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## *Mind the Gap*

### *Issue Paper on Policies and Practice of Water and Sanitation in the Context of Integrated Water Resources Management in Colombia*

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#### **Executive summary**

A first glimpse at Colombia's water resources reveals that these are abundant. A closer look shows that shortages of water may occur locally, especially in the densely populated river valleys and peri-urban areas. This can have an impact on the sustainability of water supply facilities. Of greater importance is the impact of water quality on water supply systems. Water with high organic matter loads from untreated wastewater disposal, or high sediment loads from erosion, requires intensive and expensive treatment to make it potable. Communities and utility companies thus have a stake in reducing water resource problems. However, the same communities and utility companies cause water resource problems themselves, especially through the disposal of untreated waste water.

The water and sanitation sector needs to consider developing its links with the water source through an Integrated Water Resource Management (IWRM) methodology. The policies and practices of the water and sanitation sector are analysed and compared with the principles of IWRM to see how far the sector is moving towards such integrated management.

Although the administrative structures for catchment area management in Colombia seem very favourable, there remains a gap between policy and practice. Reasons include a lack of ability on the part of municipalities to comply with environmental rules, a lack of monitoring and the insecure political situation. Community action in relation to water resources issues is limited, as the water quality problem is often obscured by the large quantity of water availability.

National laws and policies have been introduced to promote efficient use of water. However, the cost of administrative procedures will probably outweigh the expected benefits. Awareness campaigns and education would probably have more effect.

Multiple use of water mainly consists of using domestic water intended for domestic use for small-scale commercial use in the informal sector, for example, in small restaurant and kiosks. Re-use of wastewater is still not developed on a large scale.

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Although current environmental and water policies allow and promote stakeholder participation, organisational structures to implement this do not exist. Government institutions are effectively the only bodies responsible for catchment area management. The influence of some stakeholders in decision making can be large, but this is not true for all stakeholders.

Current policies do not specifically address gender and equity issues at catchment area level. As the participation of stakeholders is limited, it is difficult to analyse to what extent equity in stakeholder representation is guaranteed. What can be seen is that communities downstream of more powerful stakeholders might be adversely affected by power differences.

Pricing mechanisms for drinking water supply are issued by a government body. The prices reflect concepts of equity and efficiency. The principle of ‘the polluter pays’ is also included in the policy. The money generated from this should be reinvested in facilities and programs to avoid pollution. In practice little money is collected from polluters, affecting the financial sustainability of this program.

Basic policies exist to integrate water supply and sanitation (WSS) projects in broader IWRM. These mechanisms are not being applied everywhere and not to the desired level. Given the localised character of the problem, one can suggest that it would be more effective to apply some of these principles locally rather than issuing general national policies and undertaking large scale activities.

## Introduction

Despite massive investment, and impressive improvements in ‘coverage’, large numbers of people still do not have access to adequate water supplies. Many systems are not functioning adequately, if at all, due to a number of factors. As a result people are often stuck with systems that provide intermittent supplies, and so rely upon costly supplies from water vendors or use unsafe sources. Butterworth and Soussan (2001) mention a number of reasons for a system malfunctioning. Often it is not so much the system that is not functioning well; the resource base is the limiting factor. CINARA *et al.* (1997) evaluated 15 rural water supply and sanitation systems in Bolivia and concluded that the deteriorating resource base is one of the main causes affecting sustainability and effectiveness of facilities. The resource base might deteriorate as a result of competition with other uses, catchment area degradation or pollution. To avoid such problems, during the planning of the water supply facilities allowance should be made for future development of the resource. A call is made to plan water supply development by integrating it with other aspects of water resource management and livelihood maintenance (Butterworth and Soussan, 2001).

