

From Bucket to Basin: Managing River Basins to Alleviate Water Deprivation

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Summary

More than one billion people are deprived of access to water of sufficient quantity and quality to meet even minimal levels of health, income, and freedom from drudgery. Poor women are particularly affected. It is primarily women who bear the daily burden of hauling heavy buckets long distances to meet the domestic water needs of their families. In the world's poorest communities, women are also excluded, even more so than men, from many income-generating opportunities that are dependant on water, such as irrigated farming. Water has never been a "free good" for poor women.

Meeting the multifaceted water needs of poor men and women should be a priority in water policy at the international, national, basin and community levels. Policy makers generally recognize the need for urgent action, but today there are no agreed-upon concepts integrating gender, poverty and water that:

- define the nature of the problem for poor people
- capture the multiple aspects and linkages of poverty and water deprivation in a comprehensive way
- analyze the different processes in society that contribute to the problem and perpetuate it
- support policy makers in their efforts to alleviate water-related poverty

This paper on poverty, gender, and water aims to fill this gap by elaborating the concept of "water deprivation" and its policy implications, with a special focus on irrigation. The second aim of the paper is to elaborate the gender dimensions of irrigation.

Defining "Water Deprivation"

The term "water deprivation" refers not only to a *state*, as in "one billion people live in a state of water deprivation," but also to the *processes* that contribute to the creation and perpetuation of that state. Water deprivation is primarily human-made, not the inevitable result of natural scarcity. To eradicate the state of water deprivation, it is necessary to short-circuit the processes behind it. Two fundamental questions must be addressed: What decision processes govern the development of physical infrastructure to distribute water resources to people's homes, fields, and enterprises—to the benefit of some and the exclusion of others? What processes determine resource allocation in situations of water scarcity?

Water deprivation is "asset-related" in the sense that society's technological, institutional and financial resources for water infrastructure development and use hardly reach the poor. Water deprivation is also "direct deprivation" if the more

powerful and larger water users consume scarce water resources and impose the needed savings on the poorer sections of society. To ensure that *all* people receive the water they need for basic well-being, policies need to address both aspects of deprivation.

Promoting Women's Productive Businesses

Endowing poor women with irrigation assets and water for their own farm businesses is an effective way to alleviate poverty. Especially women who are *de jure* and *de facto* heads of households and women who manage their own farm businesses alongside those of their male kin need direct access to irrigation water. However, irrigation agencies tended to exclude women categorically from access to water. Recently, some agencies developed approaches that are based on a sound understanding of the prevailing gender relations in irrigated agriculture. These agencies include both poor men and women stakeholders from the early phase onwards in the planning process for infrastructure installation and creation of water user associations.

Developing a Comprehensive Strategy

Defining and combating water deprivation starts by identifying poor men and women; assessing their current water use for multiple purposes, including income generation; and tracing which needs are still unmet, and why. Because water deprivation affects various dimensions of well-being, strategies to meet basic water needs should be comprehensive and multipronged.

The following list of policy recommendations does not claim to be definitive, but it does offer some general orientations for action, given what we know now. More site-specific and comparative research needs to be done to serve as a foundation for comprehensive strategies to combat water deprivation.

- *Analyze poor women's and men's current water use for multiple purposes; identify their unmet water needs, and monitor any negative impacts of growing competition for water.*
- *Target new water infrastructure development and rehabilitation to poor women and men through clear, equitable water rights, appropriate technology, inclusive management institutions, partly subsidized collective schemes on poor people's land, and competitive water markets that deliver good services at low costs.*
- *Promote women's active inclusion in irrigation infrastructure development programs and water user associations.*
- *Establish a water reserve to meet poor people's needs in closing and closed basins, where competition for water is growing. Poor men and women should*

have access to more water of better quality. The responsibility of water-saving should be borne by nonpoor users.

- *Require an ex ante assessment of new water policies and programs* by national and international agencies indicating a positive impact on poor women's and men's water use, before approval. Monitor and evaluate implementation.
- *Prevent pollution of surface water and groundwater*, applying the "polluter-pays" principle, retroactively.
- *Promote information exchange, dialogue, capacity building, and training on strategies to combat water deprivation* among poor women and men, other water users, urban and rural local community organizations, civil societies, private water delivery enterprises, government agencies, and researchers from all water sectors—from local to international levels and from user level to policy level.

Areas for further research:

Assess the potential impact of water-related anti-poverty strategies in the context of overall economic development and off-farm employment opportunities for the poor.

Identify constraints and opportunities of different water technologies for poverty alleviation.

Study and test, in varying contexts, the poverty alleviation potential of targeting to enhance poor people's access to water, inclusive organizational designs, competitive water markets, and stepped pricing systems.

Analyze the impacts of competition for water on poor people and their coping strategies, including arrangements that safeguard their access to water resources and that stimulate nonpoor water users to adopt measures for water saving.

If water is scarce, evaluate options for productive water use, in on-farm and off-farm employment in rural and urban areas, in terms of "jobs per drop for the poor."

Identify the conditions under which women's irrigation businesses can be promoted and under which women can effectively participate in water management institutions at scheme and basin levels.

Chapter 1

INTRODUCTION

Poverty is increasingly recognized as a problem that needs to be brought to the center stage of mainstream water policy and intervention. Carrying buckets, drinking unsafe water, and also lacking the access to water to improve subminimal incomes are increasingly seen as important aspects of integrated water management at basin level. However, there are no agreed-upon concepts integrating poverty, gender, and water that:

- adequately define the nature of the problem for poor people
- capture the multiple aspects and linkages in a comprehensive way
- allow an analysis of the different processes in society that create and perpetuate the problem
- orient policy makers in their efforts to alleviate water-related poverty

The first aim of this paper, therefore, is to fill this gap by elaborating the concept of “water deprivation” and by highlighting the policy implications.

Water deprivation is part and parcel of poverty, which is living below the standards, that society judges as minimally required for human well-being. Water deprivation jeopardizes health, incomes, and freedom from drudgery. This *state* of multidimensional, subminimal well-being is the problem that water policy makers must address if they aim to alleviate poverty. To do so, insight is needed into the water deprivation *processes* that contribute to this state and perpetuate it. To understand and combat this state, the key comprises two forms of water deprivation processes. They are related to the nature of water, which is that water only becomes suitable for human use, if one has the physical means to abstract, store, or divert and convey water to homes, fields, and enterprises, and if there are water sources to tap from.

The first water deprivation processes are those by which society develops and distributes the physical means to abstract and convey water. Such water infrastructure development benefits some, but excludes others. Poor people are often assetless in this sense. One aim of policy and intervention is to endow poor people directly or indirectly with these assets. The second type of water deprivation processes concerns the sources from which water is abstracted. If water in a basin becomes scarce, water consumption by one directly affects the water resources available to another. One water user deprives another in a very direct and literal sense. Poor people are often disproportionately affected. Their means to tap water are weaker, if they have the means at all, and their voices are least heard. Because of this they are at risk of being even further deprived of water. Any hope for alleviating water deprivation vanishes, unless basin-level water management institutions give utmost priority to the

interests of these people who are most water-insecure. The analysis of these underlying social water deprivation processes debunks the myth that water deprivation is primarily the result of natural scarcity of water.

Chapter 2 gives a general sketch of “water deprivation.” The description of asset-related deprivation processes focuses on irrigation, which consumes 70 percent of the water resources. It is also a key input in agriculture, the most important income base of the rural poor. Improved water management is an important way to increase incomes when land resources are limited. Moreover, smallholders are the largest group of the poor, at least in Asia and sub-Saharan Africa.

