information on, for example, irrigation schedules and, in the long run, on negotiations of water distribution between head enders and tail enders. However, it was only in one WUA distributary committee that the president had informed the presidents of the WUAs under his jurisdiction about water availability and rotation schedules.[11]

Cost Recovery and Water Distribution in Gujarat

As process documentation showed (Parthasarathy 1999), the collection of water charges from farmers has been difficult for the president of one of the two Gujarat WUAs to which management has been transferred in Gujarat WUA4. The command area of this WUA covers 12 villages. With little support from the committee members, the president and one employee of the WUA had made a number of visits to some of the villages to recover water charges. Since the WUA could not collect the water charges in time, the president, on several occasions had paid the amount with his own money to take advantage of the rebate (50% of the total water charges) given by the ID to the WUAs for timely payment. The new right of water distribution at the lowest tier requires considerable organization as well. The secretary of the Gujarat WUA4 is now authorized to remove the illegal “headings” by which farmers block the canal to lead water into their fields. Once a week, the WUA president makes himself available to the farmers for sorting out issues relating to water distribution and the WUA. This was appreciated and a high proportion of farmers (33%) reported improved access to water in this WUA, as shown in figure 9.

The Gujarat WUA1, guided by the NGO, used its new water rights to introduce a new rotation during the first excessively dry year

[10]As Jairath (1999a) noticed, changes in the records of the revenue department and ID are difficult to interpret because they do not clarify the “quality of irrigation.” Once water touched the tail—after 15 years—the amount of water and the irrigated area were found to be entered in the records but it is yet to be seen what this means for the user.

[11]Raju (2000) reports effective communication in the case of a WUA in Andra Pradesh, which saved water during kharif and, for the first time, allocated water during rabi. Jairath (1999b) also observes better interaction between farmers and the ID to “get the message through.”

when water scarcity was severe. Under this schedule, each farmer got water for one acre, irrespective of the total farm size. This ensured a minimum supply of water for all, before the remaining water was allocated to the larger water consumers. This, besides the R&R work, contributed to the high proportion of farmers reporting "improved access to water" as shown in figure 9. This WUA1 also used its new freedom to raise water charges by four times its original fee. However, protests among the committee members and farmers led to a reduction again to 150 percent of the government water rates (for details see Parthasarathy 1999; 2000).

Conclusion

In sum, IMT in Andra Pradesh and Gujarat, respectively, led to:

- improved access to water for 15 percent and 25 percent of the respondents, and

- extension of irrigated area for 2 percent (average 0.66 ha) and 3 percent (1.1 ha) of the respondents.

These early gains reported by the respondents were independent of farm size. However, qualitative scheme-level information highlighted that WUA leaders imposed their personal choice with regard to the priority of sites for R&R.

In interpreting the above, it should be borne in mind that the reported impact in Andra Pradesh, if extrapolated, would apply to more than 10, 000 other WUAs. In this light, changes in Andra Pradesh become significant indeed. Moreover, these achievements are only the first step and further transfer of financial and water management from the ID to water users from the lowest to the highest level is still to come, as stipulated in APFMIS. On the other hand, the benefits from the execution of long over-due repairs and maintenance are "easy gains." The pace of improvements risks slowing down. Moreover, it is uncertain whether the heavy subsidies will remain available, and if not, what farmers' own labor and cash contributions for R&R work will be (Jairath 1999a).

In Gujarat, slightly better average results are concentrated in one WUA where drought and water scarcity problems were serious and where the NGO had made considerable efforts. The overall results took 4-5 years and can only be extrapolated for 13 pilot projects. Replication at a larger scale will require considerable human and other resources. Moreover, the design of PIM in Gujarat does not foresee federation into higher levels. Thus, the transfer of critical tasks, such as head-tail inequities, is not on the agenda. In the Gujarat WUAs, farmers more or less welcome the new rights to manage water autonomously below the outlet. However, the new obligations to collect demand forms and fees represent a serious extra burden for the irrigation committee members. Whether WUAs are willing, and equipped, to carry out the revenue functions is a question yet to be answered.