The last few years have seen research and development in water supply projects incorporate some elements of IWRM (e.g. Visscher *et al.*, 1999; WHIRL, 2001). However, most of these experiences are limited to (semi)-arid areas and situations where groundwater is the main source for drinking water (Moriarty *et al.*, 2001), notably in India and Southern Africa. Although it is recognised that there are interesting experiences of integrating water supply projects in broader

catchment area management, or integrated water resources management, in Latin America (which in general is more humid and where surface water is the main resource) few of these have been disseminated or they are only available in Spanish (Moriarty *et al.*, 2001). On the other hand, a large number of WSS projects are still being carried out without addressing specific water resource management components. An example was the large World Bank funded water and sanitation program PROSABAR carried out in the nineties in Bolivia (Sara *et al.*, 1996).

This paper explores the water resource situation in Colombia and how it affects water supply and sanitation projects. Some reference is made to other South American countries, where similar situations exist. It also looks at the impacts of water supply and sanitation projects on the water resource. This analysis provides the rationale for further integration of WSS projects and IWRM strategies in Colombia and the extent to which this is needed. On the basis of that, it is shown how in a concrete way this integration is taking place and where this integration can be enhanced further.

## Water resource situation

Colombia is well endowed with fresh water resources (IDEAM, 2000). On average some 57,000 m<sup>3</sup> per capita per year are available (FAO, 2001), one of the highest rates in the world. However, it should be noted that a very large part of these resources is needed to maintain ecological function. Furthermore, water availability is highest in the least densely populated areas, whereas 80% of the population is concentrated in the river basins of the Magdalena and Cauca River and in the Bogotá high plains, where water availability ranges from just sufficient to slightly deficient (Ministerio del Medio Ambiente, 1998). The percentage of municipalities experiencing water shortages under normal conditions is small, but substantial in dry years (IDEAM, 2000). This percentage is expected to rise due to population growth and the concentration of people in the Cauca and Magdalena valleys, and also due to processes like deforestation. By contrast, the abundance of water in many parts of the country means that phenomena like avalanches and inundation are regular events.

Ground water availability has not yet been fully quantified. One reason is that, in most cases, surface water sources have been sufficient to match demand. However, in some areas, like the Atlantic coast, parts of the Cauca and Magdalena Valley and the islands of San Andrés and Providencia, ground water is already an important source or has further potential for exploitation. This needs to be accompanied with research to avoid overuse.

In Colombia, as in other places, surface waters have a higher content of sediments and bacteriological contamination. Sediment is a particular problem, as rainfall is high and the mountainous areas are susceptible to erosion. Various processes in catchment areas, such as deforestation and overgrazing, can increase erosion and the subsequent sediment load in streams. Increasingly, pollution from domestic, industrial and agriculture uses is being recognised as a problem, at least by the authorities. The Corporación Autónoma Regional del Valle del Cauca (CVC), which is the environmental authority responsible for sustainable development, lists water pollution and inefficient use as the two key problems affecting water resources in this Department (CVC, 2002). Water pollution consists of chemical residues from industrial and

agricultural activities and of bacteriological contamination due to discharge of domestic wastewater. Sometimes even solid waste is dumped into rivers, aggravating the problem (CVC, 2002). The national water resources study indicates that water quality problems lead to a situation where water of adequate quality is scarce (IDEAM, 2000).

### **Influence of water resources on the water supply and sanitation sector**

In most cases water availability is sufficient for domestic purposes. A case study from the Tolima Department showed that although the community had observed a decrease in flow, enough water was available to maintain a full water supply (Quiroga *et al.*, 1997). Although the part of Colombia where most of the population is located experiences two dry and two wet periods per year, these periods are not very different and in many cases water stored in the rainy period is sufficient to cover demands during the drier periods. However, as noted before, in an increasing number of municipalities the demand is already higher than supply in normal years. In years with extreme circumstances, like those with El Niño, this number is obviously higher. It is noted that the imbalance between supply and demand in these areas is mainly due to the lack of capacity to regulate the flows. The construction of lakes, dams etc to store water for drier periods has not been at the same pace as the growth (and concentration) of the population and their demand for water (Ministerio del Medio Ambiente, 1998).