The second aim of this paper, building upon the focus on irrigation, is to elaborate its gender aspects. Improvement in poor women’s incomes is increasingly seen as an effective strategy for poverty alleviation, so attention to the ways in which water can better benefit both men’s and women’s *businesses* is growing as well. This requires an analysis of the processes that have either enabled women to engage in water-dependent businesses, like agriculture, or deprived them of such opportunities. Evidence shows that irrigation agencies have played an important role. In the past, they persistently assumed that irrigation was men’s business. In a number of cases, their actions have even undermined women’s existing businesses and further polarized gender relations. However, as some agencies have become sensitive to the prevailing gender relations in agriculture and have included both women and men in irrigation development from the initial planning stage onwards, poor women’s incomes have increased, along with those of men.

Chapter 3 highlights the implications for pro-poor and gender-inclusive water policy and interventions under growing water scarcity.

Chapter 2

WATER DEPRIVATION

Water Deprivation: Living Below Minimum Standards of Well-Being

Poverty Means Water Deprivation

It is widely recognized that water is vital for multiple and universally agreed-upon aspects of human well-being like health, economic security, and freedom from drudgery. Water deprivation is the other side of precisely that coin. More than a billion poor people are deprived of access to water of sufficient quantity and quality to meet even minimal levels of health, incomes, and freedom from drudgery. Poor women, moreover, disproportionately bear the burden of the unpaid chore of fetching water for domestic use, while they are excluded from many opportunities to create wealth with water. Water has never been a “free good” for women. If poverty is defined as living below generally accepted standards of well-being for multiple and interrelated dimensions of well-being, water deprivation is typically one of its characteristics.

Water Deprivation Is Multifaceted

One facet of water deprivation, that is widely recognized as a typical characteristic of poverty, is subminimal access to near, safe water and sanitation facilities, which results in severe water-borne diseases and often in exorbitantly high costs in labor or cash. But a comprehensive approach is needed, one which recognizes that poor people’s water needs are multifaceted. Water especially affects income generation, another major element of well-being of which poor people are typically deprived. Poor people’s self-employment and wage employment opportunities in urban and especially rural areas depend on water, in addition to other factors.

The dependence on water is most direct and evident for a large, and in many countries the largest, group of poor people: smallholders. Because the land resources of poor farmers are typically very limited, a major income-generating strategy is to improve the agricultural output of their holdings through intensification. Among the many factors that enable intensification, a crucial one is water in the form of year-round irrigation, supplementary irrigation, and water harvested and conserved with a range of water management techniques. It improves yields, allows for better-yielding varieties, enables continuing production during the otherwise slack season, and, last but not least, reduces risks due to erratic rainfall (although risks associated with the higher investments or failing water delivery are added). Harvests used for household consumption and sale directly contribute to food security and fulfillment of monetary needs. More substantive wealth creation and even escaping income poverty through intensification often depend on the access to markets and rewarding prices. If market

The number of poor people are increasing

Although living standards have risen over the past 25 years, 1.2 billion people still live on less than a dollar a day. In many countries in Asia, where there has been a reduction in the percentage of the population below the poverty line, the absolute numbers have continued to increase with the growing populations. In sub-Saharan Africa, there has been an absolute increase in numbers and in many countries, there has also been a relative increase in the proportion of the poor. In Latin America and the Caribbean, the debt and development crises have severely aggravated existing pockets of poverty.

The poverty line of a dollar a day suggests that some 60 percent of the world's poor live in India and China—and that 12 countries, each with more than 10 million people in poverty, account for 80 percent of the world's poor (e.g., Brazil, Nigeria, Indonesia, Philippines, Bangladesh, Ethiopia, Pakistan, Mexico, Kenya, Peru, Nepal) (World Bank 1998).

Population living on less than a dollar a day in developing regions, 1987 and 1998.

	Number (millions)		Share of population (%)	
	1987	1998 (estimated)	1987	1998 (estimated)
East Asia and the Pacific	415.1	278.3	26.6	15.3
Eastern Europe and Central Asia	1.1	24.0	0.2	5.1
Latin America and the Caribbean	63.7	78.2	15.3	15.6
Middle East and North Africa	25.0	20.9	11.6	7.3
South Asia	474.4	522.0	44.9	40.0
Sub-Saharan Africa	217.2	290.9	46.6	46.3
Total	1,196.5	1,214.2	28.7	24.3

Source: World Bank Poverty Net Data on Poverty October 1999.

<http://www.worldbank.org>

niches can be found, growing labor-intensive, irrigated, high-value crops on small rural holdings, or homesteads, or peri-urban plots considerably improves incomes.

Water is also indispensable for both smallholders and landless people for other rural income sources such as raising livestock. Trees and shrubs, which provide fuelwood, timber, fruits and medicaments, need water. Catching fish for family consumption can provide a major source of protein for poor households and can provide incomes for small artisan fisherfolk. Water is also needed for the various small industries and crafts, like brick-making, pottery or beer-making.

Poverty: A rural, agriculture-based phenomenon

In the early 1990s, it was expected that by 2000 poverty would be a predominantly urban phenomenon (UNDP 1990). This was already the case in most Latin American low- and middle-income countries, where urbanization rates were very high. But today, poverty in many developing countries is still predominantly a rural phenomenon. Data for the period 1985–1995 in 35 countries show that in 31 out of those 35 countries the proportion of the people below the poverty line in urban areas is lower and in many cases substantively lower than in rural areas (World Development Indicators, World Bank 1998/9). These higher proportions, combined with the absolute numbers in sub-Saharan Africa, South Asia, East Asia and the Pacific, where more than two-thirds of the population live in the rural areas (World Bank 1998), indicate that poverty is a predominantly rural phenomenon. It is expected to remain so for the next two to three decades. Industrialization and rural-urban migration are a path to increased well-being for a significant part of the rural poor, although many of the rural-urban poor migrants join the ranks of the urban poor—the unemployed, informally employed or badly paid wage laborers in the lower segments of the labor markets, living under the harsh conditions of the urban slums.

Data from 1988 highlight that agriculture was the main basis of income for 86 percent of the rural people in developing countries. Agriculture-based livelihoods had even become more important in Africa and Latin America over the earlier two decades. On the other hand, off-farm activities and nonagriculture employment provided incomes to an increasing percentage of rural population in the Near East (up to 27% in 1988) and Asia (up to 17% in 1988) (Jazairy, Alamgir, and Panuccio 1992).

In most developing countries, arable land per head of agricultural population declined between 1965 and 1988, with the exception of countries such as Argentina, Brazil, and Chile where the availability of land per capita increased due to an expansion of the land frontier, and/or a decline in agricultural population. These trends have continued since. Arable land area will still expand in Africa and to some extent in Latin America, but in Asia the land frontier has been reached. Decreasing sizes of per capita available land is primarily due to population pressure and affects farmers of all holding sizes (Jazairy, Alamgir, and Panuccio 1992).

Besides being direct water users and gaining from water-related incomes, poor people gain from wage employment in water-dependent businesses. The expansion of irrigated agriculture and expenditure-related growth during the last five decades provided massive wage employment and pushed up wage rates for both poor women and men. Infrastructure construction and maintenance have been identified as one of the few self-selecting poverty alleviation measures. It has created wage employment for men, and in countries where previous taboos against women's participation in construction are being lifted, increasingly for women as well—although the wage differences between men and women persist. Water used for off-farm employment, such as garment industries or mining, or urban employment also creates jobs for the poor.

