

## Water Management and the Poor: Issues and Scales of Action

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**Abstract:** *Rural areas constitute the arena for increased competition for water, not only among rural dwellers, but also among rural and urban or industrial water users. In hillside areas water is important not only for household consumption, but also for productive purposes. Even where formal irrigation systems do not exist, the ability to water crops improves people's livelihoods significantly. Nevertheless, evidence from many parts of the world suggests the poor are gradually losing their access to water. Based on research conducted in the Nicaraguan hillsides, this paper illustrates the processes through which access to water is lost by some and gained by others. The paper shows how water management takes place in the context of complex, often conflictive, social relations at multiple, often overlapping, levels. Taken together, these two features make it difficult to imagine an effective organizational design to represent and negotiate different interests relating to water management of a single river basin or watershed. Nevertheless, the examples from the Nicaraguan hillsides reveal a possible alternative; in their attempts to gain secure access to water, new local-organization practices are emerging that increasingly seek to involve and engage district and national authorities in supporting their claims and adopting a stronger, negotiated, role in regulation and arbitration. Therefore, instead of focusing on the crafting of neatly nested water-management organizations (e.g. from the micro-watershed to river basin), this paper argues in favour of supporting the development of an enabling institutional environment. Key components of such an enabling environment include: (1) making relevant hydrological assessments widely available, (2) fostering broad-based and inclusive public-hearing processes, (3) enhancing the legal capacity, particularly among the poor, and (4) providing dispute-resolution mechanisms such as a water ombudsman, widely available and accessible, especially to the poor.*

**Keywords:** *Water management; Poverty; Enabling institutions; Stakeholder representation; Access mechanisms; Conflict-resolution mechanisms*

### Introduction

Water and poverty are increasingly being linked in public debate, partly due to the Millennium Development Goals (MDGs), in which access to safe drinking water is stated as an explicit part of the first MDG-to eradicate extreme poverty and hunger (United Nations, 2000). Due to the explicit focus on drinking water, several authors fear that the wider issue of the relationship between water and poverty may not receive adequate consideration (Black and Hall, 2003;

GWP, 2003; Soussan and Frans, 2003). Particularly in rural areas, the relationship between poverty and water management reaches far beyond the lack of access to safe drinking water. To the rural poor, access to and management of water is important for productive purposes: for ecosystem protection (e.g. to ensure the availability of fish and grazing resources); for environmental protection (e.g. flood as well as drought control); and finally for cultural (e.g. religious) purposes. Despite a widespread awareness that competition is increasing among users over access to water and, in

**Table 1.**  
Household poverty indicators and scoring system, Miraflores-Moropotente and Condega

Indicator	Score	Description
Access to land	33	Own >10 <i>manzanas</i> of land.
	67	Own from 1-10 <i>manzanas</i> of land, do not own land or own <1 <i>manzana</i> , but sharecrop with somebody or lease land.
	100	Do not own land and do not sharecrop or lease land.
Sale of agricultural products	33	Sell milk or milk products, tomatoes, coffee or more than half their maize and common bean production while still satisfying household needs for maize and common beans.
	67	Sell half or less of the maize and common bean production or are self-sufficient in maize and common beans.
	100	Do not sell any agricultural products and are not self-sufficient in maize and common beans.
Non-agricultural sources of income	33	Household member is a shopkeeper, engages in retail marketing of agricultural products, is a professional or receives remittances from relatives working elsewhere.
	67	Household member is a wage labourer, engages in seasonal migration, tailoring, and construction or prepares and sells food.
	100	Nobody in the household has non-agricultural sources of income.
Dependency upon employment as casual labourer	33	Nobody in the family works for others as casual labourer or doing housework.
	67	Household head works for others as a casual labourer for 1 mo/yr or less, or the son works for others as a casual labourer.
	100	Household head works for others as a casual labourer during >1 mo/yr, or housewife does housework for others.
Food security	33	Household did not experience food-shortage period during the previous year.
	67	Household experienced a food-shortage period that lasted <2 mo during the last year.
	100	The household experienced a food-shortage period that lasted >2 mo during the last year.
House ownership	67	Own their house.
	100	Do not own their house.
Capacity to deal with health problems	67	Nobody in the household had health problems during the last year, or household member had health problems but paid doctor's fee with own money or through social security system.
	100	Household member had health problems during the last year but unable to pay doctor's fees with own money.
Marital status	67	Household head is not a single mother.
	100	Household head is a single mother.
Livestock ownership	33	Own four head of cattle or more.
	67	Own <4 head of cattle or own oxen.
	100	Do not own cattle or oxen.
Animal ownership	67	Own animals other than cattle and oxen.
	100	Do not own animals.
Institutional credit	33	Obtained credit from an institution during the last 5 yr.
	67	Did not obtain credit from an institution during the last 5 yr.