The sediment load and contamination of the water sources is often more important. In the same study from Tolima, the community identified several sources of contamination: erosion, sewage discharge upstream, agriculture and mining. The high sediment load resulting from erosion in particular requires filters in the drinking water system to be cleaned more frequently. The bacteriological contamination of watercourses also affects the drinking water sector. This is illustrated by the case from the El Hormiguero community (Restrepo, 2001). This community is bordering the heavily polluted Cauca River, from which it used to get water. After a cholera outbreak in 1991 the community decided, through a participatory process, to build a protected deep well. This is one of many cases, in many parts of the country, where contamination has had a dramatic effect on public understanding of the connection between water supply and public health. The outcry of one of the community leaders after the cholera outbreak illustrates this: “*Life is paradoxical; look, we have the second river in importance in the country and we do not have drinking water*” (Restrepo, 2001). The lower the quality of the sources, the higher the cost for users to obtain potable water, due to treatment or getting water from more difficult sources, like groundwater.

In most cases action to resolve water resource problems is still taken in an *ad hoc* way by the community. Where the water resource is quite large this obscures the deterioration in water quality, affecting the system’s sustainability and public health. As long as the resource is still abundant communities have difficulty in understanding the relationship between the deterioration processes in their watersheds and the costs of the water treatment due to high contamination levels, (Quiroga *et al.*, 1997). Communities are affected in quite an indirect way by the declining availability of *adequate* resources. Apart from such exceptions as the El Hormiguero case, poorer quality does not usually lead directly to health problems but to higher costs of treatment. In other communities, where the water supply system does not include water

treatment or has a badly functioning facility (as is the case in 35% of systems) the effects can be heightened.

### Impact of water supply and sanitation projects on water resources

In Colombia domestic water use accounts for 5 % of all water consumption, agriculture accounts for 63 %, whilst 32 % is used for energy generation and industrial purposes (Ministerio del Medio Ambiente, 1998). However, when looking at extraction rate, the domestic sector accounts for the largest extraction (59 %), whilst agriculture uses 37 %<sup>2</sup> (FAO, 2002). Total water use is estimated at between 5.8 km<sup>3</sup> (Ojeda and Arias, 2000) and 8.9 km<sup>3</sup> per year (FAO, 2002), which in any case is only a trivial percentage of the 2,133 km<sup>3</sup> of available water. The amount required for environmental purposes is not known. Although the domestic sector covers a large part of total extraction, it is still limited in terms of its impact on water availability, although its impact can be large locally and over time, especially in the growing urbanised areas (about 70% of the Colombians live in urban areas). Furthermore, it is not known if water extracted for domestic uses in fact is used for other activities such as livestock watering, vegetable gardening etc.

More notable is the effect of water and sanitation projects on water quality. Sewage systems are by far the most common sanitation system with about 70% of all houses being connected. In rural areas of course this is different, but as 75% of all Colombians live in the cities, one can imagine the large size of the wastewater flows. In fact about 2.1 km<sup>3</sup> of wastewater is generated per year, of which only 6.8% is treated before discharge into fresh water bodies. For the whole of Latin America, it is stated that only 5% is treated (Idelovitch and Ringskog, 1997). The effects of that are clearly illustrated by data from the CVC (2002). In the part of the Cauca Valley under their jurisdiction 279 tons of organic load are discharged into the river system every day.

**Table 1: Organic matter disposal to the Cauca river in the area under jurisdiction of the CVC**

Activity	BOD <sub>5</sub> (tons)	Relative contribution (%)
City of Cali	93	33
Other municipalities	55	20
Sugar cane industry	34	12
Coffee production	30	11
Paper industry	19	7
Other industries	48	17
Total	279	100

<sup>2</sup> The large difference between abstraction rates and actual use rates is due to the fact that a large part of Colombia's agricultural production is rainfed and not irrigated.