To conclude, in both states, IMT has improved access to water to a lesser or greater extent and in a manner that was fairly neutral of farm size, despite incidental signs of self-interests of elite committee members. In both states it is still an open question whether and how self-management at the lowest levels will become sustainable. Much will depend on the viability of the new institutional arrangements of the WUAs, an issue that will be examined in the next section.

Participation in WUAs

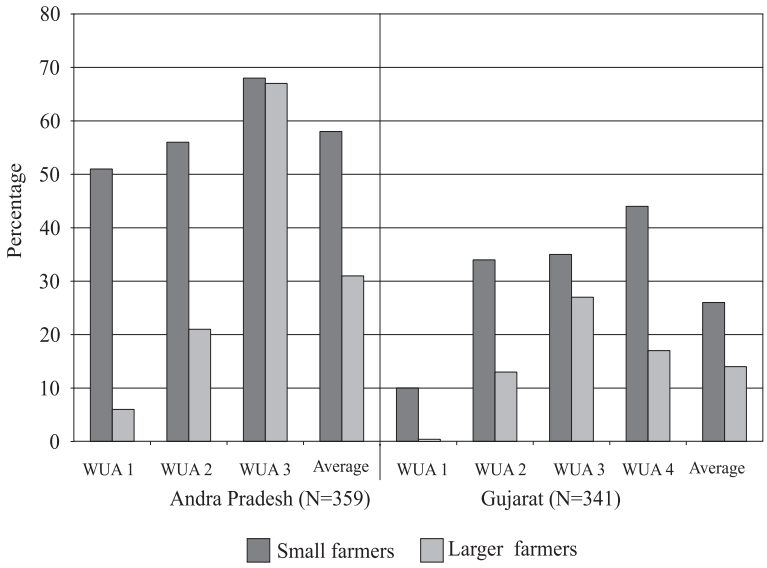
In Andra Pradesh, the creation of WUAs started with the statewide elections or appointments by consensus of committee members, who then took the process forward. In Gujarat, the local NGO or the ID staff got the involvement of some active farmers, to convince fellow farmers in the command area to join as shareholders.

Awareness

The evident minimal condition for participation is awareness about the very existence of a WUA. It is evident from figure 10 that many respondents are still completely unaware of the existence of a WUA. Lack of awareness among respondents is higher in Andra Pradesh (52%) than in Gujarat (22%). As expected, awareness was highest in Gujarat WUA1 (93%), where the NGO had strongly intervened. However, the shorter time span in Andra Pradesh played a role here. Moreover, the average area covered by one WUA in Andra Pradesh (1,342 ha) is much larger than that in Gujarat (180 ha) (see annex). However, extrapolated to the whole state of Andra Pradesh, the creation of awareness among half of the irrigating farmers about completely new forms of management is a noteworthy achievement. The generally stronger stakes of farmers in agriculture in Andra Pradesh than in Gujarat may also have contributed to the spreading of the news.

Significantly, throughout the WUAs and states, a high proportion of small farmers are unaware of the WUAs. Small farmers who have never heard of the WUA are 58 percent in Andra Pradesh, about double the proportion of larger farmers which is 31 percent. The proportion of small farmers unaware of the WUA is lower in Gujarat, (26%) , but this is also about double the percentage of larger farmers

FIGURE 10.
Proportion of households unaware of the WUA, by farm size.