Water deprivation in the economic domain, then, refers to the extent to which society denies to poor people this wide range of opportunities to create wealth with water. Poor people may directly use water for self-employment, or benefit indirectly in the case of wage employment in water-related businesses. The role of the input water among the many factors that impinge on employment creation may be trivial under certain conditions now. However, this will change if competition for water increases.

Strategies to Combat Water Deprivation are Multipronged

Because water deprivation impacts various dimensions of well-being, strategies to meet basic water needs should be comprehensive and multipronged as well. Sector boundaries need to be overcome and, at the same time, intra-sector differences need to be highlighted. People who lack access to sufficient water of sufficient quality are found in all sectors, drinking water, sanitation, irrigation, livestock, forestry, fisheries, and industries, in both urban and rural areas.

Water policy makers and interventionists who aim to alleviate poverty can adequately define the central problem in each specific context by:

- identifying poor people
- assessing their current water use for multiple purposes
- tracing which needs are still unmet, and why

The aim, then is to ensure that water primarily helps to improve the health and incomes of poor people, and that it is easily available at modest costs.

Applying such a problem analysis, which starts with poor people's multiple unmet water needs, is revealing and fruitful. For example, if applied in irrigation schemes, it will immediately highlight that poor people often use irrigation water for their domestic needs and are more dependent upon this source than their nonpoor neighbors who tend to have access to private domestic water supply facilities. Up till now, the male irrigation sector still has the strong tendency to see women's efforts to satisfy basic family water needs as a nuisance, if not as an illegitimate water use. Denying women this access to water burdens them even further. However, if the primary aim is to satisfy poor people's multiple unmet water needs, the solution is to change the design of irrigation schemes to include provisions for domestic and other uses, and to include multiple users in the hitherto very narrowly defined "water user associations."

Another application of cross-sector comparison is assessing the impact of water on poor people's incomes by estimating optimum ways for creating "jobs per drop for poor women or men," including self-employment, wage employment, on-farm and off-farm jobs, in both rural and urban areas. This information is crucial for gender-inclusive

Poor food buyers benefit from poor food producers

The main indirect relationships between water and poverty concern urban poor people and the landless rural poor. As net food buyers they may spend up to 80 percent of their incomes on food. A higher supply of their primary food sources through irrigation lowers price levels and increases price stability, and, thus, improves consumption. This underlines the importance of a productive agriculture sector.

Ample evidence suggests a synergy between promoting smallholder irrigated production and agricultural growth. Studies that have assessed the influence of holding size on land productivity in the green revolutions areas like India, Pakistan, the Philippines, Sri Lanka, Bangladesh and the Philippines, show that smallholdings, compared to large holdings having access to irrigation, tend to:

- have higher net sown proportions of their land irrigated
- have higher cropping intensities
- apply more fertilizer per unit of cultivated land
- cultivate more diversified, higher-value, and more labor-intensive crops
- obtain higher yields per crop per unit of land

(cf. Berry and Cline 1979; cf. Hossain 1989; Boyce 1987; Jazairy, Alamgir, and Panuccio 1992).

This inverse relationship between farm size and land productivity has existed throughout history and is worldwide. According to Sen (1962) the crucial explanatory factor for this inverse relationship is not the size of the holding as such, but the system of farming, i.e., whether it is wage-based or family-based. Family-based farming reduces supervision inefficiencies, while hiring and exchanging labor are on a more mutual basis. Hossain (1989) suggests that the need of poor families to meet the consumption requirements of all their members also compels them to work at below-average wage rates. This need to fulfill basic requirements for food encourages poor farmers more strongly than the better-off to adopt the green revolution package, including irrigation. Poverty induces technological innovation (Boyce 1987).

The inverse relationship between land productivity and farm size has not been found, however, in cases where the larger holdings are considerably better mechanized (Berry and Cline 1979). Studies have also shown smallholders are less productive in households that give priority to distant off-farm employment and that cultivate only intermittently or lease their land (Sobhan 1993; Castellanet 1992).

pro-poor integrated water management and allocation decisions under growing water scarcity.

An adequate definition of the problem is essential. However, a description of an undesired state will not give insight into the processes that contribute to the problem and potential solutions. Processes that create and perpetuate a state of water deprivation are concerned with both the means to access water (see the following section on Depriving poor people of water assets.) and the water resources themselves (see section on Depriving poor people of water sources).

Depriving poor people of water assets

With regard to the first, the ways in which the physical means for water abstraction or conveyance are developed and are appropriated tend to leave out the poor. Available evidence suggests that neither state-sponsored and subsidized development nor private investments so far can be termed as pro-poor. While the well-off had easier access to infrastructure and were able to tap the available water sources in sufficient quantities and quality to satisfy their various needs, the poor were often excluded, or included under adverse terms. Poor people are “water-assetless.”

This trend is well documented for urban drinking water supply. In spite of huge public subsidies it is primarily the poor who still depend upon collective taps, expensive private water vendors, or traditional and often neglected drinking water systems. Moreover, the inability and unwillingness of water agencies to properly assess women’s preferences for site selection, technology choice and management forms have reduced the beneficial impacts of these interventions.

In irrigation, evidence is still piecemeal and there seems to be quite some variation. In annex 1 data are given for 20 countries on the percentage of the area cultivated by smallholders that they have under irrigation, compared to the national percentage of total cultivable land that is irrigated. These data highlight that in 9 countries, smallholders proportionally have as much land under irrigation as the national average or more, while in 11 countries smallholders have less land irrigated than the national average. As a result of skewed land distribution, the absolute area irrigated by a considerable number of smallholders is much smaller than the national average would suggest.

If the analysis is made for each of the three forms of irrigation development—state-initiated subsidized irrigation, traditional irrigation, and modern private irrigation—both processes of exclusion and inclusion can be seen. A better understanding of these processes provides important lessons for more effective pro-poor irrigation infrastructure policy and implementation.

Depriving poor farmers of creating irrigation assets

Past subsidized irrigation development has disproportionately benefited large holders. This could be the result of two possibilities: a) agencies selected the sites of the schemes in a neutral way but the existing skewed distribution of land meant that most benefits accrued to the few larger holders, or b) agencies even further favored larger farmers by preferably selecting their land for improvement. Governments promoted the latter in the belief, which now has been recognized to be false, that large farms were more efficient, and that the sector’s best hope lay in capital-intensive modernization. Smallholders, on the other hand, were viewed as unlikely to respond to market incentives. In many economies, therefore, the excessively large and capital-intensive farms that employed very little labor enjoyed preferential access not only to irrigation development but also to credit and other subsidies. Social and political influence also led to preferential installation of infrastructure on the land of the larger farmers and to their stronger control over water, even if the irrigation

development program primarily aimed at poverty alleviation. In these ways sizeable state subsidies benefited the larger farmers most. If we take irrigated land size as a proxy for water use, larger holders now use the bulk of water.

Nevertheless, wage employment creation for agricultural producers and lower food prices for net-food buyers still alleviated poverty in an absolute terms. On the other hand, in a number of schemes in which land was expropriated and reallocated, poor occupants who used the site of the scheme and reservoir for small-scale irrigation before the project lost their access to land, without being sufficiently compensated.