Obviously domestic wastewater makes up a major part of total organic matter deposited in the river. It should be noted that industries are reducing the disposal of organic matter while increasing production, due to stricter permits and control. The CVC is trying to enforce stricter control on wastewater discharge as well. This will in the first instance affect the utility companies and the municipalities that have not fulfilled the legal requirements for discharging wastewater. Priority in this control program will probably be given to the city of Cali and other smaller towns. However, most sewage systems in the rural areas do not have treatment systems either. If control is going to be stricter, water and sanitation projects will face higher costs for treating wastewater or might want to look for alternative sanitation systems and/or reduce wastewater flows. The question remains whether effective control and sanctioning will come into effect.

**Box 1: Bolivia**

An evaluation of 15 water systems in Bolivia showed in 10 communities their sewers discharged into rivers or valleys. In 7 cases, this was done after primary treatment and in 3 cases without any treatment. Downstream this water was used for drinking water, bathing and agriculture. People reported environmental problems around the discharge points. At the same time 8 of the feeding watersheds showed high environmental sanitation risks, due to upstream activities (CINARA *et al.*, 1997).

**Box 2: La Vorágine**

La Vorágine, a small community (220 permanent inhabitants) is located on the banks of the River Pance, close to Cali (Restrepo, 2001). It is a favourite place for many *caleños* to hide from the urban sprawl at the weekend and the community has seen a boom in restaurants and other recreational facilities. With the arrival of tourists, wastewater flows increased dramatically. This wastewater contaminated the river to such an extent that articles appeared in the local newspapers and tourists stopped spending their weekends there. In order to regain their incomes, the community organised itself to improve the sewerage and built a wastewater treatment plant. Since then, recreational activities have returned to normal and peoples' incomes have gone up again (Restrepo, 2001).

The wastewater flows from smaller communities can also have a large impact on water quality. This is illustrated in Boxes 1 and 2. The first is a typical case of water and sanitation projects affecting other water and sanitation projects by increasing the need for treatment of the downstream facilities, with all the costs involved. The second case is not so common, where a community nearly damaged its own livelihoods. The question remains

whether people are willing to avoid off-site impacts, especially if they need to pay for treatment of wastewater.

## Integrated water resources management – an assessment of policy and practice in Colombia

On the basis of the analysis above and the experiences from the case studies, it becomes clear that changes in current water resources management are needed to some extent. In Colombia, water resources problems are very much localised and priorities therefore differ between locations. The water management issues that are most important could be as follows:

- high sedimentation loads,
- water quality degradation due to wastewater disposal practices,
- temporary water scarcity.

These problems coincide with the key problems identified by the Colombian Ministry of Environment (Ministerio del Medio Ambiente, 1998) and by Ojeda and Arias, (2000):

- concentration and growth of the population in those areas where water availability is limited,
- de-regulation of water flows, leading to irregular supplies in some areas and over time,
- water quality degradation due to contamination and sedimentation.

The first two issues lead mainly to the problem of water scarcity, while the last problem identified by the Ministry is split up into two on basis of the case material.

In line with current international trends, it is proposed to develop strategies to address the problems in the broader context of Integrated Water Resources Management (IWRM). IWRM is a process which promotes the co-ordinated development and management of water, land and related resources, in order to maximise the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems (GWP, 2000). Such an approach is needed to stop the current trends of sedimentation, pollution and the declining resource base, as all these processes *per se* require co-ordinated development and management of water and land related resources and actions inside *and* outside the WSS sector.

### **A framework for assessing policy and practice**

In practice implementing IWRM runs into several problems. It is increasingly seen as being too complicated, too focused on the long term and it is often used as an expert system instead of as a philosophy. Therefore, it is recommended to consider IWRM as a shared way of thinking among all the stakeholders oriented towards understanding, and taking into account, the wider implications of everyone's actions (Butterworth and Soussan, 2001).