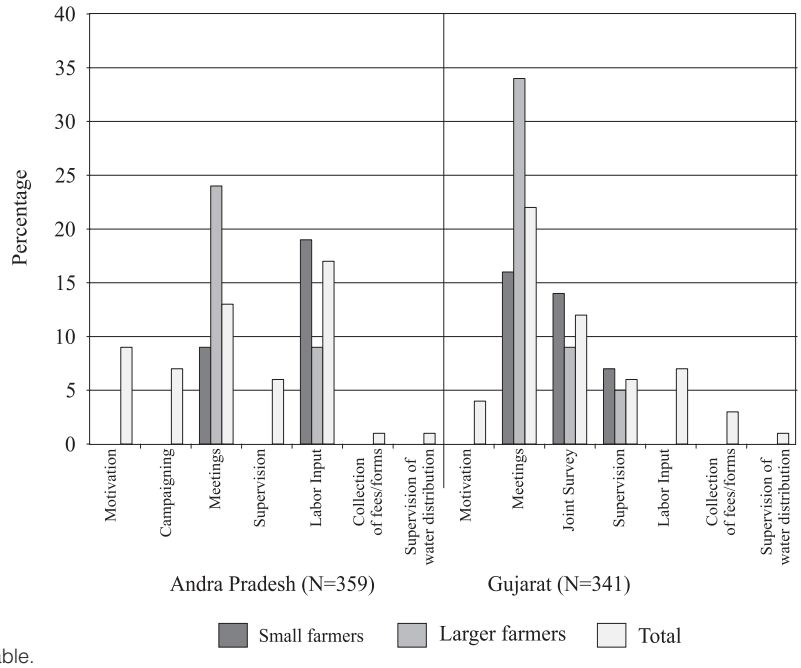
Notes: Significance χ^2
Andra Pradesh: WUA1, WUA2, total: Significant at 0.005 level. WUA3: Not significant,
Gujarat: WUA2: Significant at 0.05 level, WUA3, WUA4: Not significant. Total: Significant at 0.025 level.

still uninformed (14%). In some WUAs of each state the difference is small. For example, almost all the farmers are aware of the WUA in Gujarat WUA1, but in Andra Pradesh WUA3, farmers (whether small or larger) are not aware of the WUA. The president of this WUA which is situated at the tail of the large scheme, does not ask the farmers in the tail reaches further downstream to contribute to R&R or other WUA activities as water would still not reach them. In other cases, there is a considerable gap in awareness between small and larger farmers within the same WUA. In the Andra Pradesh WUAs, the gap is largest in WUA1, where 51 percent of the small farmers have not heard of the WUA, while the corresponding figure for larger farmers is only 6 percent. This WUA has a female president.[12] The gap in Gujarat is widest in WUA4 which covers over 12 villages—67 percent of the small farmers versus 17 percent of the larger farmers are unaware of the WUA. The gap in Gujarat WUA2, the other WUAs with NGO support, shows that NGOs per se can neither create higher awareness in general, nor necessarily reach poor farmers better.

Member Participation in WUA Activities

Figure 11 summarizes the proportion of respondents actively involved in the various activities of the WUA. In spite of the higher

FIGURE 11.
Proportion of households participating in WUA activities, by farm size.



Notes: n.a. = not applicable.

Significance χ^2

Andra Pradesh: Meetings: Significant at 0.005 level. Labor input: Significant at 0.025 level.

Gujarat: Meetings: Significant at 0.005 level. Joint survey, supervision of labor: Not significant.

Attendance at meetings by different categories of larger farmers.

Gujarat : farm size 1–2.5 ha = 28% farm size > 2.5 ha = 40%

Andra Pradesh: farm size 1–2.5 ha = 31% farm size > 2.5 ha = 18%

[12]There are female presidents in 98 WUAs in the whole state (Shyamala and Rao 1999).

rates of awareness in Gujarat, the overall rates of active participation in institution building, R&R, water distribution and fee collection are generally similar in both states. The highest rate of participation in annual meetings is found in Gujarat, which is 22 percent of the sample households. The findings are differentiated for activities with high participation rates. In all WUAs, larger farmers dominate in meetings. However, in both states, small farmers participate relatively more often than larger farmers in the R&R work, including the joint survey. Thus, most small farmers aware of the WUA also participate in the WUA work but not in decision-making.

A very active involvement of tenants in Andra Pradesh is noticeable. The proportion of tenants contributing labor to R&R work is the highest of all (27%), whereas only 16 percent of small landowning farmers and 9 percent of larger farmers do so. Their attendance at meetings is similar to that of the farmers with equally small holdings (9%). In contrast, tenants in Gujarat are virtually inactive in the WUA. Even in Gujarat WUA1, only two tenants participated in R&R work but they did not attend meetings. So, although the formal position of tenants in the new Andra Pradesh WUAs may be slightly weaker than that of landowners, their involvement in meetings and especially in R&R, is relatively strong. Tenant participation is weak in Gujarat where they have no formal status.