such competitive situations the poor do less well than others in securing their access to water, there has been no coherent analysis of the relationship between poverty and water access and use (GWP, 2003). This paper seeks to illustrate some of the ways in which the rural poor currently lose or face increasingly insecure access to water as a step towards achieving a comprehensive understanding of the relationship between poverty and water management. It is argued that this loss of access to water is firmly embedded in the social relations at large, and thus cannot be understood to the exclusion of increasing access to water by non-poor and other sectors.

Ensuring “equitable, economically sound and environmentally sustainable management of water resources and provision of water services” has been the objective on several occasions since the 1992 Dublin Conference on Water and the Environment. To foster this objective an Integrated Water Resources Management (IWRM) approach is increasingly seen as necessary. IWRM is defined as “a process which promotes the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital eco-systems” (GWP, 2000).

A recurrent theme in the discussions of IWRM is how to ensure stakeholder participation—particularly of the poor and marginalized—and at what level such participation should take place. Drawing from emerging experiences documented from different parts of the world, as well as from field work carried out in Nicaragua, this paper argues that while the creation of institutional platforms to allow stakeholder participation in water-management decision-making may be useful, there is a need to look at the broader issue of water governance in order to address the concerns with poor people’s access to, and use of, water.

## Methods

This article is based on field research conducted from 2001–2004 in two adjacent areas in the northwestern mountainous region of Nicaragua: the natural reserve Miraflor-Moropotente in the municipality of Estelí (75 km<sup>2</sup>) and the rural part of Condega district (438 km<sup>2</sup>). Both areas contain dry plains at about 5–700 m altitude, sloping mid-altitude hillsides ranging from 700–1100 m, as well as mountainous cloud forest and cool, humid plains at altitudes about 1200–1400 m. The population

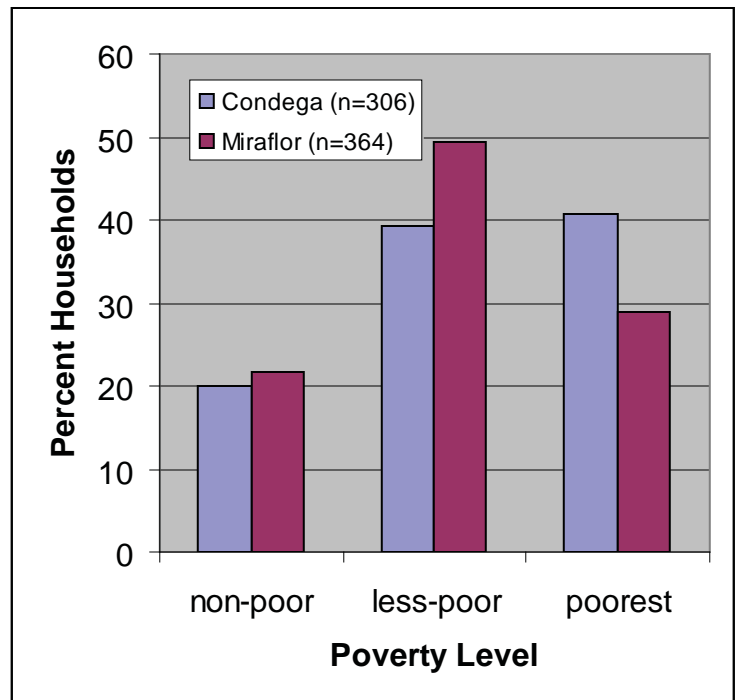


Fig. 1. Poverty levels in Miraflor-Moropotente and Condega District (rural), Nicaragua.

density is approximately 60 persons/km<sup>2</sup> in Miraflor-Moropotente and 70 persons/km<sup>2</sup> in Condega.