Traditional collective schemes in hierarchical societies, for example in South Asia, reflect these hierarchies in the distribution of irrigated land and control over water. However, the recent decay of, for example, tanks in South India, due to the erosion of collective management arrangements, has particularly affected poor farmers and users of the water for other purposes. They do not have access to the better options that wealthier farmers have chosen over maintaining traditional schemes.

Modern private irrigation development also excluded the poor as asset owners because only the better-off farmers can afford to purchase or borrow the money to purchase the technologies that are currently for sale on the shelves, such as mechanized pumps, sprinklers and drip irrigation. These technologies are typically designed for large plots and large-scale farming. However, in India, Bangladesh, and Pakistan, different opportunities of mechanized pump ownership are strongly mitigated by the fact that the pump owners sell their excess water and thus create a competitive water market. This also occurs in conjunction with canal irrigation. Millions of poor smallholders benefit from this.

Creating irrigation assets for the poor

In all three forms—subsidized irrigation development, traditional irrigation, and modern private irrigation—there are also processes by which primarily poor farmers are endowed with irrigation assets and access to irrigated land and water. Action along these lines in the future is likely to achieve positive results. Poor farmers were well served in the following instances.

In subsidized irrigation, if:

- settlement schemes, for example in Sri Lanka and Ethiopia, or other subsidized schemes were accompanied by well-targeted land expropriation and allocation programs¹

¹In the Chingazo-Pungales scheme in Ecuador and the Aandhi Khola scheme in Nepal, the water user association got a loan from a public institution and purchased certain pieces of land to redistribute for reasonable prices to those who had less land (Ecuador), or to those who were identified as the poorest (Nepal) (Martinez 1998). Measures were also taken to prevent poorer and less-informed farmers from being persuaded to sell their lands to other farmers long before infrastructure is constructed. The latter typically are informed in advance about the plans for irrigation development and the future increase of the value of the land (Chambers 1984).

- irrigation agencies purposively selected poor people's land for improvement in constructing subsidized schemes

Implications:

Although subsidized construction of new schemes is now out of favor, partial subsidization of collective schemes may still be justified on grounds of poverty alleviation. Moreover, in the past, poor farmers benefited little from state subsidies compared to larger holders. It is not logical to treat poor people on the same footing as the others when subsidies are stopped.

If subsidies are withdrawn, there is a case for the provision of long-term loans that are accessible to groups of poor women and men. There is evidence to show that poor people are more creditworthy than the well-off, and credit insurance arrangements can further protect both lending institutions and the poor against default and adversities. There is accumulating evidence that real ownership of externally initiated schemes can be created through participatory planning of construction and formation of water user associations, in which the prospective users choose the technology and build water rights through coinvestments in the construction (Coward 1986; Arroyo and Boelens 1997).

In traditional irrigation, if:

- poor egalitarian societies developed collective schemes, as has since long occurred in the Andean region, and also, to a lesser extent, if such schemes were developed in hierarchical societies

Implications:

These schemes in egalitarian societies are to be well maintained. Traditional schemes in more hierarchical societies that have deteriorated are to be upgraded, if they satisfy the water needs of the poor users who do not have the alternatives that other water users may have.

In private irrigation (as owners), if:

- appropriate technology is developed and spread, that is low-cost in terms of up-front price and energy consumed and that is apt for use on very small plots, for example, the treadle pump (Shah et al. 2000).

Implications:

Appropriate technology development and dissemination are to be intensified in the future.

Pro-poor water charges in irrigation

In collective irrigation schemes in which water use can be measured, stepped tariffs would limit the costs for the small users and also encourage water saving by the larger water users. Labor obligations for construction and maintenance based on land size are more advantageous for the smaller holders than household-based obligations. If specific pumps are particularly used by poorer people, a reduction of electricity rates for such pumps benefits poor people.

In private irrigation (as buyers), if:

- competitive private water markets developed, as seen in South Asia, on which poor farmers buy water. These competitive groundwater markets deliver good water services at low prices for millions of assetless smallholders. Especially the availability of smaller, cheaper pumps, which are low-cost in operation allows less-well-off farmers to become owners as well, and also fosters competition. Many smaller pumps rather than one or a few larger ones would have this effect by itself. Moreover, less-well-off pump owners have not much land to irrigate themselves and strongly depend on the income from water sales to make their enterprise profitable, so their services tend to be better (Shah 1993).

Implications:

Water markets, also those in conjunction with canal irrigation, can be more pro-poor if technology is available that is relatively small, but still provides excess water that the owners cannot use on their own land.

If the hydro-physical environment allows competitive private water markets to sustain and if overabstraction can be prevented, competitive water markets have a high potential for pro-poor irrigation development.

Conclusion

To conclude, poor people have been generally less able to get access to the means to tap water of sufficient quantity and quality to meet basic needs. In the drinking water sector, even minimal requirements for a healthy life are not met, and the labor and financial costs are high. In the economic sector, the business unit of poor people is smaller, and so is their per capita water use, if they have access to infrastructure. In irrigation in particular, publicly financed irrigation and modern private irrigation development have tended to favor the larger farmers even further.

More poor farmers can gain access to irrigation infrastructure in the future if:

Tenancy

Vesting water rights and membership of water user associations in the tenant rather than in the landowner is efficient if tenants are already the actual irrigators, already fulfill obligations for maintenance work, already pay water fees either directly or indirectly in the tenure contract, and are more motivated than landowners to ensure the proper functioning of the scheme. Moreover, in irrigation schemes in which the majority of tenants are poor and lease-in land, this could also decrease tenants' dependency upon the landowner for water, and thus empower the poor. However, this strategy becomes complicated if the prevailing Land Tenure Reform law discourages any public registration.

- Collective infrastructure that is well targeted to poor people is either subsidized or stimulated by institutional credit. Either the site selection should ensure that poor people's land is improved, or land reform should be implemented on the selected site. Displaced people should be well compensated.
- Disintegrated traditional schemes that provided water to poor people are upgraded.
- Appropriate technology is developed and widely spread, and credit facilities are provided.
- Competitive water markets are promoted.

These asset-building strategies to meet poor people's basic needs are based on the assumption that water resources of sufficient quantity and quality are available in the basin. This raises the issue of the availability of sources to tap from and the second "direct water deprivation" processes that create and perpetuate a state of water deprivation.

Depriving poor people of their water sources

If freshwater resources in a basin are abundant, well-off people's ability to extract water, even in large quantities, does not *directly* negatively affect poor people. There are still the important trickle-down benefits for the poor as in terms of wage employment and food prices, as noted before.

However, the number of basins and subbasins in which all water resources are already committed and in which water used by one literally and directly deprives another from using water are growing. Moreover, growing pollution degrades water quality. Pollution and competition for water in a basin fundamentally change the scene.

As small water users, poor people play minor roles in causing scarcity and pollution, but they often bear the consequences disproportionately. In South Asia, declining groundwater tables have already shown that owners of the more expensive and deeper-boring wells were able to continue pumping, at least for a while. However,

hand pumps for drinking water and shallow irrigation pumps were the first to fall dry. As a result, women's burdens increased, and smallholders' plots that critically contributed to family income went out of irrigated production.

Poor people are less able to prevent people with more powerful water extraction technology and the louder voices in decision making from using and polluting large quantities of water, and from literally depriving them of the scant quantities of water they are using. In general, there are no basin-level institutions, and even if formal basin-level fora were developed, the interests of poor people are not likely to be represented. The further deprivation of those who are already deprived figures prominent only on the agendas of informal fora such as the NGOs (Hildyard et al. 1998).

