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***Research Report***

**Free-Riders or Victims:  
Women's Nonparticipation  
in Irrigation Management in Nepal's  
Chhattis Mauja Irrigation Scheme**

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and  
Nita Neupane***



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# Summary

Although irrigated farming at the head end of the Chhattis Mauja irrigation scheme in Nepal is increasingly being done by women, female farmers do not formally participate in the scheme's organization. However, women's noninvolvement as formal members in meetings and the lack of female representation in the organization do not seem to negatively affect their access to irrigation services. On the contrary, women succeed extremely well in getting their irrigation needs accommodated, in part because they are not formally participating in the scheme's management. This allows them to take more water than they are entitled to, as well as to contribute less labor to maintenance than they should without being punished. Because women are not recognized as members, the organization has difficulty enforcing its rules on women. At the same time, female farmers cunningly make use

of the prevailing gender ideology, which pictures them as weak and in need of protection. Although this ideology does not reflect realities as perceived by women themselves, it strengthens them in their negotiations for more water and in their attempts to minimize their contributions to the scheme's maintenance.

Previous studies attribute the successful performance of the Chhattis Mauja irrigation scheme to the fact that all users are involved in its management. This study shows that in the head end of the system, the group of users is not identical to the group of managers: women are the main users, but only men participate in the Chhattis Mauja organization. Although overall scheme management performance does not unduly suffer from the lack of users' participation, the problems of free-riding and labor mobilization in the head end do create performance weaknesses. If feminization of agriculture continues to grow, these problems will become more widespread and threaten the sustainability of the whole irrigation scheme.

# *Free-Riders or Victims: Women's Nonparticipation in Irrigation Management in Nepal's Chhattis Mauja Irrigation Scheme*

Margreet Zwarteveen and Nita Neupane

## **Introduction**

Irrigation-related studies, policies, and interventions are often based on the implicit assumption that irrigators, farmers, and water users are predominantly male and that they function as individuals. Irrigation and farming are consequently analyzed as reflecting individual behavior, and the users are thought to consist of men only (Illo 1988; Hulsebosch and Ombara 1995; Zwarteveen 1994). This assumption is not true for most parts of the world. Farming is, almost everywhere, a collective endeavor, involving male and female members of farm households. The specific ways in which resources, labor, and incomes are shared and allocated among the various household members vary across, and even within, cultures and regions, but women are much more involved than is generally assumed.

Overlooking women as irrigators, farmers, or water users leads to a faulty understanding of the determinants of the performance of irrigated agriculture. Policies and interventions based on such an incomplete understanding risk being ineffective. The absence of women from organizations may lead to inefficiencies in management performance. A study carried out in Indonesia, for instance, suggests that a major reason for the poor functioning of water users' associations was the lack of women in these associations. The official members (the male "heads of households") were not the actual irrigators or farmers—their wives performed most of the agricultural and irrigation-related activities, while men were away for long periods of the year (Schrevel 1989). In a study of an irrigation scheme in Kenya, Hulsebosch and Ombara (1995, 2) observed that representation and participation of women in the scheme's management "is the only way to secure their interests, which may differ from the interests of male water users."

The proper recognition and understanding of gender roles, responsibilities, and rights are particularly pertinent in an era when more and more state agencies are turning over responsibility for irrigation management to users' associations (Vermillion 1991). Many of the arguments supporting such moves toward decentralization are derived from studies that aim to prove the

### **Glossary**

<i>kulara</i>	an irrigation share, assigned to a member village; also the irrigation rights and obligations of that village
<i>lahure</i>	person employed in the Indian or British army
<i>mauja</i>	village, or more than one village constituting an irrigation unit
<i>meth muktiyar</i>	main-scheme irrigation leader
<i>muktiyar</i>	village irrigation leader

<sup>1</sup>For example, Pradhan 1983, Shrestha and Sharma 1987. Yoder (1994) summarizes most of the previous studies of the scheme.

<sup>2</sup>Although the field study covered villages in all sections, this report focuses only on the head-end villages. There is better access to irrigation water in the head end, and cropping intensities are consequently higher. Average landholdings are smaller. One other significant difference is that a larger proportion of settlers in the head end belong to the so-called *lahure* group of settlers—those who bought land with money earned through employment abroad, mostly by male household members working in the army.

greater success and sustainability of irrigation systems that are, and always have been, entirely operated and maintained by users themselves. The Chhattis Mauja irrigation scheme in Nepal is an example of such a system. This irrigation scheme has attracted IIMI and other researchers<sup>1</sup> because it was built by water users and is entirely operated, managed, and maintained by them. As in other studies of farmer-managed irrigation systems, the success of the Chhattis Mauja irrigation scheme is attributed to the fact that “all users are involved in the irrigation organization” (Yoder 1994). However, the earlier studies of Chhattis Mauja do not specify who these users are and, more specifically, whether women are or should be considered as members of the users’ group, nor do the studies examine how social and economic differences among users influence their access to irrigation-related services.

This report reexamines findings of earlier studies of the Chhattis Mauja irrigation

scheme from a gender perspective. First, an empirical analysis of the livelihood strategies of farm households<sup>2</sup> in the Chhattis Mauja irrigation scheme is made, the objective of which is to determine who the members of the water users’ community are. Priority is given to understanding the intra-household organization of production in order to establish which household members are to be considered water users. Then the report documents the level and nature of women’s and men’s participation in the water users’ organization, and analyzes women’s access to irrigation services. In the concluding section, the desirability of increasing the participation of women in the Chhattis Mauja organization is discussed in terms of both the performance of the scheme and the responsiveness of the organization to the irrigation needs of women. This report is based on findings of a case study (see Annex) carried out in the Chhattis Mauja irrigation scheme between June and December 1994.<sup>3</sup>

## The Chhattis Mauja Irrigation Scheme

### *Scheme description*

The Chhattis Mauja<sup>4</sup> irrigation scheme diverts water from the Tinau River at Butwal in the terai (plains) of Nepal. The main canal is 11 kilometers long and has 44 branch canals. Irrigation water is delivered to about 2,500 households living in the 3,500-hectare command area. The scheme was originally constructed by local landowners in the 1880s. From the late 1940s through the 1970s, migrants from the hills cleared the dense jungle and settled in the upper command area.

Diversion of water into the canal is accomplished by two temporary stone-and-

brush structures (Kannya Dhunga and Ittabhond) on the alluvial fan at Butwal town. Because the fan is continually reshaped by floods, the temporary wing walls must frequently be modified and maintained. Farm households in the command area contribute the necessary labor and resources for maintaining the scheme, in return for which they obtain the right to use irrigation water.

