



113326

30 MAR. 1995

**Organizing for local-level watershed management
- lessons from Río Cabuyal watershed, Colombia**

Helle Munk Ravnborg and Jacqueline A. Ashby

ABSTRACT

Watershed management involves the integrated management of a multitude of resources such as crop land, pastures, forests and water to each of which a multitude of often conflicting interests relate. These interests arise from stakeholders inside as well as outside the watershed. The identification and negotiation of these interests therefore is an important element in watershed management. Based on experiences with organizing for local-level management of the Río Cabuyal watershed in Colombia, this paper discusses what should be the role of local-level organizations in watershed management and draws out some organizational principles.

(9388 words, excluding references and tables)

CIAT

Helle Munk Ravnborg is post-doctoral fellow and Jacqueline A. Ashby is program leader at the Hillside Program at the Centro Internacional de Agricultura Tropical, Cali Colombia. Address of correspondence is CIAT Hillside Program, A.A. 6713, Cali, Colombia.

1. Introduction

Successful management of natural resources to promote their conservation and where appropriate their development, is increasingly seen as dependent on the involvement of local organization. Recent literature witnesses a growing interest in and optimism about the role of local organizations in natural resource management. From having been viewed primarily as an ecological and technical issue, there is now a growing recognition of natural resource management as a social and economic issue [10]. And for good reasons: natural resource management problems tend to be of a nature where one actor's use or neglect of a particular resource influences other actors' possibilities for using that (and other) resource(s). This makes the development of institutions, i.e. of norms, rules, rights, sanctions and conflict resolution mechanisms to govern resource use a crucial issue.

Based on game theoretic work as well as on empirical cases, primarily from the domain of irrigation management, but also from social forestry and rangeland management, lessons are being synthesized with respect to the conditions under which local organizations are likely to be successful in natural resource management as well as the organizational features that characterize successful local organizations [2][8][10][12]. However, very few empirical cases are actually reported and thus included on the role of local organizations in watershed management.

One of the lessons emerging from these syntheses is that natural resources that are naturally bounded, predictable and lend themselves to preventing others from using them, are more likely to be successfully managed by local organizations than are resources that do not possess these characteristics. Moreover, the bigger and the more heterogenous the group using the resource is, the smaller is the likelihood that local organizations will emerge and become successful in its management.

Watersheds generally do not meet these conditions. Moreover, watershed management tends to involve a complex mix of managing interlinked common-pool and privately owned resources. These are among the factors that make watershed management a special case of natural resource management - a case for which many have concluded that prospects for local organizations to take responsibility seem rather limited, e.g. [4][12]. Instead, it is argued, higher level organizations such as regional or national-level authorities have to be called upon to manage watersheds. Yet, experience shows that in low-income countries regional authorities are not particularly able to influence the direct watershed managers to adopt beneficial practices from a watershed or a regional point of view [1][13]. In the absence of local-level counterpart organizations, such higher-level organizations tend to operate in an authoritative manner with rules of compliance which are difficult to enforce, particularly when watershed resource management involves a large number of individual decision-makers.

This paper questions the implicit assumption upon which the above lessons are drawn, namely that organizational principles for local-level resource management in general and watershed management in particular can be drawn from case studies to a large extent undertaken in the context of irrigation management. The paper argues that

a number of features make watershed management a special case within resource management and therefore that the role and thus organizational principles for local-level management need to reflect these special features.

Among the features that make watershed management a special case is that i) it involves the integrated management of a multitude of common-pool and privately owned resources; ii) a multitude of interests and opportunities for meeting these interests relate to the use of any given resource almost at any given place and time; and that iii) these interests and objectives originate inside as well as outside the watershed. Based on experiences gained from studying a process of organizing for local-level management of a micro-catchment area in the northern part of the Cauca department in Colombia, the paper identifies six functions which are essential in watershed management and define the role of local-level watershed management organizations as well as some principles for organizing for local-level watershed management.

The activities to build and support local-level resource management analyzed in this paper are part of a special project to improve sustainable agriculture and livelihoods in the Río Ovejas watershed in Cauca, Colombia, of which the Río Cabuyal is a tributary watershed. They cover a period of approximately two years, from November 1992 to the end of 1994. The project is managed by a consortium of organizations, including the International Center for Tropical Agriculture (CIAT), and is supported by grants from IDRC, Canada, the W.K. Kellogg Foundation and the Colombian government agency, Desarrollo Rural Integrado (DRI), as well as contributions by local governmental and non-governmental organizations. Within this set of activities, the paper focuses on the process of creating a local-level watershed management organization in the Río Cabuyal watershed.