In the future, the most likely scenario is, that without protective measures, competition for water will push poor people further below the subminimal levels of health and income, and increase drudgery, especially for women. It will hit poor people hardest because they have few alternatives for safe drinking water and even fewer employment opportunities. Thus, all prospects for a better future are lost, both for those who have at least some access to water and for those who do not have even that. Water security in closed basins is fundamentally the issue of those who are already the most water-insecure and the most strongly threatened to be further deprived.

If water policy and interventions are to combat water deprivation under conditions of competition, measures are needed to ensure that more water resources become available for use by the poor. Water that is currently being used to meet the needs of nonpoor users is to be reallocated to that end. Inequities from the past need to be redressed. The feasibility of this endeavor is not easy to conceive without effective basin-level regulatory institutions. Indispensable elements in this strategy include:

- recognition that poor people have little to save and spare water, and that instead they need more water of better quality for varying purposes to meet at least the minimal human needs
- water saving among the nonpoor and pollution prevention are strongly promoted
- combating water deprivation is the absolute priority of basin-level water management institutions
- accelerated development of new infrastructure targeted to poor people is actively promoted
- the vague requirement of "people's participation" in formal and informal basin-level water management institutions is sharply specified as inclusion of poor women and men, either directly or indirectly through genuine and accountable representatives

Combating water deprivation in South Africa through the National Water Act (NWA)

The purpose of the National Water Act of South Africa (Republic of South Africa 1998) is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled in ways that take into account, among other factors

- (a) Meeting the basic human needs of present and future generations.
- (b) Promoting equitable access to water.
- (c) Redressing the results of past racial and gender discrimination (NWA, Section 2).

The water-supply and sanitation sector receives high priority. The government has assessed the gap between the current level of water services and the minimal standards in all villages in South Africa. This dataset is publicly available on CD and supports decision making among all stakeholders involved.

The South African National Water Act explicitly states that the achievement of social equity is one of the considerations in setting differentiated charges (NWA, Chapter 5).

For the management of South Africa's basins, most of which are water-scarce, the National Water Act prescribes the formation of public catchment management agencies to which the Ministry can delegate and assign far-reaching powers over water allocation and licensing. For developing the proposal for a catchment management agency, consultations with all stakeholders in the river basin concerned must be held (Section 77.f). After appointing members to the board, the Minister may appoint additional members, in order to, among other reasons, achieve representation of disadvantaged persons or communities, which have been prejudiced by past racial and gender discrimination in relation to access to water (Section 81.f).

Intra-sector differences within agriculture are addressed, for example, by proposing two representatives: one representative from the large-scale (white) farmers and one from the smallholder (black) farmers, for example in subbasins of the Incomati Catchment Management Agency. In the ongoing public consultations for the proposal of the Olifants River Catchment Management Agency, it has been recognized that smallholders, the majority of whom are women, have not sufficiently been reached. They are typically not organized yet, while the large-scale farmers are. A new round of consultations among smallholders has been initiated, building upon informal networks and NGOs among the smallholders. This is to lead to a Smallholders Forum that will have a direct input in the Catchment Management Agency.

- a water reserve to meet poor people's water needs is defined and quantitatively estimated and all means to implement priority allocation according to this reserve are exploited

Chapter 3

GENDER AND IRRIGATION

Promoting Women's Businesses

Deprivation along gender lines has already been mentioned for domestic water supply and sanitation. This section elaborates the gender dimensions of productive water use, particularly in irrigation.

Promoting poor women's irrigation businesses is the crucial contribution that irrigation policy and intervention can make to the widely endorsed policy priority of improving poor women's incomes. The rationale for this policy is manifold. Especially among the poor, the incomes of both men and women are required to meet basic family needs. Reportedly, women's incomes benefit the family relatively more than men's because women spend a higher proportion of their incomes on family expenditures than men do (Agarwal 1994). In female-headed households women's incomes are usually the major source of income. Lastly, women's own economic security has proved to be a crucial micro-level factor to explain a macro-level reduction in fertility rates (Safilidou 1991).

A major obstacle for implementing the promotion of women's irrigation businesses is the persistent assumption that the *managers* of the businesses for which irrigation water is an input are men. The implications of this assumption are that men have the primary responsibility for field irrigation; they should have all the water rights and responsibility for the obligations, negotiate the effectuation of their water rights; should participate in all formal and informal decision making, and are the exclusive investors and owners of private assets. As a corollary to this, women would not directly need irrigation water, and not be the primary members of the water user association, but at best they are proxies for their male kin. In short, women would not be key stakeholders in irrigation. Women would nevertheless be involved in irrigated agriculture if they assist their husbands in agricultural activities and even in field irrigation. Women would of course benefit from the irrigated crops to the extent that this is used for family welfare. Moreover, as mentioned above, they could be users of irrigation water for purposes other than irrigation. Such relationships could still justify women's stronger involvement in management than is the case now, but not as key stakeholders.

This assumption has been especially strong among intervening irrigation agencies that developed new infrastructure, with high subsidies, in the past. But local reality is much more varied. In many farming systems both men and women are farm managers and irrigators, which fact has been totally overlooked by irrigation agencies.

In the next section, the gender dimensions of agriculture are discussed in general. It shows why this first assumption is wrong and, therefore, why its implications are not valid either. Worldwide, women have their own farm businesses for which they themselves need water, or they are keen to develop those businesses. And if women farm together with their male kin, this is not universally as unpaid and right-less “helpers.” So, under a range of conditions, women need direct access to water. The issue is that these needs are not well met, if irrigation is perceived as a male activity and basically controlled by men. Especially at the higher levels of water management decision making, then, women are strongly excluded.

Then, in the section on Gender at Agency Level: Women’s Exclusion and Inclusion (p.20), the consequences of interventions by irrigation agencies that imposed this norm, are discussed. It shows that women even lost rights to irrigated land and water that they had before the project, and that the direct benefits of the highly subsidized “free good” went exclusively to men. Several agencies have realized this bias and changed their intervention approach. They have built upon the prevailing gender relations by including both women and men farmers in the early stages of the process of construction or institution building. This entails important lessons for gender-balanced interventions in the future.

Gender at the Farm-Level: Women Have Their Own Businesses and Need Water

Women are Farm Managers

Two situations in which women manage their own farm business are the following. Women who *de jure* or *de facto* lead their households are usually responsible for all or the largest part of their households’ farming. Second, women have their own intra-household production unit, as a result of cultural patterns in the specialization of production along gender lines. Women’s plots in many African countries are an example. Homestead cultivation in Indonesia or Bangladesh is also primarily women’s domain (Westergaard 1993). These women-managed businesses are certainly market-oriented, and sometimes even stronger than men’s farming activities.

Women farm managers do not necessarily own the land they cultivate. Women who cultivate the lands of their in-laws, often have lifelong use rights, which are quite secure at least until a divorce from, or the death of, the husband. In fact, women may be more interested in long-term investments in improving a piece of land than, for example, tenants. The assumption that only landowners are farmers has seriously contributed to the invisibility of many women farmers and their water needs, and indeed their other needs for credit, training, access to markets, etc.

Does agriculture feminize or do women become more visible?

What is called "the feminization of agriculture" is at least partly the result of the better visibility and appreciation of women as heads of households and women's agricultural work.