The field research had two objectives:

- *Gain insight into the organizing practices taking place in the context of natural resource access and management.* Semi-structured and conversational interviews were conducted with key actors from the local to ministerial level in addition to participating in meetings and workshops concerning natural resource management.
- *Develop a poverty profile for each of the two areas and determine whether a correlation exists between household poverty levels and different natural resource access and management strategies.* The poverty profiles developed for this research were based on people’s own perceptions of poverty, identified through well-being rankings. This approach was inspired by the reservations expressed by Sen (1981; 1985) regarding understanding and measuring poverty and well-being solely on the basis of income or expenditure data. It is in line with the increasing recognition among agencies such as IFAD (Jazairy et al., 1992), UNDP and the World Bank (e.g. Narayan et al., 2000) of the multidimensionality of poverty and the importance of including the poor’s own perceptions in poverty assessments.

**Table 2 .**

Description of household poverty index and threshold values defining the categories of non-poor, less poor and poorest households, Miraflores-Moropotente (N=306 households) and Condega (N=363 households)

Area	Minimum	Maximum	Median	Average	Threshold Values
Miraflores-Moropotente	45.4	94.0	72.9	72.9	non-poor: = <62.0 less poor: >62.0 and = <76.5
Condega	48.5	97.0	69.9	71.1	poorest: >76.5

The rankings were conducted in a sample of six communities, drawn from the two areas using a maximum-variation sampling strategy (Patton, 1980; Guba and Lincoln, 1989) with respect to factors such as population density, presence of social services (e.g. school and health), agro-ecological conditions and accessibility, all which could potentially lead to the existence of different perceptions of well-being. The descriptions of different poverty levels resulting from the rankings were 'translated' into indicators. Subsequent analyses examining the extent to which the use of specific indicators was associated with specific types of communities found no such association. Thus a single set of well-being indicators could be identified for both areas. The indicators (see Table 1) covered aspects related to sources of livelihood, basic needs satisfaction, animal ownership and access to institutional credit (Ravnborg, 2002a; 2003) and were made quantifiable through the formulation of a household questionnaire.

The questionnaire was administered to two independent samples, selected in a two-stage random-sampling procedure from each area, based on complete lists of households, drawn up specifically for this study. The samples comprised 306 households for Miraflores-Moropotente and 363 households for Condega.<sup>1</sup> A categorical scoring system was designed for each poverty indicator identified through the aforementioned well-being rankings, distinguishing among low, medium and high levels of poverty (33, 67 or 100 points, respectively). Based upon the questionnaire data, a score for each indicator was assigned to each household. Table 1 gives the indicators and describes the scoring system. The scores obtained on each of the eleven indicators for each household were then combined into a poverty index calculated as the arithmetic mean of the scores obtained on each indicator on the basis of which three poverty categories