Monsoon rice is the most important irrigated crop; during the monsoon season the whole command area is covered with rice. Wheat is the most important winter crop, but lentil and mustard are also grown in winter. In recent years, wheat has been

<sup>3</sup>Illustrations (indicated by ♦ symbol and italicized paragraphs) were obtained from in-depth interviews with households in the head-end villages of Shankar Nagar Tola, Naya Chapparhati, Kalika Nagar, and Purbi Shankar Nagar.

<sup>4</sup>Literally meaning “thirty-six villages,” which is the original number of villages in the system. The system now has some 60 villages.

partly replaced by maize because of its higher profitability. The only spring crop (which is only cultivated in the upper part of the command area) is maize (table 1).

### *Farm households*

The nature and degree of involvement in irrigated farming by male and female household members in Chhattis Mauja are very much a function of the importance of irrigated farming in a household's livelihood strategy.<sup>5</sup> Taking the farm household members' own socioeconomic classification as a starting point, a broad typology can be made of three categories of household in the head-end village of Purbi Shankar Nagar: the rich, the middle class, and the poor.<sup>6</sup>

**Rich households.** Households in the rich category<sup>7</sup> have access to 0.67 to 2 hectares of land, which, in combination with access to irrigation, is enough to meet the yearly food requirements of the family. In addition, in many rich households (56%), one or more male members earn some off-farm income or are receiving pensions. Many of these men formerly had high positions in the British or Indian army before settling in Chhattis Mauja. They purchased land in the command area of Chhattis Mauja with the money thus earned. These households' basic rationale for irrigated production is to grow enough food for the family. None of the rich households have to purchase rice although occasionally some buy wheat for a change of taste. In addition, 67 percent of the rich households produce some crop surplus, which most of them sell to finance the following years' agricultural investments. Nonagricultural income earned by male members is both used for regular cash expenditures (clothes, electricity, school fees, etc.) and invested in off-

TABLE 1.  
Cropping patterns in the Chhattis Mauja command area (based on a survey of 128 households in three villages).

Monsoon	Winter	Spring
Rice/lentil	wheat	maize
Early rice	mustard+pea/gram	maize
Rice/lentil	maize	maize
Rice lentil	vegetables	maize

Note: (/) = relay cropping. (+) = mixed cropping.

farm enterprises, such as small shops or buses, or in livestock (67% of the rich households rear cattle of improved breeds).

◆ *An example of a rich household is a family in Shankar Nagar Tola with 20 members, 13 of whom are living together. Three sons are working in the army. The household owns 2.35 hectares of land. Rice, wheat, and maize are the major crops the family cultivates. Production from their farm is enough for family consumption, and the income earned by selling the surplus almost covers the expenses of next years' agricultural investments. The by-products of crops are used as fodder. The sons' army salaries and the pensions received by the father (who is retired from the army) have helped the family invest in two buses, which run from Bhairawa to Pokhara. Part of the money is also used in dhikuri, a sort of gambling. They have no intention of buying more land.*

**Middle-class households.** Among the middle-class households<sup>8</sup> are those who depend almost entirely on farming irrigated land for their livelihoods. Land, family labor, and irrigation water are the most important productive resources of these households. Landholdings in this category of households vary between 0.20 and 0.57 hectare. Of these households, 25 percent gain access to additional land through sharecropping.

For 56 percent of these households, their landholdings are large enough to meet

<sup>5</sup>The degree of women's involvement in farming is thus not a function of the amount of work they have "at home," but is determined by the socioeconomic status of the household. See Whatmore 1991 for an elaboration.

<sup>6</sup>This typology is based on a ranking of all the households in a village by the villagers themselves.

<sup>7</sup>Of the village's 69 households, 20 percent were categorized as rich.

<sup>8</sup>In the sample village, this group constitutes 45 percent of the total number of households.

the family's yearly food demand, and 10 percent produce a surplus, which is sold on the market. However, for most middle-class households that sell surpluses, the income gained is not sufficient to meet their cash needs, and sometimes it is not even enough to purchase agricultural inputs and to pay labor costs. This explains why more than half the middle-class households need regular access to off-farm incomes, most often through full- or part-time employment of male members. Some of these men work as teachers, and others work as rickshaw pullers or in private companies in nearby towns. Cash income is used for purchases to supplement the households' food requirement and to cover other necessities such as clothes and school fees. Income is also used to pay for agricultural inputs and to hire laborers. If anything remains it is invested in livestock.

◆ *A male member of a middle-class household in Shankar Nagar Tola who records the expenses for cultivating his 0.67 hectare of land indicated that in the previous year his rice cultivation cost Rs 7,625.<sup>9</sup> He had to spend 27 percent of his annual salary just to cover those costs. In addition, he had to pay an annual fee of Rs 1,400 for using the Chhattis Mauja irrigation water because no one from his family was available to do maintenance work. He and his wife explained that if he were to lose his job, they would be forced to*

*gradually sell off their land to meet their cash requirements.*

**Poor households.** The category of households labeled as poor<sup>10</sup> consists of families who own little or no land (landholdings vary between 0 and 0.34 ha.) and who have no stable off-farm income. Landholdings are too small to produce enough to meet the family's food requirements. For their livelihoods, the poor depend on a combination of sharecropping (57% of all poor households), hiring out their labor (70%), off-farm employment (8%), and irregular sources of income, such as the (illegal) collection of fuel wood and timber. Most often, it is the female household members who work as agricultural wage laborers because demand for female wage labor is higher than for male wage labor.

◆ *One of the poor households in Shankar Nagar Tola has survived through sharecropping for the last 23 years. The household consists of five economically active members, and it owns no land. The family earns incomes through agricultural wage labor. Even though sharecropping is less profitable than working on others' farms for wages, the family prefers to sharecrop because it assures them of at least having access to a tangible quantity of food. In addition, the landowner has provided them with a house, and they have access to loans through the landowner.*

<sup>9</sup>US\$1.00 = N Rs 47.50 (in 1994, the time of the study).

<sup>10</sup>Thirty-five percent of the households were ranked as poor.

## The Intra-Household Organization of Production

### *Gender division of labor*

The way in which tasks and activities are shared and divided among the various household members is partly governed by cultural notions concerning male and female roles. An important aspect of this gender ide-

ology is the distinction made between tasks on the basis of the supposed physical strength required to carry them out. Tasks considered physically demanding are usually thought of as typical male tasks, while typical female tasks are those that require less physical strength and more care and pa-

FIGURE 1.  
Gender division of tasks as perceived by villagers in 38 households in Purbi Shankar Nagar (W = women, M = men, B= both).