In the past, estimates of female-headed households often undercounted their real numbers, because in most countries a man was still perceived as the 'boss' and the head of the household. More recent and better concepts and research methodologies reveal both higher numbers of female-headed households and larger involvement of women in agricultural work. For example, the 1988 ratio of female-headed households in Latin American and the Caribbean is 17 percent according to the data of Jazairy, Alamgir, and Panuccio 1992. A more recent study (IICAIDB 1994) shows that in Central America, households headed by women account for between 29 and 48 percent of the total cases analyzed. In the Andean region, the number of such households ranged between 29 and 55 percent. Types of female-headed household that often have been missed in the past, are the consumption and production units in polygamous households headed by the respective wives.

The proportion of *de jure* and *de facto* female-headed households varies between and within countries. For example, in South Africa and southern African countries the proportion of female-headed rural households and women-led farms in incidental districts may go up to 50 to 90 percent (Safilidou 1994). In Zimbabwe's communal areas, women constitute 61 percent of the farmers and comprise at least 70 percent of the labor force in these areas (FAO 1998). In rain-fed and irrigated agriculture in the former South African homelands, their proportion is estimated to be 70 to 90 percent (Makhura and Ngqaleni 1996; Van Koppen 1999).

The extent of land cultivated under the control of women, whether in male-headed or female-headed households is also often underestimated. In Burkina Faso women cultivate independently one-fifth to one-quarter of the total land (Imbs 1987; Burkina Faso, Ministère de l'Agriculture et de l'Élevage 1989).

Even if cropping is men's business, women's role may still be considerable. In some cases, there are joint enterprises in the literal sense where it is not only the labor that is shared, but also land and other resource rights, decision making and, say, the output, as seems to occur in places in Madagascar and some Andean regions. But in other situations women are not involved at all, as is the case in some high-caste rural farm households in South Asia.

In general, women's participation in male-managed farming is stronger among the poor. This is valid if one compares women's participation in farming in wealthier and poorer countries, as annex 2 shows. It is also found within countries. Studies in low-income countries like India and Bangladesh show a stronger participation of women in family farming or in the agricultural labor force among poorer households than among the better-off (Agarwal 1986; Safilidou and Mahmud 1989). In Bangladesh, it was also found that in poorer households, women and men make important farming decisions more often jointly than the better-off respondents (Safilidou and Mahmud 1989).

Women are most productive if they have access to inputs and human capital and control the output

Two studies that compare the land productivity of irrigated plots under women's management to that under men's management indicate a higher productivity of female-managed plots. This was the case in the Dakiri scheme in Burkina Faso (Zwarteveen 1997). In Senegal, a higher density and higher-variety of crops were observed in women's irrigation schemes compared to men's schemes (Deuss 1995).

Most estimates of male-female differences in technical efficiency show that male and female farmers are equally efficient managers, controlling levels of input and human capital (Quisumbing 1996; Udry et al. 1995; Adesina and Djato 1997). In one Kenyan case (Mooock 1976), a simulation model predicted a 22-percent increase in women's yields in maize, bean, and cowpea plots if women farmers were given the human capital and input levels of male farmers (Saito, Mekonnen, and Spurling 1994: cited in Quisumbing 1996).

Women's productivity also depends upon their control over the output. In a Kenyan study by Ongaro (1988), the introduction of new weeding techniques by female heads of households increased yields by 56 percent and that in the farms of male heads increased yields only by 15 percent. Ongaro argues that female household heads may have a greater incentive to adopt better weeding practices (traditionally a woman's task) when they control the proceeds of their increased effort (cited in Quisumbing 1996; citing Elson 1995).

Jones (1986) and Carney (1988) studied the relation between women's labor input and their control over the output in the SEMRY irrigation scheme in Cameroon and in the Jahally Pacharr irrigation scheme in The Gambia, respectively. Lack of control over the output of husbands' production units and too-limited compensation by husbands were important reasons for women to reduce their overall labor input on their husbands' irrigated plots to the minimum level of culturally defined obligation (Jones 1986; Carney 1988). This was also one of the reasons for women in the Mwea settlement scheme in Kenya to completely abandon irrigated agriculture and to return to their original villages (Hanger and Morris 1973).

Ethnicity and caste play a role as well in women's participation in agriculture in male-headed households. In India, tribal women are more active in farming tasks and decision making than Hindu women, for instance (Agarwal 1994). In Africa, patterns in the division of productive activities also vary between ethnic groups that would be equally poor in terms of incomes.

Problems Women Water Users Face

If women's role in agriculture is strong, they play an important role in water management. For example, rice cultivation in inland valleys in West Africa is a farming system in which the proportion of women cultivating on their own accounts is high. Irrigated land tenure, water distribution and conflict resolution are also women's affairs, under the leadership of the women of the clans of the land chiefs. In one

traditional rice scheme in Southwest Burkina Faso, it is even taboo for men to enter the scheme during the cropping season, as this would cause inundation (Van Koppen 1998). In egalitarian farmer-managed irrigation systems in the mountains of Ecuador and Bolivia, both sons and daughters can inherit water rights (Krol 1994; Arroyo and Boelens 1997; Prins 1996).

Generally speaking, the more the farming is a male affair and the higher the level of decision making on scheme affairs, the stronger the norm and the reality that irrigation is a male affair. In South Asia, for example, women's role in male-headed households is often just helping in irrigation, or replacing men during their absence. If women are sent to fulfill the obligations for canal maintenance, this is usually counted in their husbands' names. Attendance of informal meetings in bars and teashops and, even more so, attendance of formal meetings on water management are left to men. In extreme cases, like in Pakistan's canal irrigation, even the suggestion of women touching field gates may provoke strong disapproval, at least in the higher caste. In male-managed farms, the main individuals responsible for irrigation are men who are vested exclusively with water rights and membership of water user association.

It is men who invest and own private equipment if the business is theirs. Women and children contribute labor by, for example, pedaling the treadle pump, and they also enjoy part of the higher yields (Shah et al. 2000). However, this does not affect the basic production relationship which is that men make the final decisions over the farm business and its output.

In male farming systems there is always a smaller or larger minority of women who manage their own farms and need water themselves. A common practice in such schemes is that women solicit men's mediation in ensuring water for their plots, fulfilling labor obligations, and especially in representing them at meetings. This may work well, especially if water is abundant, as was found to be the case in Peru (Lynch 1991), Ecuador (Bastidas 1999) and also for better-off women in the head ends in the Chhattis Mauja Scheme in Nepal (Zwarteveen and Neupane 1996). But male mediation was also found to be time-consuming entailing high costs, if it worked at all. In the rainy mountainous areas in Kenya, where local law often forbids women from acquiring water rights by contributing to construction work, women are reported to be facing high transaction costs in mobilizing others to do the work, or in purchasing water from men who are legitimate right holders (Adams, Watson, and Mutiso 1997). Women's marginal position in the irrigation hierarchy also relegates them to the less-favorable night turns, as observed in Nepal (Von Benda-Beckmann et al. 1996).

In specific cultural contexts, women are not supposed to do maintenance work and they must find men to do this instead. If women do not find such men they have to pay fines for nonparticipation. Women would prefer to come themselves, but when they do so, they are, for example, laughed at and do not try again. Prohibition from maintaining the canals, as women used to do in the past, is also newly imposed by

governments. Tanzanian women complained that they could hardly protest any longer when they did not get their water turn (Van der Grift 1991).

To conclude, women who need water for their businesses in an environment in which irrigation management is locally perceived as a male activity face gender-specific constraints in their access to irrigation water if it is scarce, in fulfilling obligations, and certainly in participating in decision making on water allocation.