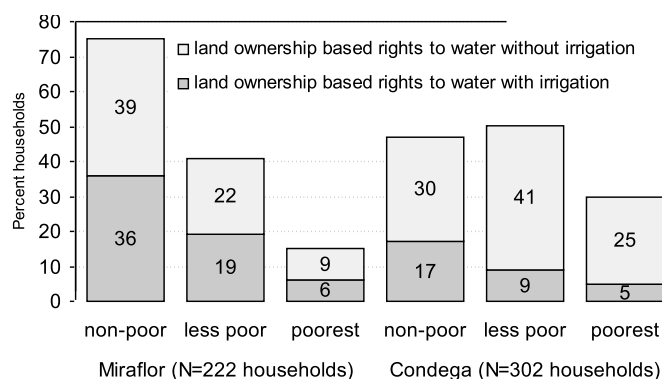
were established, namely, the poorest, the less poor and the non-poor households. Information was obtained on the households through the well-being classifications and the questionnaire survey of the households. Then the constructed poverty index and the resulting poverty categories were correlated with the ranking in order to test the validity of the index. Significant correlations between the constructed poverty index and the ranking results were found in all six communities where the well-being rankings were conducted (Spearman Rank Order Correlation test). Table 2 describes the household poverty index and the threshold values defining the three poverty categories. Figure 1 shows the distribution of households according to these poverty levels. Through this procedure, qualitative and relative poverty descriptions are converted into an absolute, but locally informed measure. For a more detailed description of the methodology, refer to Ravnborg (2002a, 2002b) and Ravnborg et al. (1999).

### Access to water in the Nicaraguan hillsides

The hydrological landscape of the Nicaraguan hillsides is characterized by many small springs and streams. Having access to such water resources [i.e. having the ability to use or otherwise benefit from them (Ribot and Peluso, 2003)] can make a significant difference to people's well-being (GWP, 2003).

In Nicaragua, as in many other countries, water is constitutionally established as a national heritage. Thus, no individual or corporation can own water in a legal sense, but can be granted concessions to a specified use of water for a given period by the Ministry of Public Works, Industry and Trade (MIFIC). In practice, however, at least in the hillsides, individuals who own land on which there is a water spring, a stream or aquifer enjoy ample rights to that water, at times including what Bruns and Meinzen-Dick (2000) label as use,





Percent land-owning households per poverty level by area

**Figure 2.** Ownership of land with water springs or streams and irrigation, by poverty level, in Miraflor-Moropotente and Condega District (rural), Nicaragua.

control and transfer rights. Rather than being backed by formal legal frameworks, such land ownership-based water rights tend to be negotiated locally and are thus embedded in social relations at large. An example of informal negotiation of water rights occurred in late 2003 when a widow sold her rights to water from a spring on her land to two communities who wished to establish a community drinking-water supply. In return for handing over her rights to the water source, the widow received payment in cash and in kind, as well as a series of commitments from the community representatives. Among these commitments was a priority to construct a house for her if a housing project resulted in the area and to ensure that a proportion of the water-user fee (to be negotiated in the two communities) would be paid to her (pers. com. with community representatives, Miraflor, March 2004).

In the Nicaraguan hillsides, the poorest households are significantly less likely to enjoy land ownership-based rights to water resources than the less poor and non-poor households.<sup>2</sup> Obviously, this reflects a skewed land distribution and a high degree of landlessness, which prevails in the area. However, even when considering only land-owning households (Fig. 2), the poorest are significantly less likely than the less poor and the non-poor to own land on which there is a water spring, or is crossed by, or bordering, a small stream or river.

Holding land ownership-based rights to water is, however, neither a sufficient nor a necessary precondition to enjoy access to water resources. In their

*Theory of Access*, Ribot and Peluso (2003) distinguish between property and access as “the right to benefit from things” versus “the ability to benefit from things.” Hence an individual or group that holds land ownership-based rights to use, control and/or transfer water according to locally accepted or negotiated customs and conventions may experience restricted access to that water due to lack of access to structural and relational mechanisms through which that access may be gained, maintained and controlled. These structural and relational access mechanisms include capital and technology, labour and labour opportunities, markets, knowledge, authority, social identity and social relations of friendship, trust, reciprocity, patronage, dependence and obligation (Ribot and Peluso, 2003). As is evident from poverty assessments undertaken all over the world (e.g. Narayan, 2000), as well as specifically from the Nicaraguan and Honduran hillsides (Ravnborg, 2002a; 2002b), poverty is characterized by lack of access to such structural and relational mechanisms, with the occasional exception of social identity and relations.