These findings underscore the essential contribution of small farmers and, in Andra Pradesh, especially of small tenants to the upkeep of infrastructure. Their strong stakes in irrigated agriculture and higher dependency on canals are probable reasons. This implies that their continued support is important for sustainable self-management. In that light, the much more limited participation of small farmers in meetings is likely to become a major obstacle against their continued support. Their limited participation denies them many benefits like information sharing, for example, on water schedules upstream and within the scheme. Furthermore, their voices are not heard in decision making, which ultimately shapes the gains they receive.

Committees

Committee members are virtually always larger farmers.[13] It was learnt that in the first elections in Andra Pradesh in 1997, for president and representative positions of the different territories within the WUAs, candidates sometimes spent up to Rs 50,000, an amount only affordable to better-off households. These positions may be attractive because they enhance conspicuousness and help in a political career, although many farmers claimed that party politics did not play any role. Finally, given that substantial amounts are available for R&R, these positions make it possible to propose oneself or one's relatives and friends to replace the contractors appointed by the ID. A new generation of "president-contractors" may have been created (Raju 2000).[14]

Under the PIM program in Gujarat, the implementing agencies largely controlled the composition of committees through their motivation efforts. After 4 to 5 years of implementation, these efforts were still found to be confined to the wealthier sections of society. This pattern was sharply discernible in Gujarat WUA1 and Gujarat WUA3 where the motivation process was limited to better-off Patel

[13]Jairath (1999b) found that out of 28 WUA presidents 14% have less than 1 ha each, 22% between 1 and 2.5 ha while 64% have more than 2.5 ha. Given the average irrigated holding size of 0.88 ha in Andra Pradesh, the domination of large farmers is evident.

[14]It is estimated that around 30-40% of the WUA presidents have been involved in construction works as contractors (Raju 2000).

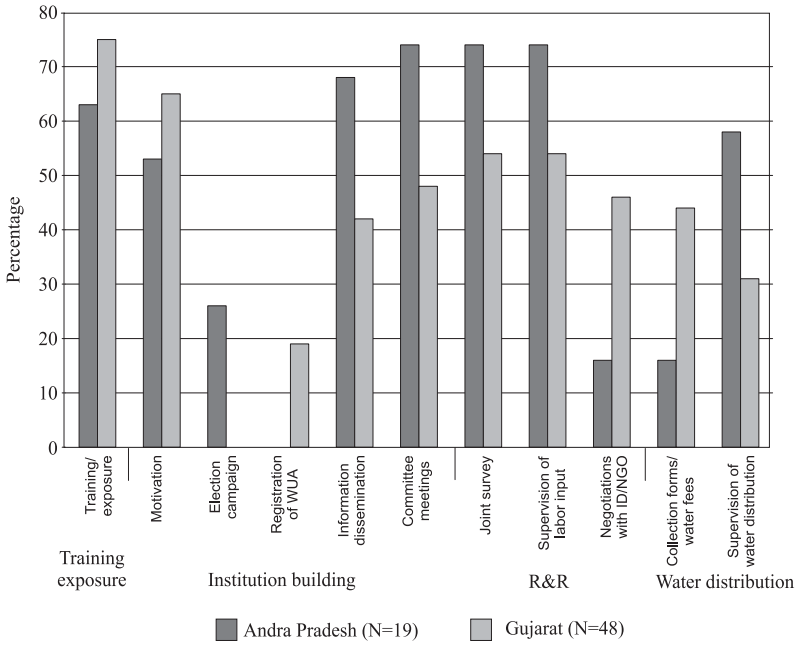
community members, ignoring other castes. The formal rule is that command area farmers elect committee members and that they, in turn, elect among themselves the office bearers consisting of a chairman, a secretary and a treasurer. Usually, constituent villages are also represented. However, in reality, genuine elections are rarely held.