	Activities	W	B	M
Rice	preparing seeds	•		
	preparing seedbed			•
	sowing			•
	plowing			•
	leveling			•
	preparing food <sup>a</sup>	•		
	transplanting	•		
	weeding	•		
	irrigating		•	
	harvesting	•		
	bundling	•		
	transporting			•
	threshing			•
	storing straw			•
	storing grain		•	
manual winnowing			•	
fan winnowing	•			
Wheat	plowing			•
	leveling			•
	sowing			•
	irrigating			•
	fertilizing		•	
	harvesting		•	
	threshing <sup>b</sup>	•		
	cleaning	•		
	storing	•		
	transporting manure	•		
Maize <sup>c</sup>	applying manure		•	
	plowing			•
	leveling			•
	broadcasting			•
	line sowing	•		
	weeding	•		
	harvesting	•		
	removing kernels		•	
	storing		•	
	broadcasting		•	
Lentil	harvesting	•		
	threshing		•	
	storing	•		
Mustard	broadcasting		•	
	transporting manure	•		
	applying manure		•	
	irrigating		•	
	harvesting		•	
Livestock	threshing		•	
	storing	•		
	milking		•	
	cleaning shed	•		
	watering		•	
Other	feeding		•	
	cutting grass	•		
	herding			•
	collecting fuel	•		
	cooking	•		
	cleaning	•		
	child caring	•		
kitchen gardening	•			
	maintaining irrigation			•

<sup>a</sup> For field laborers.

<sup>b</sup> Usually done mechanically; female household members do manual threshing only if the quantity is very small.

<sup>c</sup> Winter/spring.

tience. In general, a greater value is attached to male or heavy tasks, which is normally reflected in higher wages for male labor.

The distinction between heavy male tasks and light female tasks appears to be based on cultural norms rather than on the actual physical strength required to carry them out. Transportation of rice from the field to the threshing floor, for example, is considered to be physically demanding, and for that reason it is carried out by men. Carrying manure (which is as heavy as rice) from the livestock shed to the field is considered easy and light work to be done by women.

In spite of the rather strict denomination of tasks as being either male or female, in practice men often assist women in carrying out female tasks and vice versa. The ideology thus seems to refer more to the value that is attached to certain work than to a strict assignment of activities based on gender. Figure 1 shows the gender division of tasks according to the ideology; it does not necessarily reflect how tasks are actually divided among household members.

### *The actual organization of agricultural production*

The actual involvement of male and female household members in agricultural activities is very much a function of the household's livelihood strategy, or more specifically of the amount of off-farm income in relation to the size of the landholding, and depending on a household's livelihood strategy, crop choices also vary (table 2). Households that can afford to do so, will replace family labor with hired laborers. If households have cash income, in addition to having a relatively large landholding, they may also decide to rent their land on a sharecrop basis. Most households identified as belonging to the middle class and poor cat-

TABLE 2.  
Proportion of total cultivated land by crop and economic category of household in Purbi Shankar Nagar.

Household	Average landholding (ha)	Proportion of land (%)				
		Wheat (winter)	Mustard (winter)	Lentil (winter)	Maize (winter)	Maize (spring)
Rich	1.14	20	51	13	1	67
Middle class	0.34	25	36	36	0	72
Poor	0.12	23	35	12	2	47

egories try to save money by maximizing the labor inputs of family members.

The organization of agricultural production in the rich households is either a joint affair of husband and wife (22% of the rich households), or it is done mostly by the wife. In some households, male members either have hardly any experience in farming, because they have never farmed (56%), or they are absent for the greater part of the year (11%), being employed elsewhere. In these cases, the responsibility for managing irrigated agriculture lies almost entirely with female household members. Women organize agricultural production either by relying heavily on hired and exchange laborers or by renting their land on a sharecrop basis.

◆ *An example of a rich household comes from a de facto female-headed farm. The woman, when interviewed, recalls how she used to be responsible for carrying out all agricultural activities because her husband was employed in India. "Once my husband came for a short visit during the rice season," she relates. "I had to irrigate the field at night, and my husband decided to accompany me. On the way to the field, my husband saw a snake. This made him realize the danger I had to face while farming, and he instantly decided to return home without even having irrigated the field. He then found a sharecropper to cultivate the field for us." If the household members can cultivate the fields by themselves, they need not buy any food. As it is, the husband comes home once a year and buys all the necessary sup-*

*plies for the year. He also sends his wife Rs 1,000 a month for regular expenditures. The woman is proud of her husband and proud that she has been released from fieldwork.*

If the land is not given out for sharecropping, female household members often continue to do all the "female" tasks, although they are assisted by hired laborers. In addition to doing fieldwork, they are expected to prepare meals for the hired laborers.<sup>11</sup>

Whether male household members work abroad or not, all the male labor required for irrigated farming is often supplied by hired laborers. At most an adult male household member accompanies the plowing team to the fields at the time of land preparation, but even this task may be carried out by a permanent hired laborer.

◆ *An example of such a rich household is a family of five members in Naya Chaparrhati, which owns 2.68 hectares of land, plus a small plot in Kathmandu. All the children are in school. The family owns a store and a rice mill. One of their relatives helps manage the store. Most of the time, the husband is busy with political activities. In his free time, he plays cards with other villagers. He is an advisor to the Sohra-Chhattis joint committee.<sup>12</sup> His wife spends most of her time at home, except during busy periods in the fields such as transplanting and harvesting rice or harvesting wheat. Then she has to prepare meals for the hired laborers. Sometimes, she also works with the hired laborers to increase their efficiency. There is a permanent male domestic laborer in the house to help her look after the livestock and collect fuel and fodder; he also assists in the rice mill and sometimes with fieldwork (during land preparation). The daughters sometimes help their mother in the kitchen.*

It is in the middle-class households that physical involvement of family members in farming is highest; they usually have reason-

<sup>11</sup>When hiring tractors, preparation of meals is unnecessary. This explains why many women prefer to hire people with tractors rather than people with bullocks.