### Short-term loss of access to water vs. long-term lack of rights to water

Juan Rodriguez<sup>3</sup> is not among the poorest farmers in Condega District. He owns around 6 ha of land, has previously enjoyed access to institutional credit, and most of his children have finished primary school. He is even fortunate to be among the 46% of the less-poor households in Condega district (Fig. 2) having a water source on his land, and he clearly perceives having the “right to benefit” from this water. Asked whether one has to ask permission from someone or somewhere to use water, he promptly answers “Of course, from the owner”; i.e. the owner of the water who is the owner of the land (pers. com., February 2001). Despite his rights to the water, Juan Rodriguez does not enjoy full access to water. During the dry season, he rents out his land-and water-to another farmer because he has not had sufficient capital to invest in the PVC pipes necessary to irrigate a maize or common bean crop. While enjoying some benefit from the water—namely the rent he receives—Juan Rodriguez does not have the access mechanisms enabling him to draw the full benefits from his resource. Asked whether he would cultivate the land himself if he had the necessary pipes, Juan Rodriguez promptly

responded, "Yes, obviously I would cultivate!"

Juan Rodriguez is not the only farmer who has not been able to enjoy full access to water resources to which he/she has the right. Overall, the less poor and poorest households are the least likely to exploit water resources present on their land. In the Condega district, roughly one-third of the non-poor households who have water resources on their land indicated that they had irrigation; this was the case for less than one-fifth of the less poor and poorest households (Fig. 2). In Miraflor, close to half the non-poor and less poor households having water resources on their land had irrigation as opposed to roughly one-third of the poorest households. Beyond the present restricted access to water and the foregone benefits from its use, the question is whether a farmer like Juan Rodriguez will be able to resist the short-term temptation or the pressure to sell his land, increasingly in demand for its water sources.

### **Insecure access and the struggle for authority in local water management**

The community of El Descanso<sup>4</sup> in Miraflor draws its drinking water from a spring on the land of a resourceful landowner in a community farther upstream. During an interview with a former member of El Descanso's Water Committee in 2001, he explained that he felt unsure of the community's continued ability to maintain access to the water coming from the upstream landowner. El Descanso's access to the water was established on the basis of a written agreement with the upstream farmer, in which she granted the community access to the water for the school and for household consumption, but not for watering crops. The written agreement was not, however, formally legalized, e.g. signed before a public notary. Moreover, there was conflict between two siblings over the ownership of the land that is the source of the water that contributed to a further insecurity in water access. Today (2004) this land conflict has been resolved, and the present owner is willing to continue honouring the agreement of the former owner; but he is also unwilling to enter into a legally binding agreement. The lack of such a formally legalized agreement makes it impossible for El Descanso to obtain technical and economic support from ENACAL (The Water Supply and Sewage Co.) to improve their water supply; e.g. improve the intake,

install a filter, etc.

In 2001, 42% of the households in El Descanso claimed to have experienced problems with their water supply in terms of contamination caused by the proximity of animals and agricultural chemicals to the water intake. Moreover, 15% of the households reported not having water when it was being used for irrigation. As these two categories overlap, a total of 49% of the households claimed to have experienced water problems.. The majority (77%) of those experiencing a water-supply problem claimed that the owner of the water source was responsible, but they had not taken any action directly or through the Water Committee to solve the problem. In a community further downstream from El Descanso, which also draws its water supply from the same water source, 29% of the households claimed to have experienced lack of water due to irrigation farther upstream, while 25% had experienced problems of contaminated water. For lack of individual water sources, the less poor and the poorest households in Miraflor are the most likely to experience problems due to contamination or lack of water. During the last couple of years, 41% of the less poor households and 30% of the poorest households in Miraflor had their water source contaminated or dried up as compared to 20% of the non-poor households ( $p < 0.05$ ; Pearson chi-square).