Gender at Agency-Level: Women's Exclusion and Inclusion

Women's Exclusion and Inclusion in Female and Male Farming Systems

Ample evidence of the implications of state-subsidized construction and institution building in regions where farming was predominantly done by women or both by men and women, highlights two points. First, irrigation agencies themselves have been the strongest adherents and promoters of the norm that irrigation water should only serve men's businesses. Their action, based on this belief, has even eroded women's existing businesses, while only men directly benefited from the new irrigation infrastructure. Second, once this bias was recognized, some agencies successfully developed and implemented intervention methods that respect rather than polarize prevailing gender relations.

Some examples that illustrate the above-mentioned two points are:

- First, women lost their land rights and businesses in the inland rice valleys in West Africa that were upgraded by government projects. Later, the same agency reallocated the improved land to the former predominantly female title holders (Carney 1988; Van Koppen 1998).
- First, improved land in irrigation schemes was exclusively allocated to male heads of households. Later, women got their own plots as well, either in the mixed scheme (Diemer 1990) or in separate and women-only vegetable gardens or rice schemes (Projet Sensibilisation et Formation des Paysans autour des Barrages 1993; Carney 1994; De Lange et al. 1999).
- First, women who wanted to create their water rights through coinvestments in the construction of a new scheme, as was the local custom, were literally sent home (Prins 1996). Elsewhere, agencies included both women and men in scheme construction and both obtained water rights (Arroyo and Boelens 1997; Video. 1996. Irrigation in Andean community: A social construction).

The crucial element of the successful cases is the understanding of the locale-specific gender relations in agriculture and the agency-steered process of selecting, timely informing, and organizing both men and women at community level in a decision-making forum for joint planning of the future intervention. Since membership

A gender-inclusive participatory design process

In the intervention approach for an extension of the Licto irrigation scheme in Ecuador, local arrangements in which both women and men have water rights, were respected. The agency started by organizing both men and women in a local forum in which the proposed scheme layout was discussed and the construction activities were planned. Before the construction started, clear and inclusive membership criteria for the new water user association were established, and water rights were linked to obligations in the construction of the new scheme. So an inclusive organizational design was implemented at the very start. About 80 percent of all construction activities were carried out by women in *mingas* (working groups). The new water certificates were given in the names of both spouses of the household. Pregnant women also obtained water rights, but they were granted dispensation from carrying out construction work (Arroyo and Boelens 1997; CESA et al. 1996. Video on Irrigation in Andean community: A social construction).

of these fora was based upon the prevailing gender relations in agriculture, it was readily accepted by men. Or, in case there was no irrigated agriculture yet, the opportunities that were new to all were opened up to both men and women. This successful intervention method is replicable elsewhere.

Whereas respecting prevailing gender relations is basically a conservative approach, there have been few proactive efforts to redress the prevailing gender inequities. The Traditional Irrigation Improvement Program in Tanzania, which upgrades small water schemes in mountainous areas where local law forbids women to establish water rights, is one of the few exceptions (Kitunga 1989). This project challenges prevailing gender inequities by attempting to include women in planning and construction and to build water rights accordingly, and to conduct legal literacy training on women's land rights (TIP 1993).

In all mentioned cases, having stakes as irrigating farmers was more conclusive for water rights and management than having titles to the land. This line of thinking is also pursued by the Government of South Africa. The National Water Act of 1998 vests water rights in the persons who use the water productively on a certain portion of land, irrespective of the land rights of that person (Republic of South Africa 1998). Legal clarity on water rights and membership is needed for the creation of the new formal water user associations under the Act. Disconnecting water rights from landownership, but still attaching it to land, is especially relevant in the former homelands where communal land tenure prevails and ownership issues are extremely complex.

This arrangement also removes formal blockades for the many women farm managers and irrigators, who do not own the land they cultivate. They can now become formal members. As for tenants, this arrangement is likely to be more

Establishment of gender-balanced water user associations in dual farming systems

The importance of early inclusion of all stakeholders and membership criteria at the very start of new organizations and the need and scope for a better reflection of the stakes of both genders were realized by the Provincial Irrigation Unit in the Nyanza Province in Kenya. In this region, women contribute over 60 percent of all hours spent in rice farming, including irrigation, and manage 64 percent of all plots (Hulsebosch and Van Koppen 1993). Until the 1990s, the project's policy was to include predominantly men as members of water user associations. In its new policy, the project requires a minimum of 50 percent attendance by women at the preparatory meeting of new water user associations. Parallel to these meetings, women are organized in women-only groups and trained to articulate their interests and to participate effectively in the mixed meetings. This policy proved to be effective. Women's attendance in the preparatory meetings and committees today is higher than in the male-biased fora in other schemes that continued in the usual way. Furthermore, women's knowledge on project matters has increased, as well as the participation of women in water distribution and maintenance. Performance of women leaders is judged to be similar to that of male colleagues (Hulsebosch and Ombarra 1995). The Small-Scale Irrigation Program Dodoma in Tanzania also

efficient, if women are the actual irrigators, fulfill obligations for maintenance work, pay water fees, and are more motivated than their noncultivating husbands to ensure the proper functioning of the scheme.

Women's Exclusion in Male Farming Systems

In male-irrigated farming systems in South Asia, the assumption that men mediate on behalf of the women farm managers, such as women-headed households, is strongly adhered to and this leads to the already mentioned constraints in women's access to irrigation water if it is scarce, in fulfilling obligations, and certainly in participating in decision making on water allocation.

There is little evidence of effective approaches to tackle these problems, for example, in irrigation management transfer programs. Usually, membership is formally based upon landownership, which may build upon the prevailing taxing systems for irrigated land. But even women landowners reportedly still do not automatically get new shares in their names,² nor attend meetings in irrigation management transfer programs. Being male seems the most important criterion in practice.

²In the large-scale irrigation scheme of West Gandak in the Nepalese Terai, the government transferred irrigation management to the users from 1992 to 1997. This was accompanied by the sale of new water shares. Shares were allocated to the 10-year old grandson rather than to the widow who manages the farm and owns the land.

The active promotion of women in the newly established water user association committees under irrigation management transfer in India and Nepal,³ seems still a mainly token affair and not effective as yet to address the problems of women farmers. The appointment of women committee members is mainly done by the small group of male committee members, and the criteria for selection have often more to do with political affiliation than with stakes in water affairs.

Joint water titles for both spouses who cultivate an irrigated plot and sensitization on the legitimacy of such titles, could especially facilitate women in female-headed households in their hitherto tedious job to obtain water and fulfill responsibilities. Water user associations can impose joint ownership for all member households, or just actively promote the option but leave the choice to the households concerned.

Conclusion

In the past, irrigation agencies have created the perception that irrigation water is only used as an input to men's businesses. Since local gender relations were much more varied, imposing this norm in a universal way eroded women's existing businesses and water rights in more equitable traditional systems. Moreover, women who would have been keen to develop their own irrigation businesses were denied that opportunity. Later, some agencies effectively tapped this potential, although on a small scale. However, this showed that gender-sensitive irrigation interventions, which allocate new infrastructure to both women and men or established water user associations in a way that strengthens the businesses of both women and men, are feasible if:

- both male and female stakeholders are identified and brought on board in the earliest stages of agencies' local contacts and organization

³In this same West Gandak scheme, the policy of both the government and the new water user association was to actively include women as committee members. This policy led to the rapid appointment of a woman member in each of the 145 of the 173 newly established lowest-tier committees, and 10 percent women on the Board of Directors. However, interviews with 13 of these women office bearers highlight that most do not feel well informed about their tasks in the organization. Four women have no idea what their function implies; other women can indicate some of their tasks but express the wish to be further informed. Some women feel that relevant information is purposely hidden by the male members of the organization. The female members of the Board of Directors report that their fellow male farmers refuse to allow them to have a look at the constitution. Some women do not know if they really are invited for every meeting. Lastly, female office bearers face difficulties in being accepted by males who occupy a lower rank in the organization (Van Etten, Bajracharya, and Tuladhar 1999).