<sup>12</sup>This is the highest level of the organization managing the Chhattis Mauja. It is responsible for the division of water and maintenance responsibilities between the Chhattis Mauja irrigation scheme and the Sohra irrigation system.

ably large landholdings, but do not have enough cash income to replace family labor with hired labor. Family labor inputs are thus maximized, and female household members try as much as possible to arrange for exchange laborers, instead of hiring laborers. The “real farming couples,” that is, husband and wife closely working together and helping each other to carry out field activities, can be found among the middle-class households. In some of the households identified as middle class, agriculture is predominantly practiced by women, while men earn some cash income. Even though the off-farm income helps meet the household’s cash needs, it often implies that women become almost solely responsible for agriculture, and for many this experience is stressful. Many of these women complained about the large quantity of work they have to do and expressed the wish to give up farming or to give out the land for sharecropping.

◆ *At the time of land preparation, a visit was paid to one of the middle-class households. The senior male member of this household is a village leader (chairman of the Shankar Nagar Tola village development committee) who is deeply involved in political and social activities. The household owns 0.36 hectare of land. The man does not earn enough to hire laborers, so his wife organizes and carries out most of the tasks. She arranges exchange laborers or tries to find laborers who accept wages in kind. For land preparation, a man was contracted one day to come to their fields with a pair of bullocks to plow. The husband monitored the work and assisted by digging the borders of the field and leveling it. The woman had arranged for transplanters to come at 2 P.M. Suddenly, the husband was called away for an urgent matter by a neighbor. He left, leaving his wife to do the digging and leveling herself.*

The start of the rice season is often a time of much stress for women belonging to

middle-class households. Plowing, labor and bullocks, irrigation water, and transplanters all have to be arranged at a time when there is high competition for these resources.

◆ *In Kalika Nagar, a woman remembers the difficulties she experienced when trying to arrange for transplanters and labor for plowing. Her husband, who is an ex-army man, does not know how to plow, nor do her sons, who are in college. On the day she had arranged for draft animals, she could not find transplanters. Eventually, when she had found them, she could not get the bullocks. She recounts how she was crying and swearing in the field. She was almost certain that she would give out the land for sharecropping the following year.*

Some middle-class households own bullocks and use them to plow their fields and often those of others. This provides some additional income or labor for transplanting because labor for plowing can be exchanged for transplanters.<sup>13</sup>

Rearing livestock, however, requires a large amount of female labor, and thus it increases the workload of women. As one woman puts it, “Every morning when I have to clean the shed, I am cursing my parents for not having allowed me to study, which would have enabled me to find some off-farm job.”

The poor households often have fewer farm-related activities because of their small landholdings. All field activities are carried out by family members, and for labor-intensive activities such as transplanting and harvesting, exchange labor is arranged. Male members of poor households either earn some cash income through the illegal collection and sale of timber and fuelwood, or they have a low-paid job with the government. Sharecropping households can sometimes earn additional income by using the landowners’ bul-

<sup>13</sup>One day of plowing is equivalent to three to five days of transplanting, depending on the location.

locks for plowing others' fields. Female members of poor households may earn additional incomes through agricultural wage labor.

◆ *One of the poor households consists of five members (parents and three children, the two youngest still in school). The father has a low-paid job in a bank in a bordering town in India. He comes home every weekend. The family own 0.09*

*hectare of land and has access to an additional 0.12 hectare on a sharecropping basis. They recently bought two cows of an improved breed. Because of the investments in land and livestock, they are indebted, but hope to be able to pay back soon. The mother and the eldest daughter, who has finished high school, carry out most of the field activities, and during weekends the whole family works together in the fields.*

## Gender Aspects of Irrigation Management

### *The kulara system*

The management of the Chhattis Mauja irrigation scheme is based on the use of the *kulara*, a unit that expresses a certain irrigation share, which is assigned to a member village,<sup>14</sup> and also refers to the irrigation rights and obligations of that village. Water rights and voting rights are in proportion to the number of *kularas* held by the village, as are the amounts of labor and cash the village is obliged to provide for the upkeep of the scheme. The total number of *kularas* is not fixed. The Chhattis Mauja executive committee controls the number held by villages according to certain rules and procedures. Each village or group of users of a branch canal can request the number of *kularas* they think is most appropriate for them. Whenever a village wants to increase its share of water, they forward a request to the executive committee. Such requests are discussed at the general meeting, along with the implications for water allocations to other branch canals. If the request is approved, the applicants have to pay a fee of Rs 600 for each additional *kulara* of water.

A village that receives the right to open a branch canal outlet from the main canal is considered a member of the scheme. Membership at that level thus refers to villages

served by a branch canal rather than to individuals or to households. At the branch canal level, the village organizations deal with farm households. Most village organizations keep a list of households and their landholdings to assist in determining rights and obligations within the branch, but these lists are not passed on to higher levels of organization in the scheme.

### *Levels of organization*

The final authority for decisions concerning the Chhattis Mauja irrigation scheme is vested with the general assembly, of which, in principle, all irrigators are members. In practice, only male irrigators<sup>15</sup> are encouraged to participate in meetings. Each branch canal can designate four voting members for each *kulara* water allocation unit it is entitled to. There are no women among the branch canal representatives, and thus no female voting members in the general assembly.

Because the designation of *kulara* representatives for proportional representation is time-consuming and inconvenient for many irrigators, provision for another general-level decision-making meeting has been made in the constitution of the Chhattis

<sup>14</sup>Yoder 1994 provides a detailed and accurate description of the management, operation, and organization of the Chhattis Mauja irrigation scheme.

<sup>15</sup>It may be that not all male irrigators are de facto members.

Mauja executive committee. This is simply called a general meeting and is composed of all the *mukhtiyars* (village leaders) and members of the Chhattis Mauja executive committee. Often, the so-called “knowledgeable water users” are invited to the general meetings; women are not considered knowledgeable water users because so far they have never been invited.

The Chhattis Mauja constitution specifies that a general assembly meeting should be held at least once a year. The members of the executive committee and two-thirds of the *kulara* representatives constitute the quorum for the general assembly. The agenda of general assembly meetings includes (1) the scheduling of main canal desiltation works, (2) the presentation of the executive committee’s financial statement, and (3) the election of the executive committee officials. The general assembly meeting is usually held at the executive committee office located in Prem Nagar in January or February, before the main canal desiltation work starts. The users are given a month’s notice by the *mukhtiyars* of the respective *maujas* (villages). General assembly meetings can also be called by the executive committee for amending the constitution or whenever there is a need to discuss something that involves more than one branch canal.

Women never attend general assembly meetings because (according to the men and women interviewed) they are not able to voice their concerns and needs at such meetings.<sup>16</sup> One reason is the cultural rule that women are not supposed to speak up in front of male relatives. Women also referred to their illiteracy as a reason for not attending meetings; they were afraid that they would not be able to understand what was being said and thought they had little to contribute.