This latter view has been used here to analyse to what extent the integration of the WSS sector with the development and management of other land and water resources is taking place. Both policies and practices in the WSS sector have been reviewed to see how they contribute to meeting IWRM objectives and principles.

For that purpose, the Dublin principles (which lie at the heart of the IWRM philosophy) have been revised, adapted and extended in order to make them useable and feasible to implement within the WSS sector (Moriarty *et al.*, 2000)<sup>3</sup>. To what extent the WSS sector currently meets each of these principles has been analysed. The principles are:

1. Catchment area management and source protection are essential to ensuring sustainability of supply
2. Water use efficiency and demand management must be addressed to minimise the need for new source development.
3. Multiple uses of water should be acknowledged and encouraged.

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<sup>3</sup> These are principles governing 'light' IWRM, which concerns the WSS sub-sector solely and not 'full' IWRM concerning the full integration with other sub-sectors. However, 'light' IWRM will be a realistic first step towards 'full' IWRM.

4. All stakeholders should be involved in decision making, with particular emphasis on the active participation of users.
5. Gender and equity issues must be addressed throughout the project cycle.
6. Water provision should be priced so as to discourage wasteful use, while ensuring the right to access of a necessary minimum for all.

It should be noted that these principles need adapting and contextualising to the specific conditions of each country or region. For example, the first principle is explained as being a guiding principle for stopping contamination of downstream sources by wastewater. In Colombia catchment area management is often understood as, and limited to, management of upstream areas (reforestation and erosion control) and does not have a focus on managing the *entire* catchment area, including the downstream areas that receive pollution. Experts in Colombia suggest therefore including wastewater management specifically in this principle, as it is often a forgotten issue in catchment area management. For this article, the principles as such have not been reviewed and the analysis is made on the basis of the original principles, mentioned above.

### Principle 1: Catchment area management and source protection

Before going into this issue, the often confusing concepts around catchment area management will be clarified. Just as in the English language, in Spanish a lot of misunderstandings exist on the concepts of catchment or watershed management. The figure below tries to give an overview of definitions in use in South America. As explained above, activities of catchment area management, however, are often limited to reforestation and erosion control and less often include aspects such as wastewater management.

**Figure 1: Concepts of river basin development in South America**

<b>MANAGEMENT AT THE RIVER BASIN LEVEL: STAGES AND OBJECTIVES</b>			
<b>Management stages</b>	<b>River basin management objectives</b>		
	<b>Integrated use and management</b>	<b>Use and management of all natural resources</b>	<b>Water resources management (integrated or sectoral)</b>
	<b>(a)</b>	<b>(b)</b>	<b>(c)</b>
(1) Preliminary stage	<b>Studies, plans and projects</b> <i>("ordenamiento de cuencas")</i>		
(2) Intermediate stage <i>(investment)</i>	<b>River Basin Development</b> <i>("desarrollo integrado de cuencas" or "desarrollo regional")</i>	<b>Natural Resources Development</b> <i>("desarrollo" or "aprovechamiento de recursos naturales")</i>	<b>Water Resources Development</b> <i>("desarrollo" or "aprovechamiento de recursos hídricos")</i>
(3) Permanent stage <i>(operation, maintenance, management and conservation)</i>	<b>Environmental Management</b> <i>("gestión ambiental")</i>	<b>Natural Resources Management</b> <i>("gestión" or "manejo de recursos naturales")</i>	<b>Water Resources Management</b> <i>("gestión" or "administración del agua")</i>
		<b>"Watershed Management"</b> <i>("manejo" or "ordenación de cuencas")</i>	

Source: Dourojeanni, 2001

## Policies

Law 99 of 1993 establishes the Regional Autonomous Corporations as public service corporations, made up of territorial units that, on account of their characteristics, constitute a single geographical ecosystem or form a geopolitical, biogeographical or hydrogeographical unit. At the moment the majority of Corporations has a jurisdiction corresponding to provincial boundaries, only a few are based on river basin boundaries. Similar entities also exist with jurisdiction in the four main cities: Bogotá, Cali, Medellín and Barranquilla.