Rather than approaching the owner of the water source, the El Descanso Water Committee has called upon various external authorities, primarily MARENA (Ministry of the Environment and Natural Resources),<sup>5</sup> which has the greatest presence in the area due to Miraflor's legal status as a protected landscape. Nevertheless, the efforts to receive support in obtaining legal rights to the water source have been unsuccessful thus far. Moreover, in 2002, El Descanso in collaboration with downstream communities called upon MARENA, MAGFOR (Ministry of Agriculture, Livestock and Forestry), INAFOR (National Forestry Institute) and the municipality to inspect and take action against upstream farmers who had allegedly installed motorized pumps for irrigation, thus depriving downstream communities of their drinking water supply.

One aspect complicating negotiations to obtain legal access to water from the upstream farmer has been the regulation of water use in El Descanso. Despite

the condition that water would not be used for watering crops, the temptation to violate this condition is high in a semi-arid environment. The ability to water crops makes a significant difference to the livelihoods of people struggling to make their living from relatively small plots of land, just as it does to more resourceful farmers with larger landholdings. Thus, rather than strictly sanctioning the watering of crops, attempts have been made locally to negotiate the extent to which this should be permitted. For instance, individual farmers were making agreements with the Water Committee to collect water from the village water-supply system during the night; e.g. in a small household tank or reservoir, which they could then use to water crops during the day. One of the arguments used to back this agreement is that “otherwise water running during the night would just be wasted”—an argument that holds true because there is no community reservoir or holding tank. Using water directly from the water-supply system for watering crops during the day, however, would not be permitted, as this would prevent water from reaching water taps further downstream, particularly during the dry season.

Such agreements, of which some gradually develop into more context-specific and less restrictive ‘rules’ or ‘norms’ for how to manage water, can be meaningfully negotiated locally; e.g. in the case of norms with respect to watering crops, specifying the amounts and the timing of water collection for irrigating crops, both during the day and during the year. This process can be strengthened if outside agencies provide information concerning the amount of water available from the source at different times of the year and the approximate amount of water required for human consumption. However, the lack of support from external authorities in the form of institutional presence, as well as clear legal and regulatory frameworks for water management, impedes the successful development and implementation of such locally negotiated water-management norms. Hence, in the current situation, the enforcement of locally negotiated water-management norms is the responsibility of the local Water Committee. During the past few years, there has been a struggle for leadership of this Committee, and the leadership has changed. As both the members of the former and the present leadership use water for their crops, the

struggle for leadership has not been over whether or not watering of crops should be allowed, but rather over the authority to interpret and enforce locally negotiated water-management norms selectively, as well as over access to an institutional platform from which to approach external authorities; e.g. to denounce the ‘illegal’ use of water by other community members.

As is the case for most local organizations, the poorest households are the least likely to be members of village water committees. In the Miraflores communities that have a Water Committee, only 5% of the poorest households were members as compared to around 20% of the less poor and non-poor households. In Condega, 11% of the poorest households were members of the local Water Committee compared to around 20% of the less poor and non-poor households. Generally, therefore, the poor have less of a chance to hold the necessary power to enforce locally negotiated norms or call upon external authorities to intervene in cases of unfair or ineffective local water governance.

### **Stakeholder representation in water-management institutions**

The tendency of water-governance organizations to overlook the poor has sparked reforms that emphasize stakeholder participation. According to Jaspers (2003, p. 82), “stakeholder participation is a condition which has to be fulfilled to make water resources management effective.” He sees stakeholder participation as significantly facilitating enforcement of water-resource management.

Several attempts have been made to craft stakeholder-based institutions both as water users’ associations particularly in relation to irrigation schemes and as river basin councils or boards (Jaspers, 2003; Wester et al., 2003; Funder and Ravnborg, 2004). Based on detailed accounts of the processes of institutionalising stakeholder participation in river basin planning and management in Mexico and South Africa, Wester and his colleagues conclude that while in South Africa the mining and industrial sectors, the suppliers of water to larger towns, and the commercial farmers are all well organized to represent and articulate their interests, the millions of rural poor smallholders are not. In Mexico the failure to include poor stakeholders