The Chhattis Mauja organization has three tiers.<sup>17</sup> The first is the Chhattis Mauja

executive committee, consisting of 13 members. The chairman, vice chairman, and secretary are elected by ballot for 2-year terms by voting members (*kulara* representatives). So far, only men have been elected to these positions. A treasurer is appointed by the executive committee from among the male water users. Nine area-level representatives (all of whom are male) bring geographical representation to the executive committee and are directly responsible to their constituencies.

The executive committee employs two *meth mukhtiyars* (main scheme irrigation leaders; one for the head reach and one for the tail end) to supervise day-to-day operations and maintenance of the main scheme. Two messengers are hired to assist the *meth mukhtiyars*. The *meth mukhtiyar* and messengers are all men. This is explained by the notion that the tasks of the *meth mukhtiyar* and messengers are unsuitable for women—the *meth mukhtiyars* have to monitor and supervise the emergency maintenance works and are responsible for making sure that water is distributed properly among the *maujas*. The most important duty of the messenger is to communicate information and orders received from the executive committee to the village-level *mukhtiyar* and to the area-level representatives, which requires a significant amount of traveling, even at night.

At the second tier are the area-level committees, which link the executive committee and the village-level committees. An area-level committee is composed of the village or branch-canal *mukhtiyars*. One of the members is selected to serve as the area-level chairman for 1 year, and during that period he is the area-level representative to the executive committee. There are no female *mukhtiyars*.

◆ *In Kalika Nagar, a head-end village with a high percentage of de facto female-headed farms, a woman volunteered to become the mukhtiyar. She*

<sup>16</sup>Nita Neupane, a coauthor of this report, attended a general assembly meeting, which was conducted in a very chaotic way and where the atmosphere was rather hostile. This explained the reluctance of women to attend meetings. Political differences among water users and leaders influenced the decision-making process; many among those present were suspicious of the ideas and proposals of the chairman. Among the men who attended the meeting, many remained silent.

<sup>17</sup>Excluding the Sohra-Chhattis Mauja joint committee.

*thought she would be able to perform well because she had gained experience in organizational matters by being the local representative of the women's wing of a political party. Other villagers shared this view and she was elected. However, she was forced to resign from her job as mukhtiyar after 5 months. Nobody could be found to assist her; women did not think of themselves as capable and knowledgeable enough, and the few who wanted to assist were prevented by their husbands. Men did not want to work under a woman.*

When discussing the absence of female mukhtiyars, villagers pointed out that an important capacity of a mukhtiyar is to be able to negotiate with the meth mukhtiyar and the executive committee chairman for extra water. People think that such negotiating skills are harder to find in women than in men. The success of a mukhtiyar depends very much on whether he or she has a good relationship with the chairman, and chances of having such a relationship are often better when the mukhtiyar shares the same political preferences. Because women are hardly involved in politics, their chances of establishing a good relationship with the chairman are estimated to be lower. In this respect, it is noteworthy that the woman who was briefly a mukhtiyar did have political experience and affiliations.

The village-level committee forms the last tier of the Chhattis Mauja organization. This committee manages all the irrigation activities within the branch canal. These include (1) allocating the water the village is entitled to receive from the main canal among irrigators in the branch, (2) monitoring water distribution in the main canal and within the branch, (3) managing conflicts, (4) planning and carrying out maintenance within the branch, (5) assessing fines to irrigators within the branch, and (6) appointing branch canal representatives to vote in the general assembly. In addition, the vil-

lage-level committee is responsible for mobilizing labor for main scheme maintenance as directed by main scheme officials, and for linking management of the main scheme with the branch canal. Except for activities that involve other branches or the main scheme, the village-level committees function as autonomous units.

The structure of a village-level committee differs from one branch to another. In all cases there is a mukhtiyar who is either elected by the villagers for a fixed period or appointed by the village and expected to serve as long as he is willing and as long as he carries out his tasks satisfactorily. In some maujas, the mukhtiyar is the only member of the village-level committee. In others, a messenger is assigned to assist the mukhtiyar. In still other maujas, officials who are to form a committee are elected by the villagers.

The village-level irrigation meetings (which are held once to five times a year, depending on the mauja) are the only meetings that are sometimes attended by women. Female household members only go to these meetings when their husbands are not around; they reported that they go only to represent the household. When they go, they usually do not actively participate, but just observe and listen to what is being said. Instead of going to meetings, women prefer to directly meet with the mukhtiyar whenever they have an irrigation-related problem. In most maujas, the mukhtiyar is a trusted person who is well known by all the villagers.

### ***Water allocation***

If women, because of their nonparticipation in the organization, are systematically disfavored with respect to the quality and quantity of irrigation services they receive, this can become apparent at three levels:

- irrigation scheme—as indicated by villages with a greater number of de facto female heads of farms receiving less water than other villages (or experiencing greater difficulty in obtaining their fair share of water)
- mauja—as indicated by female farmers receiving fewer irrigation services or lower quality services than male farmers
- household or farm—as indicated by women’s specific irrigation needs being less well accommodated than men’s

*Scheme level.* Water is supposed to be allocated among the different branch canals according to the kulara system. If there is a continuous flow of water, water distribution is monitored and controlled by adjusting the width of the outlet from the main canal to each branch canal.<sup>18</sup> Whenever water becomes scarce (which occurs most often during rice seedbed preparation and transplanting, and for spring crops), water is distributed according to a rotation schedule.

Although in principle water allocation is based on the number of kularas, in practice several other factors govern water distribution. The mukhtiyar of a branch canal frequently appeals to the chairman for extra water when water users in his branch canal complain of water shortages. In the head end, water users sometimes even appeal directly to the executive committee chairman for more water. Many water users were, for instance, upset that the chairman gave in to a request by a woman for more water to irrigate her maize field.

To answer the question whether villages with a high percentage of de facto female heads of farms are systematically disfavored, Kalika Nagar was studied.