Referring to Figure 1, the mandate of these bodies lies within the development and management stages and encompasses the management of all natural resources and broader environmental management. They are responsible within their jurisdictions, for *“managing the environment and renewable natural resources, with a view to promoting sustainable development in keeping with the overall principles embodied in the law”* (ECLAC, 1994).

The Autonomous Regional Corporations are endowed with financial and administrative autonomy, their own assets and legal status. Their sources of funding are, among others: pollution charges, a charge for water use, the environmental percentage of property taxes and transfers from the electric power sector (ECLAC, 1994). There is thus a large financial incentive for these Corporations to enforce permits as they can obtain part of their budget from issuing environmental permits. It is said that the Corporations, in general, have well qualified and motivated staff.

As well as finding mechanisms to avoid water pollution and promote treatment, one can consider further development of groundwater resources. Several areas have been identified where greater use can be made of groundwater (Ministerio del Medio Ambiente, 1998). More studies are required before development and a management plan is needed to avoid over exploitation. At the moment no coherent activities are undertaken in this area.

## Practice

Looking at the website of the Regional Autonomous Corporation of the Valle del Cauca (CVC, 2002) one has to conclude that it is not able to tackle all the problems or carry out its tasks to the desired level. It states that most settlements have not complied with the established environmental control plans issued by the CVC, the city of Cali being the most conspicuous. Apparently, the city of Cali is financially unable to comply with the regulations, although it is now working on improving wastewater treatment. Lack of ability to pay and lack of knowledge on the part of the communities are the reasons for non-compliance (see also the review of the sixth principle). Some communities do pay for environmental permits and to extract water, but these are exceptions. Guerrilla activities and drug trafficking in the higher catchment areas are another important reason why the Regional Corporations are not able to fulfil their tasks effectively. Another reason for limited results of activities of the Corporations is poor monitoring and control. Monitoring and control does take place in areas like the Valle del Cauca, but not in most other departments. For example, the corporation of Tolima (CORTOLIMA) has established

mechanisms to make physical-chemical analyses of river water. However, there is no regular monitoring of the catchment areas.

As catchment area management by government entities does not always function satisfactorily, one might expect communities to act themselves to undertake catchment management activities, probably in co-ordination with other stakeholders. Legal regulations exist which can give responsibility for acquiring and managing the strategic areas around the water intake to Administrative Committees of the water supplies systems (Quiroga *et al.*, 1997). However, it is not clear to what extent use is made of this procedure, and where the limits are of these strategic areas. In the case of community management, the community owns the systems and manages it with its own resources, but it does not have a direct relationship with the entity that handles the water resource nor with the inhabitants or the landowners where the water source is located. It is therefore difficult to consolidate efforts to change water resource management (Quiroga *et al.*, 1997; CINARA *et al.*, 1997). Besides, guerrilla activities influence the extent to which action can be taken, as was the case, for example, in the community of La Vorágine (Box 2).

Dourojeanni and Jouravlev (1999) emphasise the need to consider urban catchment areas, as a large part of the South American population lives in urban and peri-urban areas. For these communities, relations between water supply and catchment management might be even more difficult to see. In this case, the key stakeholders are the utility companies. One might expect the utilities to take an active role in protecting and managing their catchment areas, or at least to co-operate and co-ordinate with the environmental authorities. At Cali, we do not see such action. The main drinking water intake is just downstream of a waste water outlet and a large landfill, whose liquids enter the river via the groundwater. This creates a large sanitary risk and, of course, extra cost and effort in treating the water.