can be explained, in part, by lack of political will on the part of the government to hand over power to river basin councils and by the decision that only “water users with a water license will be eligible to elect committee members, thus excluding the vast majority of the basin’s population” (Wester et al., 2003, p. 804). This exclusion is carried over into the river basin council, whose members are elected from the water-user committee members. Although technical solutions to alter such biases in stakeholder representation are straightforward, the more profound question is whether the political will exists to craft institutions in ways that would be inclusive of the poor. In South Africa, a higher degree of political will exists to include the poor and ensure their effective participation. Yet, small-scale farmers are still struggling to get organized and have been found to be “unaware of the provisions of the new water law and the CMA process [the process of organizing the Catchment Management Agencies]” (Wester et al., 2003, p. 208).

A similar situation was encountered in Chile (Bauer, 1997; 2004), where many small-scale farmers have lost their access to water. Bauer describes how water rights have become completely separated from land ownership under the 1981 Water Code and can be freely bought, sold, mortgaged or transferred like any other piece of real estate. The Water Code provides for the legislation (i.e. formal registration) of previously held water rights as well as granting new rights free of charge whenever there is water physically and legally available. These rights are granted by the state through the National Water Directorate (DGA). In the 1980s, however, the government did not undertake information campaigns about the Code’s new features or how to apply for new rights or regularize old ones; “By the time peasants and their organizations learned of the new procedures, available water rights in many areas had already been granted by the DGA or regularized by those more legally adept” (Bauer, 1997, p. 650).

The difference between the Mexican and South African attempts of institutionalising stakeholder participation, in terms of the emphasis placed on including the poor in water management and the extent to which formal options exist for small-scale farmers’ participation, illustrates the importance of political will on the part of government agencies and the way

institutions are crafted. At the same time, however, the limited success of achieving genuine participation of the poor in South Africa points to the limitations of policy-driven institutional reform. In particular, the likelihood of achieving genuine participation of the poor is low if the ways in which social and economic relations shape the access to, and management of, water, and if the interactions among stakeholder representatives are not clearly recognized and addressed. In this vein, Cleaver (2002) questions whether new institutions can be crafted to be representative and facilitate consensus on complex, and often conflictive, issues of natural resource management. Likewise, Wester and his colleagues conclude that if the socio-economic relations shaping water management and the interaction among stakeholder representatives are not taken into account, “participatory processes may further institutionalise power differentials, a real danger in both Mexico and South Africa” (Wester et al., 2003, p. 809).

### Implications for scales of action

The urge to create stakeholder-based water-management institutions has, to a large extent, been associated with the establishment of hydrologically defined water-management institutions such as river basin- or watershed-management institutions. The argument has been made that in order to achieve IWRM, water-resource management on hydrological boundaries is a *sine qua non* (Jaspers, 2003). However, as illustrated by the foregoing empirical cases, ‘everyday’ water management is undertaken at multiple and often overlapping levels, depending on the issue at stake and factors such as topography and social relations at large. Such levels range from a group of neighbours managing a water spring or a group of individuals in different local communities having a stake in a drinking water supply scheme to other, much higher levels of management; e.g. in the case of a large, downstream irrigation or urban water-supply scheme. No single hydrological unit would serve as the most optimal for managing water with respect to such different issues, let alone the highly diverse social realities determined by a range of political, institutional, economic and socio-cultural factors within which water management takes place. This ‘messiness’ has to be accepted as a fact of socially



**Table 3.**

## Main water-governance functions

1. Overall policy development ( <i>water-management priorities and principles</i> )	1. Inter-level ('transboundary') coordination and negotiation ( <i>interdependencies between levels/ units for water allocation</i> )
2. Water resource policy/regulatory framework ( <i>water ownership, access and management obligations; monitoring; institutional framework</i> )	2. Intra-level coordination and negotiation ( <i>deal with competing claims from multiples users and uses</i> )
3. Domestic water supply policy/regulatory framework ( <i>standards, coverage, price policy for water provision; monitoring; institutional framework</i> )	3. Independent appeal and dispute resolution ( <i>provide investigation and arbitration in cases of dissatisfaction with negotiated settlements</i> )
4. Hydrological and environmental water resource assessments ( <i>water availability and environmental needs</i> )	4. Independent knowledge production ( <i>assess state of the water and social, economic and environmental impacts</i> )
5. Allocation of water rights ( <i>permanent or temporal withdrawal and discharge rights; monitoring</i> )	

embedded natural-resource management (Cleaver, 2002). Nevertheless, there is clearly a need for water management at these multiple and overlapping levels to have hydrological assessments of availability of water.