◆ *In West Kalika Nagar, about 80 percent of the actual farmers are women. Many of them*

*have husbands who are retired from the army and never work in the fields. Women in Kalika Nagar reported that the management of the Chhattis Mauja caused problems for them, citing to two instances. In 1992, just after sowing wheat, the executive committee decided to reconstruct the dam beyond one of the intakes, close to the intake of the Kalika Nagar branch canal. Water flow in the branch canal was stopped during the whole construction period, which seriously affected wheat production. In 1993, at the time of rice seedbed preparation, the executive committee repeated the mistake. Rice seeds were already broadcasted in the nurseries, but could not be irrigated. The women recounted how they had to lift water from the river with buckets to water the seedbeds. The seedlings did not grow well, so they had to buy seedlings from other areas to transplant in their fields.*

It is difficult to know whether these problems would also have occurred had the majority of farmers in Kalika Nagar been men. It is certain, however, that communication between Kalika Nagar and the executive committee is poor due to gender-related factors. The mukhtiyar in Kalika Nagar has a weak personality and does not perform his task well. It is difficult to find a good male mukhtiyar partly because of the large number of female farmers in Kalika Nagar; the one woman who volunteered to become a mukhtiyar in Kalika Nagar had to give up for reasons explained earlier. Female farmers in Kalika Nagar do not like to approach the mukhtiyar because he is a drunkard and also because his wife becomes suspicious when he meets with other women.

At the same time, Kalika Nagar is among the four head-end villages that have constantly created problems for the Chhattis Mauja management for taking more water than their legal share without even contributing their share of labor to scheme maintenance.

<sup>18</sup>The width is calculated so that the ratio of the outlet width to the main canal width equals the ratio of the number of kularas served by the branch canal outlet to the total number of kularas served by the main canal downstream of the outlet.

nance. A former chairman reported in the general assembly meeting, "When we went to adjust the inlets to get more water during periods of water scarcity, we were often kept in the goat pen by the women of these villages" (Yoder 1994). This suggests that the noninvolvement of female water users in the organization, rather than being a disadvantage to women, actually enables them to become free-riders.

*Mauja level.* Another indication of whether water distribution is biased against women, as a result of their peripheral position relative to formal decision-making bodies, is that de facto female heads of farms within a mauja systematically receive less water or poorer quality irrigation services, or have greater difficulties in obtaining their fair share of water, than farms that are jointly managed by men and women. In the head-end villages studied, almost the opposite appears to be the case. Female farmers are favored with respect to water distribution—they are the first to receive water.

The rules for water distribution differ within each mauja. In the villages studied, the mukhtiyar uses proportionality criteria as a starting point for adjusting irrigation deliveries from the main canal, but during the periods of continuous water flow, crop status, notions of fairness, and reduction of farmer complaints are the main criteria used, rather than exactness of allocation according to official kulara entitlements.

One such notion of fairness adhered to by many mukhtiyars, which is not disputed by irrigators, is that female-headed farms should be given priority in water distribution. Female farmers reported that when they have arranged bullocks and transplanters, they inform the mukhtiyar that they need water. Their fields are often among the first to be irrigated. The mukhtiyar confirmed this. The reason given is that it is more difficult for female heads of farms to

arrange for labor to plow and transplant than it is for jointly managed farms.

*Farm level.* Water distribution may also be skewed at the level of the farm or household because men's irrigation needs are prioritized or better accommodated than women's. To examine this possibility, it first needs to be established whether women have specific irrigation needs different from those of men.

Women and men hold the same opinion with respect to the objectives of irrigated farming: both expect to obtain yields high enough to feed the family. But men and women differ<sup>19</sup> about the quantity of inputs required for irrigated farming. Women are especially concerned with the amount of their labor certain crops require. This is why many women are eager to plant less wheat and more maize.<sup>20</sup>

When discussing criteria for assessing irrigation supplies, male farmers stressed the importance of having enough water to transplant on time. Female farmers did not disagree, but they mentioned that, in addition, water should be sufficient during the rice season to prevent weed growth. Women explained that the inadequacy of water during the season leads to frequent stealing of water; when they go to irrigate the fields and close all the upstream field inlets, it often happens that these are opened again by upstream users before water actually flows to the field.

Women's noninvolvement in the organization is not likely to negatively affect the amount of water available during the rice season. On the one hand, both women and the village mukhtiyar report that there is nothing to prevent women from meeting with him. In fact, when they have a request or a complaint to make regarding the quality of irrigation services, women do go to meet with the mukhtiyar. The mukhtiyar is aware of their need for more water and tries to accom-

<sup>19</sup>These differences of opinion are not open or articulated, but are expressed through different preferences for crops and for areas to be allocated to different crops.

<sup>20</sup>In addition, because women attach great importance to having enough oil for cooking, they often express the wish to expand the area of their only oilseed crop—mustard. However, this hardly affects irrigation requirements, because water is not a constraint for growing mustard.

moderate this need by appealing to the chairman for additional water. On the other hand, women are the ones who steal water if there is scarcity during the season. There is a fine for stealing water, and women thus have an interest in not being noticed. Their absence from the organization may make it relatively easier for them to steal water. The fact that it is mostly women who steal water was even given by one of the interviewed mukhtiyars as a reason for increasing the involvement of women in the organization—at present, women can hardly be punished, because they can always claim not to be aware of the official rules.

Unlike men, women said that it would be easier for them if some water is available in the canal permanently because this would facilitate the use of water for a number of nonagricultural tasks they are responsible for. Many women wash their clothes and clean the pots in nearby irrigation channels, and they also use this water for feeding and watering livestock and cleaning the livestock sheds. Women explained that Shankar Nagar Tola has a domestic water supply system, but it only operates a few hours a day and at times inconvenient for them. In Naya Chaparrhati, most households have access to hand pumps for domestic water, but women said that it is difficult and time-consuming to pump the water for washing and cleaning, and even more so for feeding and watering livestock, so they prefer to use irrigation water.

Shortage of water for domestic uses and livestock is a specific problem for women that might have been better addressed had they been more involved in the organization. However, it is partly the inadequacy of the domestic water supply systems that induces women to use irrigation water. Thus it is debatable whether the Chhattis Mauja organization can be held accountable for these problems.

When discussing gender-related irrigation problems, many mukhtiyars mentioned that night irrigation is problematic for women and that that topic is frequently brought up at meetings. But both male and female farmers indicated they were reluctant to irrigate at night, mainly out of fear of snakes. Nonetheless both women and men accept that it is essential to irrigate at night once in a while. Each woman or man tries to find some companion when her or his irrigation turn is at night. It is easier, however, for women to avoid night irrigation because the mukhtiyar and male villagers tend to believe it is worse for a woman to do night irrigation than for a man.

### *Resource mobilization*

Labor is mobilized in the Chhattis Mauja irrigation scheme for the maintenance of the head dam, the main canal, and the village canal. Regular maintenance of the head dam is mostly carried out during winter months, and emergency work is carried out whenever the need to do so arises. Each mauja has to contribute a fixed number of kularas for maintenance work. The mukhtiyar informs the villagers when and where to go for maintenance work. The number of kularas to be contributed by each household is determined at the village meetings.