## **Principle 2: Water use efficiency and demand management**

### **Policies**

In 1997, Law 373 on the Efficient Use and saving of Water was issued. This law gives the Regional Autonomous Corporations responsibility for carrying out programs for efficient use and saving of water. *All* water users have to submit plans to the Corporations that outline how losses are going to be reduced. The Comisión de Regulación de Agua y Saneamiento Básico (CRA) sets the goals for efficiency in water supply systems. The metering of water use is also promoted and educational and awareness raising campaigns are required.

### **Practice**

The Corporations probably set as priorities the aim of reducing losses in agriculture. The law at least is not widely known. La Sirena, a community with which CINARA has been working for over a decade and which is quite aware of issues in the water sector did not know the law (Sanchez Torres, 2002). But, even without knowing the law, people were trying to reduce losses and install meters. However, in a country so rich in water sources, it can be doubted whether so much administration for the purpose of saving water is justified. Raising awareness, as in the La Sirena case, already seems to help a lot, without having to deal with the whole administration as proposed by Law 373. For example, it has been noted that water use has decreased in the large

cities, due to national education programmes, programmes to change in-house technologies and especially by raising the water tariffs (see the sixth principle).

### **Principle 3: Multiple uses of water**

#### **Policies**

Current drinking water policies do not specifically mention its use for other (productive) purposes or its role in livelihoods.

#### **Practice**

The La Vorágine case (see Box 2) shows that domestic water has an important role in the subsistence economy, for example, in small restaurants and kiosks, related to recreational activities. In this case it is also evident that the environmental health itself has an important influence on the livelihood of the community members. The drinking water source is also the source of income.

Some wastewater is reused for irrigating sugar cane in the plains of the Valle de Cauca and plans to develop this further are underway. However, it will probably remain limited in the coming years.

### **Principle 4: Stakeholders participation in decision making**

#### **Policies**

The National Environmental Policy states that dialogue and analysis together with stakeholders are of large importance in coming to solutions in water management (Ministerio del Medio Ambiente, 1998) but it does not provide an administrative structure to enable this dialogue and analysis. So, it is not clear to what extent stakeholders can participate and how they can do this. At the moment, final authority for decision making lies with the Autonomous Regional Corporations. Communities often do not have relationships with these Corporations. However, with respect to water supply in itself, the decentralisation policies are clear on the ‘what’ and ‘how’ of user participation. So contradictions may arise between the water resource administration and the water supply administration (Quiroga *et al.*, 1997).

#### **Practice**

Although the formal structures do not exist for community participation, it can be seen that communities step into tough negotiations with the Corporations on issues like wastewater treatment sites (as in La Vorágine) and the search for alternative sources (as in El Hormiguero) (Restrepo, 2001). They leave the final decision making power to the CVC, but their influence in the process is large. However, a risk of this *ad hoc* ‘participation’ is that it may result in the most powerful actors having the main influence on water resources issues.

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## **Principle 5: Gender and equity issues**

### **Policies**

Current policies do not specifically address gender and equity issues at the catchment area level. As no projects for representing the different interest groups in water resources issues have been undertaken, it is difficult to examine whether gender and equity issues are taken account of.

### **Practice**

In a study of the actions communities take to improve water management at catchment area level to protect their water supply systems, an interesting account of the role of women was described in the El Hormiguero community (Restrepo, 2001). There, the women organised the community to take action to look for alternative drinking water sources. In other case studies no account was given of gender aspects in community actions.

With respect to equity at catchment area level, one of the important aspects is the geographic distribution of powerful and less powerful communities and how they act upon each other. The most obvious example is that in the Valle del Cauca, the most powerful actors, i.e. the city of Cali and its suburbs, are located in the upper part of the catchment area. Only via the intermediary of the CVC are the downstream communities able to make Cali follow the pollution resolutions, and then only to a limited extent.