- water use for farming is the functional criterion for membership and water rights, either for women individually or jointly with their spouses

Women's positive responses to these new approaches suggest that there is greater scope for more fundamental approaches in which women already have their irrigation businesses with the needed water and in which the promotion of new and stronger women's businesses is proactively pursued.

Chapter 4

FROM BUCKET TO BASIN: POLICY RECOMMENDATIONS

Policy and Implementation

- Meeting multifaceted water needs of poor people to reach basic levels of health, income, and freedom from drudgery should be a priority in macro-level national, international, and basin-level water policies.
- Poor women's and men's current water use for multiple purposes, their unmet water needs, and any negative impact of growing competition for water, should be identified and monitored.
- Multipronged strategies to combat water deprivation should be developed and integrated into current programs.
- In open basins, where water resources are still being developed, new water infrastructure development and rehabilitation should be targeted to poor women and men, through appropriate technology, clear, equitable water rights, inclusive management institutions, partly subsidized collective schemes on poor people's land, and competitive water markets that deliver good services at low costs.
- In closing and closed basins where competition for water is growing, a water reserve for poor people's needs should be established, poor people's use of more water of better quality promoted, and water savings imposed on nonpoor water users.
- Pollution of surface water and groundwater should be prevented, applying the "polluter-pays" principle, retroactively.
- Governments and international agencies should approve new water policies and programs by national and international agencies only after an ex ante assessment indicates a positive impact on poor women's and men's water use, and should also monitor and evaluate the implementation.
- Women's water businesses should be promoted through women's active inclusion in irrigation infrastructure development programs and in building water user associations.

Analysis

- Linkages between poverty, gender, and water in different contexts need to be systematically analyzed as a basis for designing pro-poor policies.
- Constraints and opportunities of different water technologies, targeting to enhance poor people's access to water, inclusive organizational designs, competitive water

markets, and stepped pricing systems for poverty alleviation need to be studied and tested in varying contexts.

- The potential impact of water-related anti-poverty strategies need to be assessed in the context of overall economic development and off-farm employment opportunities for the poor.
- Research is needed to assess the impacts of competition for water on poor people and their coping strategies, including arrangements that safeguard their access to water resources and that stimulate nonpoor water users to adopt measures for water saving.
- If water is scarce, options for productive water use in on-farm and off-farm employment in rural and urban areas need to be evaluated in terms of “jobs per drop for the poor.”
- The conditions under which women’s irrigation businesses can be promoted and under which women can effectively participate in water management institutions at scheme level and basin level need to be further identified.

Water-Wise Movement

- Information exchange, dialogue, capacity building, and training on strategies to combat water deprivation need to be promoted among poor women and men, other water users, urban and rural local community organizations, civil societies, private water-delivery enterprises, government agencies, and researchers from all water sectors, from local to international levels and from user level to policy level. Water users who carry buckets now will be basin managers tomorrow.

THE DISTRIBUTION OF IRRIGATED LAND

For 20 For 20 developing countries data are available on the extent to which smallholders' land is irrigated, compared to the national percentage of irrigated land. In 11 countries, the percentage of area smallholders irrigate out of the total area they cultivate is lower than the national percentage of cultivable land that is irrigated. In the other 9 countries, the percentage for smallholders' irrigated land is equal to or higher than the national percentage. The proportions of the absolute irrigated areas are much strongly skewed, because of inequities in land distribution. So the absolute area irrigated by considerable numbers of smallholders is much smaller than that expected on the basis of the national average. If irrigated area is used as a proxy for water use, few larger holders use the bulk of water. The opportunities for wealth creation with water in the rural areas have largely been exploited by the better-off.

Table 1. Distribution of irrigated land according to holding size (1988).

	Smallholder farmer population (% of rural population)	Share of smallholders in total arable and permanent crop land	Area irrigated by smallholders (as % of total area cultivated by smallholders)	Area irrigated by smallholders (as % of nation's total cultivable land)	Total irrigated area (as % of nation's total arable land)
	(i)	(%)	(ii)	D = B*C	E
	A	B	C		
Bhutan	76	25	12	3	31
Bolivia	45	13	37	5	6
Ecuador	58	8	47	4	18
Guatemala	47	20	2	0	8
Haiti	81	63	4	3	13
Jordan	16	7	20	1	20
Lao, PDR	75	60	2	1	14
Madagascar	70	62	31	19	35
Mauritania	?	41	12	5	25
Morocco	36	11	15	2	15
Nepal	66	55	25	14	39
The Niger	23	13	4	1	2
Nigeria	83	71	3	2	1
Pakistan	?	14	76	11	73
Philippines	40	37	19	7	28
Sierra Leone	30	11	25	3	6
Somalia	21	11	8	1	18
Swaziland	77	60	2	1	33
Thailand	41	21	16	3	23
Yemen AR	67	50	18	9	23

Source: Jazairy, Alamgir, and Panuccio 1992 (A-D) and FAOSTAT 1988 (E).

Note that Jazairy, Alamgir, and Panuccio use 3 hectares as the cutoff point for 'smallholders,' which is high.

The cutoff points for 'smallholder' used in these particular studies are not known.

GENDER AND AGRICULTURAL EMPLOYMENT

The values and trends on men's and women's participation in agriculture in table 1 show, first, that both men and women are leaving agriculture, and that proportional changes for women are slightly stronger than for men. However, as men still constitute a larger part of the labor force in absolute numbers, the absolute number of men leaving agriculture may well be higher than the corresponding number of women. In such cases agriculture is really "feminizing."

Table 1. Employment in agriculture (as percentage of total economically active population in agriculture, industry, and services), and female participation in total labor force (as percentage of total labor force).

	Employment in agriculture (as percentage of total economically active population in agriculture, industry, and services)						Female % of total labor force **	
	Percentage of economically active male population *			Percentage of economically active female population *			1980	1996
	1980	1994	Change	1980	1994	Change	1980	1996
Low income	69	66	-3	80	76	-4	40	40
Low income-exclusive China/India	69	65	-4	79	75	-4	40	40
Lower middle	35	35	0	35	35	0	39	39
Upper middle	31	25	-6	23	14	-9	32	35
<i>Low and middle income:</i>								
East Asia and the Pacific	69	67	-2	75	72	-3	42	44
Europe and Central Asia	25	23	-2	27	22	-5	47	46
Latin America and the Caribbean		29			12		28	33
Middle East and North Africa	39	29	-10	53	55	+2	24	26
South Asia	64	59	-5	82	75	-7	34	33
Sub-Saharan Africa	69	65	-4	80	75	-5	42	42
High income	8	6	-2	8	4	-4	38	43
World	50	48	-2	56	52	-4	39	40

Source: World Bank 1998; Tables 2.5* and 2.3**

** World Bank 1998 defines labor force as the supply of labor in an economy. Unpaid workers, family workers and students are usually omitted.

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