In case of nonparticipation or failure to contribute the required amount of labor, penalties are levied. Offenders have to pay a fine of Rs 30 per working day. Fines form the major source of income of the executive committee. This income is spent for staff salaries and construction materials. The amount to be paid as a fine is less than the existing wage rate for men (Rs 45 to 50 per day), which was explained by the executive committee chairman as a measure to ensure cash income to the Chhattis Mauja organi-

zation—if the fines were higher, then nobody would pay them anymore.

Construction and maintenance of the irrigation scheme are male domains in the Chhattis Mauja. In fact, the executive committee constitution stipulates that labor for emergency maintenance and maintenance of the head dam and the main canal can only be contributed by men. The chief explanation Chhattis Mauja officeholders gave for this rule is that women are physically less able to carry out construction and maintenance activities. Women's labor, in other words, is considered to be of less value. Thus sending female laborers to do maintenance work would imply contributing less, which would be unfair. Male villagers also explain that male laborers, when carrying out maintenance activities, crack jokes that embarrass women. The explanations that most interviewed women give for not being allowed to contribute labor refer to the social undesirability of women working alongside strange men. Women from the middle and tail-end sections also stated that it would be inappropriate for them to contribute labor to maintenance of the head dam because it would require traveling and working in places unknown to them.

In households where men work abroad for long periods, the constitutional rule that prohibits women from carrying out maintenance work implies that they either have to hire male laborers to do the work, or they have to pay the fine. This amounts to a large amount of money and a large share of the total household income; women in middle-class and poor families said that it was difficult for them to pay this fine. Some families have given out their land for sharecropping only because they could not afford to pay the fines; the sharecropper household then becomes responsible for contributing labor to the irrigation scheme. In other households, women make arrangements with a male

neighbor to go in their place, in return for which they work in the neighbor's field.

In many maujas, however, special arrangements are made to accommodate households facing difficulties in complying with the kulara rules. In some maujas, a provision is made for making a cash contribution instead of providing labor.<sup>21</sup> Whether or not such a provision exists depends on the total number of kularas to be contributed by the mauja in proportion to the availability of labor. The amount to be paid is determined by the village-level committee, and in the villages studied it was around Rs 670/ha. Who among the irrigating households should be allowed to pay instead of providing labor is decided at the village-level meeting; it was observed that female heads of farms were often given priority in this decision. In one village (Pedrahani), female heads of farms were even allowed to pay only half as much as others had to pay because of the recognition of their difficulty in paying the full amount.

In West and East Kalika Nagar, both of which are close to the main intake, the rule that women should not provide labor for maintenance is not adhered to because it is impossible to mobilize enough male labor from these villages (around 80% of the farms are headed by women). Women from these villages do participate in the maintenance of the head dam. The actual construction work is carried out by men, while women carry the construction materials (mainly logs and wood). Because these villages are close to the intake, women do not have to travel far to contribute labor, which makes it easier for them to go. Another reason that women participate in maintenance work, despite the rule, is that many of them belong to the Magar ethnic group. Magar women are often less shy and more open. Women provide around 80 to 85 percent of the total kularas from these villages.

<sup>21</sup> The cash contributions are smaller than the potential fines.

It is noteworthy that for many years the villages of Kalika Nagar and Shankar Nagar Tola, did not contribute any labor to the maintenance of the main canal. The rationale was that maintenance in the lower reaches of the canal would not benefit them, so they should be released from doing this work. After several years of conflicts, it was decided that these villages must provide

relatively more labor for maintenance of the head dam. At the 1989 general assembly meeting, a former chairman reported how difficult it was to get head-end villages (among which is Kalika Nagar) to contribute labor for scheme maintenance and repairs, although they receive a higher share of water than they were entitled to.

## **Should Women Be More Involved in the Chhattis Mauja Organization?**

Although there are no official or written rules preventing women from participating in the Chhattis Mauja organization, there is not one female representative, mukhtiyar, meth mukhtiyar, or officeholder, nor do women ever attend general meetings or general assembly meetings. Women's participation at village-level meetings is very low, and when they do attend meetings they are inactive. At the same time, women (at least at the head-end section of the Chhattis Mauja) constitute more than half of all users. Female members of farms that are jointly managed by men and women are very much involved in irrigated agriculture, and there are a large number of farms entirely managed by women.

### ***Performance***

According to the literature on participatory management of irrigation systems, all users should be involved in the management of the system for it to operate efficiently. In the Chhattis Mauja setup, the prevailing gender division of labor underlies a division in irrigation-related tasks, men being primarily responsible for the provision of water (organizing water allocation and mobilizing and providing labor for irrigation scheme main-

tenance) and women being primarily responsible for using the water in their capacity as farmers. In the Chhattis Mauja irrigation scheme (contrary to earlier studies), the group of users is thus not identical to the group of managers.

Yet, management performance does not appear to suffer a great deal from the lack of participation of the real users in management. Earlier performance assessments of the Chhattis Mauja claimed that, given the physical condition of the irrigation scheme and the market conditions, the Chhattis Mauja organization was doing well (Yoder 1994). Yields were higher than average yields in similar irrigated areas, and there seemed to be little scope for increasing yields through improved water allocation. Irrigated areas or cropping intensities were not likely to increase much even if there was better or more irrigation. The study also claimed that distribution efficiency cannot be increased through better management practices.

While the present study basically confirms the findings of this earlier performance assessment, it also reveals two potential areas of performance improvement in terms of distribution efficiency. The reason head-end villages receive more water

than their official entitlement is likely to be related to the higher proportion of female-headed farms at the head end. The described case of Kalika Nagar suggests that the absence of the majority of the users, i.e., women, in the organization contributes not only to these villages using more water than they are entitled to, but to the problems encountered in mobilizing the required amount of labor from these villages. And, although a more systematic assessment of water delivery performance at the level of the mauja would be needed to establish performance weaknesses at this level, the difficulties the mukhtiyars have in trying to punish women when they steal water also suggest a potential performance weakness, which can be attributed to the nonparticipation of female water users in the organization.

### ***Responsiveness of the organization to the needs of women***

According to theories related to the role of women, exclusion of women from formal participation in decision-making bodies constrains women's ability to get their needs accommodated. In the Chhattis Mauja, the opposite is true. Women, although they are entirely excluded from formal management, succeed in getting their irrigation needs accommodated.