An overview of the committee members' participation in the various WUA activities is given in figure 12. The degree of participation in Andra Pradesh is generally higher than in Gujarat, especially in R&R. The involvement of committee members in Andra Pradesh in water distribution is high (58%). This may reflect a partial overlap between the new WUA committee and the existing local water distribution arrangements in Andra Pradesh where, below the outlet, a *Neeruganti* (a paid local person) distributes water under the supervision of a *Calava Pedda* (an elected, unpaid authority). In fact in Andra Pradesh WUA3, some traditional local office bearers observing that funds were flowing to the WUA, started demanding remuneration from the government for their work.[15]

Conclusions

What is called a "WUA" in reality is first and foremost a handful of local elite who facilitate the beneficial implementation of state-initiated and funded R&R work. In Gujarat, these leaders are also in the process of undertaking water allocation, distribution and fee collection, which are cumbersome tasks the government would like to hand over. A half of the supposed constituencies of the WUAs in

FIGURE 12.
Proportion of committee members participating in WUA activities.



[15]Raju (2000) observed the following reaction of some local water distributors vis-à-vis the flow of money for the establishment of the new WUA, "Then, let the WUA president and TC members do all."

Andra Pradesh and a quarter in Gujarat are unaware of the existence and the purpose of WUAs. Being informed is definitely related to larger farm size. In spite of the higher level of unawareness in Andra Pradesh, actual participation rates are comparable and equally low in both states. Relatively higher levels of participation in R&R work and the joint survey were found among small farmers—this is even more true for tenants than for landowning small farmers. However, in all WUAs small farmers participate considerably less in meetings than larger farmers, while they rarely become committee members. This domination of the new 'WUAs' by local elite is also reported elsewhere (Jairath 1999b; Raju 2000).

Recommendations for Pro-Poor IMT

The present research shows that there are systematic poverty-related differences in functioning large-scale canal irrigation schemes in the WUAs in Andra Pradesh. In this state, canal irrigation tends to be a "poor man's affair." Small farmers use more water because they cultivate paddy more often than larger farmers. They face more problems in accessing water, as their plots are concentrated in the tail ends, unlike those of larger farmers. Small farmers have less access to generally better-performing alternative irrigation sources, receive less waterings and, as buyers, tend to pay a higher price for water from alternative sources. As a result, they rely more often on cheap canal water than larger farmers and take more waterings per crop from canals than larger farmers. Lastly, in the virtual absence of non-agricultural employment in Andra Pradesh, small farmers depend heavily on irrigated agriculture for the production on their own plots, leasing-in land and agricultural wage employment. Therefore, APFMIS, which in its first two years of implementation led to general improved access to water, is in itself pro-poor. The labor contribution made by small farmers and tenants to R&R to realize the benefits are considerably higher than those of better-off farmers. This implies that if R&R is to continue, possibly without the current subsidies, a pro-poor mode of IMT that benefits small farmers is the key to the viability and sustainability of the WUA, in addition to being a measure for poverty alleviation.

The major weakness of APFMIS from both viability and equity perspectives, is small farmers' serious lack of information about the WUA and their relative absence from committees and general meetings, where crucial benefits are to be realized. Thus, small farmers are excluded from information, decision-making and negotiation with leaders regarding spending of government grants or site selection for R&R and future self-management of water and cost-recovery. By law, APFMIS contains all elements of a pro-poor mode of IMT. It vests well-defined rights in members for electing leaders and to hold them accountable. Small farmers have strong formal voting rights because rights are irrespective of farm size. Moreover, APFMIS stipulates potentially effective election procedures. Therefore, the most important and globally unique chance to substantially improve small farmers' inclusion in the WUAs, in order to concretize these rights better than in the past, will be the elections for new presidents and territorial committee members. In the forthcoming publicity campaigns, state policy makers and the civil service should better inform poor farmers about their rights than

during the hasty elections in 1997. Moreover, rather than rewarding for consensus,[16] the promotion of contest between several candidates and the election of the most favored renders the elections more transparent. This benefits those who are still least aware of WUAs—small farmers.