## **Principle 6: Discouraging wasteful use by pricing and ensuring minimum access for all**

### **Policies**

The tariffs water supply utilities charge to their customers should officially be based on guidelines by the CRA. These reflect some concept of efficiency and of equity. The equity concept is built in, as tariffs differ for people in different economic strata of the population, with lower tariffs for poorer people. Other mechanisms exist to promote efficiency. One which is sometimes applied is tiered pricing, for example in the community of La Sirena (Sanchez Torres, 2002).

### **Practice**

The impact of pricing on efficiency is difficult to measure, especially taking into account that water might be used productively as well in the informal sector. Pricing water by volume also requires metering, and the costs of the meters can be higher than the final gains. Besides, a large number of community based water supply systems are not registered with the CRA and prices are determined on the basis of criteria other than the official guidelines issued by the CRA. On the other hand, in large cities where water subsidies have been abolished, water use has gone down. This has not so much affected efficiency as consumption, with the result that tariffs remain subject to public debate in the local newspapers.

### **Compensation tariffs for wastewater discharge**

Related to pricing mechanisms to discourage wasteful use, is pricing to discourage disposing of hazardous waste. In South America, large programs for discouraging wastewater generation and

wastewater treatment have not been implemented. Securing financial resources for this purpose is essential for setting off on this road. Only recently has some advocacy for this case begun. According to World Bank calculations, 60% of the people connected to sewage systems, can have their wastewater treated at a cost of 70 US\$ per capita annually (Idelovitch and Ringskog, 1997). This is a modest investment seen in the light of the need for improved wastewater treatment, but still a sharp rise from the past. Different financing arrangements need to be found to cover the huge investment costs (for an overview see Idelovitch and Ringskog, 1997). At the moment many municipalities do not have sufficient capacity to treat wastewater and instead resort to disposal where effective river basin management is not in place (Idelovitch and Ringskog, 1997).

In Colombia the investment costs for building treatment plants will be covered for by the money coming from pollution permits (so called *tasas retributivas* or compensation tariffs). The polluter pays to finance the reduction of pollution by building treatment sites. The Regional Corporations are the entities to execute this policy.

However, the collection of fines from polluters does not take place to the degree that it could, For reasons for that include lack of registration of polluters, lack of commitment from the municipalities, resistance from the communities and lack of capacity of Corporations (Dourojeanni and Douravlev, 2001). Questions can be raised about how many treatment sites can be reached. Moreover, there are discussions on who is the polluter: the utility company or the user, and it is not clear who is going to pay. But even if all compensation tariffs are collected, there still seems to be a lack of resources to build sufficient plants. La Vorágine is one example where a community decided to build a treatment site. The costs for the site were born by the CVC (Restrepo, 2001). However, before building the site, the community did not pay the environmental fines. The sustainability of such a mechanism for pricing and financing is doubtful.

## Concluding remarks

This overview shows that basic policies to integrate WSS projects in IWRM exist and are even put into practice to a certain extent. However, this does not occur in a comprehensive or widespread way. Even the Ministry of Environment recognises that too little emphasis has been placed on instruments to make policies work, and too much on writing laws and regulations (Ministerio del Medio Ambiente, 1998). As a result, the Ministry of Environment has proposed a broader palette of policy instruments, including economic, educational and administrative measures. The task is now to carry out these measures at a decentralised level.

The field in which policies are mostly lacking is in stakeholder participation and in promoting equity via this. Although the policies allow, and even promote this, the administrative structures to make this work are not there.

Knowing the localised character of water resources problems in Colombia, one could question whether detailed national policies are feasible. It is clear that to enable local level solutions, national level enabling policies are needed, but not as detailed and exigent as for example Law

373 on Efficient Water Use. It would probably be more effective to specify some of the principles above in the bye-laws of the Regional Autonomous Corporations where necessary, rather than issuing national blueprint policies and undertaking large scale activities. These bye-laws should conform to the requirements of the particular region and still fit into the national framework.

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