Women, including female heads of farms, see no need for formal participation in the organization and completely lack interest in it. Their inconsequential position relative to the organization is based on an ideology that gives little importance to women in terms of their contributions to the provision of household food and income or in terms of their involvement in community matters and politics. Women are seen to be dependent on their husbands for

survival and in need of support and protection from men. Although this ideology neither reflects reality nor the way in which most women perceive themselves, it does imply that social transaction costs of participating in meetings are higher for women than for men, while at the same time the effectiveness of meetings for women is less. It is far more effective and less time-consuming for women to personally meet with the village mukhtiyar whenever they have a problem.

It is probably because they are not formal members of the Chhattis Mauja organization that women succeed so well in getting their irrigation needs accommodated. The same ideology that prevents them from formally participating in the organization enables female heads of farms to reduce their contributions to the maintenance of the scheme, without risking a reduction in the amount of water they receive. Female-headed households are allowed to pay smaller irrigation fees, but women are among the first to receive water, and they steal water without being noticed or punished. Women's short-term interests with respect to irrigation are thus not served by challenging the prevailing gender ideology nor by promoting their formal participation in the organization.

### ***Future scenario***

At present, the inability to control the branch canals that have a large number of female-headed farms is a source of irritation to the Chhattis Mauja organization, but it does not undermine the efficiency of the scheme's operations. The number of de facto female-headed farms is, as yet, a relatively small percentage of the scheme's farms, which makes it possible to allow them special favors. However, if the num-

ber of de facto female-headed farms increases, the absence of women in the organization may very well become a threat to the sustainability of the scheme.

When analyzing livelihood strategies of households, it becomes clear that irrigated agriculture is heavily subsistence-oriented. Rather than aiming to produce agricultural surpluses for generating household income, households increasingly seek and rely on off-farm incomes. This trend is accompanied by a shift from labor to capital as the organizing principle of the internal social relations of the family farm. This shift is structured by gender relations; men predominantly seek off-farm employment and nonagricultural businesses and enterprises, while women become increasingly responsible for farming. As the importance of irrigated agriculture in terms of its contributions to a household's livelihood decreases, it is likely to become more and more the responsibility and domain of women.

The fact that many parents strongly support and push their sons to get a good education so that they can find well-paid jobs outside agriculture contributes to this trend. Rather than investing in agriculture (buying land, livestock, or agricultural implements) parents prefer to invest in the education of their children, giving first priority to sons. Some families even sell all or

part of their land to pay for the education of their children or to cover the expenses of their sons' travels abroad. This trend may lead households that succeed in finding good sources of off-farm employment to abandon agriculture altogether. It may also be, however, that they will try to maintain a foothold in agriculture, leaving it to be managed by women.

If this happens, it will probably be necessary to formally involve women in the Chhattis Mauja organization for it to continue to effectively enforce the rules and regulations regarding water allocation and resource mobilization. Female farmers are likely to become more interested in being involved when problems related to a higher incidence of free-riders or to a low mobilization of resources for maintenance become more apparent.

Mobilization of labor for maintenance probably will become more difficult because of the decreased availability of male labor. Parallel to the shift from labor to capital in the intra-household organization of irrigated production, a shift to mobilizing cash instead of labor for irrigation scheme maintenance may occur. As a consequence, cash investments in scheme improvements to reduce maintenance requirements that currently seem economically unjustifiable may become attractive.



## Methodology

Data for this study were collected through participant observation and repeated in-depth interviews with a small number of households in two head-end villages in the Chhattis Mauja irrigation scheme (nine households in Shankar Nagar Tola and eight households in Naya Chaparrhati). These are villages with a relatively large number of de facto female-headed farms. Most people in these villages belong to the lahure group of hill migrants, who settled in Chhattis Mauja quite recently (1970s). They purchased land in the command area of the Chhattis Mauja with money earned mostly through employment of male household members in the British or Indian army. The “early” hill migrants, the lahure migrants, and the original inhabitants (Tharu) of the Chhattis Mauja are socially three quite distinct groups. Many of the male members in the villages studied are quite well-to-do (because of their army salaries and pensions) and many are politically influential. The number of sample households for the in-depth interviews and participant observation was as follows:

	<i>Shankar Nagar Tola</i>	<i>Naya Chaparrhati</i>
Rich	1	2
Middle	6	4
Poor	2	2

Each sample was taken so as to include at least two households headed by women in each village. In Shankar Nagar Tola, one

female-headed household belonged to the rich category and one to the middle class; in Naya Chaparrhati one belonged to the middle and one to the poor category of households. These households were all visited at least once a week over a period of 6 months, either in the house or in the fields. All of the examples and qualitative statements are derived from this part of the study. Two group discussions were organized with female farmers of the two villages to identify and explore their irrigation-related problems. A few long qualitative interviews were also held with farmers (men and women) in surrounding villages (Shankar Nagar Tola, Kalika Nagar, Purbi Shankar Nagar, and Pedrahani) and with irrigation leaders.

To cross-check and validate the information obtained, a survey was held towards the end of the study in three different villages (annex table 1). These villages were selected to represent the head, middle, and tail sections of the Chhattis Mauja scheme. Purbi Shankar Nagar, a settlement consisting of lahure hill migrants was chosen in the head end; Madrahani, a community that consists predominantly of original inhabitants of the area (Tharus) was selected in the mid-region; and Semara was chosen to represent the tail end. The total number of respondents for the three villages included in this “single-shot” survey was 128. However, this report focuses primarily on the head-end village; thus the data given in the text refer to Purbi Shankar

Nagar only.

ANNEX TABLE 1.  
 Characteristics of rich, middle-class, and poor households (as classified by villagers) in the three survey villages—located at the head, middle, and tail end of the Chhattis Mauja irrigation scheme.

Village location <sup>a</sup>	Households (no.)	Average landholding (ha)	Buy food (%)	Sell rice or maize (%)	Off-farm employment <sup>b</sup> (%)	Own improved cattle (%)
<i>Rich</i>						
Head	9	1.14	0	67	56	67
Middle	10	2.35	0	100	30	10
Tail	5	4.02	20	80	60	0
<i>Middle class</i>						
Head	16	0.34	44	10	56	25
Middle	15	0.80	20	73	33	0
Tail	18	1.01	17	39	77	0
<i>Poor</i>						
Head	13	0.12	29	0	8	7
Middle	20	0.47	90	0	40	0
Tail	22	1.34	53	0	44	0

<sup>a</sup> Head-end village: Purbi Shankar Nagar. Middle village: Madrahani. Tail-end village: Semara.

<sup>b</sup> One or more males employed off-farm.

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