In contrast, in Gujarat, the hypothesis was confirmed that there are no systematic differences between small and larger farmers in a) the choice for cash and food crops, b) access to alternative irrigation sources, except water costs and c) in the number of waterings from either canals or other sources. Although small farmers were found to be concentrated in the tail ends, their dependency on canal water is mitigated because alternative sources abound in Gujarat, especially in the tail reaches. Lastly, irrigated agriculture is less central for the incomes of almost half of the smallest farmers who are engaged in off-farm employment. So, PIM would serve all farmers' interests alike. However, while it was found that both small and larger farmers benefited from the impacts of R&R, PIM also introduced new inequities in awareness and decision-making in the WUAs. As in Andra Pradesh, this may have long-term negative impacts on equity, and perhaps also on the viability of PIM. In the pilot WUAs the already crystallized inequities are probably difficult to redress. If PIM is newly introduced elsewhere, information provision and inclusion of all farmers need strong attention from the start onwards.

Another important issue in assessing the impact of IMT on poverty alleviation concerns the scale. To what extent can the findings of the sample WUAs be extrapolated in space and in time? APFMIS is clearly superior in both respects. APFMIS is state-wide from the start onwards. The past implementation of the first steps at the lowest tiers created massive momentum, which forms a sound basis for the planned next steps: the organization of farmers at higher tiers and complete hand-over. In contrast, a program focusing only on the lowest tiers such as PIM in Gujarat (which, moreover, in its pilot-phase only selected few scattered schemes) is limited by design in its potential for vertical upscaling overtime.

In sum, irrigation management transfer, or more precisely its R&R component has short-term benefits for all farmers in a scheme, including, if not especially, poor farmers. However, long-term benefits of irrigation management transfer for poor farmers and the viability of hand-over itself are at risk because of serious inequities in the new WUAs. Better inclusion of the poor in information and decision-making flows for sustainable poverty alleviation requires, in any case, systematic monitoring of key scheme variables and IMT variables by farm size, which is rather easy, or by income, which is more accurate but also more time consuming.

[16]In 1997, Rs 50,000 was awarded to presidents who were unanimously appointed, without elections, and only Rs 30,000 when there was a contest between several candidates.

Annex

Characteristics of the study of WUAs.

States/details	Gujarat				Andra Pradesh		
WUA	WUA1	WUA2	WUA3	WUA4	WUA1	WUA2	WUA3
village(s)	Thalota	Laxmipura	Tranol	Digas	Ellabotharam	Peddapala-kaluru	Jantaluru
Canal scheme	Dharoi	Dantiwada	Mahi Kadana	Ukai- Kakrapar	Sriramsagar	Nagarjunasagar	Cuddapah - Karnool and Tungabhadra
Region	Mahesana	Patan	Anand	Bharuch	Telangana	Coastal	Rayalseema
Water supply	Scarce	Scarce	Perennial	Perennial	Scarce	Other	Scarce
Main irrigation season	Rabi	Rabi	Rabi	Rabi	Kharif	Kharif	Kharif
Two main crops	Wheat Mustard	Mustard Wheat	Tobacco Wheat	Sugarcane Wheat	Paddy Maize	Cotton Chili	Groundnut Paddy
Command area (ha)	224	246	356	921	464	2,600	1,369
Number of villages/ territories	1	2	1	12	4	12	12
Number of WUA members	210	174	168	169	500	2,325	1,200
Implementing agency	NGO	NGO	ID	ID	ID	ID	ID

Particulars

- Gujarat WUA1: 5 tube well companies operate in the village. People contributed to R&R work.

- Gujarat WUA2: Only one watering in 1998–99 but none in 1999–2000. People contributed to R&R work.

- Gujarat WUA3: Seepage of earthen watercourses. Waterlogging and inaccessibility of tail ends. People contributed to R&R work.

- Gujarat WUA4: Excess water and waterlogging, lack of drainage.

- Andra Pradesh WUA1: Female President. No water supply in 1998–99 due to repairs. R&R work done under different programs like Jhanmabhoomi. Voluntary labor for R&R work reported.

- Andra Pradesh WUA2: Many villages and large command area. Mini-dams upstream for power generation affect water flow. WUA helped to improve water supply.

- Andra Pradesh WUA3: Many villages. Lack of water in tail ends. Jail authorities upstream illegally appropriate water. Traditional water distribution practices observed.

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