Funder and Ravnborg (2004) argue in favour of taking water-management functions, rather than the organizational unit and level, as the point of departure for thinking about how to ensure effective water governance in general, and inclusive stakeholder participation in particular. Among the water-management functions identified (see Table 3), only hydrological assessments need to be undertaken with respect to boundaries that are defined hydrologically. In contrast, the allocation of water rights needs to be institutionalised so that it combines both hydrological concerns (to prevent shared water- e.g. by two districts- being allocated twice) and political concerns; i.e. in a setting that facilitates inclusion of stakeholders, negotiation of priorities and competing claims and where mechanisms exist for holding representatives accountable.

Beyond the fact that the need for hydrologically based water-management institutions can be questioned, Barham reminds us that "gains in human freedom and democratic self-rule have never been given but have always been won, sometimes only after long and bitter struggle" (Barham, 2001, p. 190). By transferring authority from conventional political and administrative institutions, such as district and national governments and ministries, to hydrologically based institutions, there is a risk of losing the spaces and mechanisms for democratic control and accountability that have been gained gradually.

## Conclusions

Despite the lack of a comprehensive understanding of the relationship between poverty and water access and use, evidence from many parts of the world suggests that competition for water is increasing and that the poor are at risk of losing their already limited access to water. The cases from the Nicaraguan hillsides presented herein support this claim. Moreover, these cases illustrate that the appropriate scales of water management depend on the issue and the context; i.e. the topography, the institutional, political and social settings. Thus, rather than assuming that this wide range of water-management issues is best addressed at nested layers of hydrologically defined levels, it should be accepted that water management takes place at multiple and often overlapping scales, sometimes hydrologically defined, while other times defined according to social or administrative structures.

Experience to date shows success in terms of fostering representative and accountable water-management institutions has been limited. Thus, rather than aiming to craft a single and coherent (from a hydrological perspective) organizational structure, assumed capable of identifying, representing and negotiating the interests involved, the aim for institutional reform to ensure that water governance is inclusive of the concerns of the poor should be to create multiple opportunities for participation-an enabling institutional environment. Key elements of such an institutional environment are:

- Widespread access to water-related knowledge and information; i.e. to general hydrological assessments of the quality and quantity of water available within specific geographical areas
- Enhancement of the capacity among water users, particularly poor ones, with respect to legal and regulatory aspects of water management
- Broad-based hearing processes in relation to new water-management initiatives; e.g. legislation or investments
- Making dispute-resolution mechanisms such as a water ombudsman widely available and accessible, especially to marginalized stakeholders, to provide help in settling conflicts caused by competing water-management claims as well as by conflicting claims of users and the water-management institution.

## Endnotes

1 Unless another source is indicated, the following information about the populations of Miraflores-Moropotente and Condega stems from this household questionnaire survey.

2 The same conclusion is reached on the basis of data from similar questionnaire-based research from three hillside watersheds in Honduras (Ravnborg, 2002b), where from 3-23% of the poorest households had land with a water spring or stream, compared to 47-64% of the non-poor households.

3 The names of the persons interviewed were changed to honour the spirit of confidentiality in which the information was given.

4 The name of the community was changed to honour the spirit of confidentiality in which the information was given.

5 Water management-related issues correspond to MIFIC; water supply, to ENACAL. MARENA can intervene only in water management-related issues in cases of contamination or otherwise environmentally harmful water uses.

6 1 manzana = 0.7 ha.

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## About the Author

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