Research by the project is monitoring the process of institutional development in order to develop recommendations or design principles on institutional options that promote local responsibility for ecologically sound and economically viable use of watershed resources. The project uses a participatory action research methodology which provides feedback to the participants in a 'learning process' approach [7]. This approach promotes self-correction in the expectation that the organizational set-up for local-level watershed management will evolve over time, and that lessons will be derived as much from the mistakes and corrective actions, as from setting up the institutions as originally conceived at the initiation of the project. The results of the first two years discussed in this paper are, therefore, very much results of work in progress as opposed to definitive conclusions. The entire time-frame of the project is expected to be at least six years.

The paper is structured as follows: The following section discusses in more detail the features that make watersheds a special and, according to some, a problematic case seen from the perspective of local-level management. In section three, one of these features, namely the existence of multiple, conflicting interests is illustrated in the context of the Río Cabuyal watershed by way of introduction to the study area. Section four describes the process leading to the creation of FEBESURCA, the Río Cabuyal watershed beneficiary federation, and the wider organizational set-up within which it belongs, while

section five brings out some issues that have emerged during this process. Section six identifies six functions which based on the Río Cabuyal experience appear to define some basic principles for organizing for local-level watershed management, while section seven summarizes the conclusions.

2. Five features making watershed management a special case of natural resource management

First of all, whereas irrigation schemes or forests have well-defined boundaries, the extension of watersheds is not definite, once and forever given, nor are they immediately visible. Like little chinese boxes, watersheds are nested within each other. Within a given area, it is possible to identify almost an indefinite number of watersheds. Watersheds can be defined with reference to major rivers such as the Amazonian watershed, covering a considerable part of the South American continent, or to tertiary rivers such as the Río Cabuyal watershed (see Map 1). This means that neither the physical boundaries nor the social categories of the users of the watershed are easily defined.

Second, the management of watersheds is not confined to the management solely of one resource for which there is a single predominant use, such as water for irrigation. Instead, watershed management involves the use of a number of resources such as soils, forests, crop land and water, each of which have multiple potential and actual uses. For example, water is not only used for irrigation but also for drinking water inside as well as outside the watershed. Likewise, forests are used for collection of firewood, building poles or forage to be used locally; for burning of charcoal to supply urban and semi-urban populations; as a source of important plants and animals; as an important element in determining the local microclimate and protecting water sources from drying out; and as a pool of genetic diversity. Whereas in an irrigation scheme, everyone would agree that the water should be used for irrigation once it has entered into the irrigation system (the question being who should use it, when and for how long), interests with respect to the often competing purposes for which a given resource within a watershed should be exploited are likely to be conflicting.

Third, as noted by Uphoff [12], the benefits resulting from watershed management are often deferred and/or accrue to others than those directly involved in the management. This, of course, is likely to considerably reduce incentives to people living within the watershed to undertake watershed management for the benefit of people downstream.

Fourth, it is often complicated to measure and even to perceive or sense the extent to which a watershed is degraded as well as the impact of management efforts. The concept of a watershed is a systemic one. It draws attention to the functional interrelationship between the different resources within a watershed such as land, water, vegetation and thereby between the management practices to which each of these resources are subjected. Rather than planting and protecting trees for reasons exclusively related to trees and wood, such as the need to ensure future building material and firewood supply as would be done from a forestry management point of view, the

watershed management point of view is likely also to suggest the planting and protection of trees due to non-tree related objectives. Such non-tree related objectives can include reducing erosion on lower-lying fields and thereby - perhaps - increasing crop production and reducing siltation of water courses. Another non-tree related reason for planting trees can be to protect important water sources from drying out. Such interrelated or systemic effects are, however, difficult for managers to measure, value and perceive. This is likely to reduce the immediate incentives to the actual watershed managers.

Although the physical effects resulting from management of the individual resources within a watershed are interrelated, this is seldom the case for the decision-makers involved in this management. Typically, the wood cutters harvesting trees to produce charcoal are not involved in decisions about which forested water sources to conserve for drinking water, and vice versa, although both decisions vitally affect the outcome desired by each separate interest group. Unless the physical interrelationship between management of two resources becomes apparent to the extent that continued utilization of the resource(s) is threatened, the structure of local organizations involved in decisions about resource management does not promote management in the common interest.

A fifth reason why watershed management constitutes a special case and local organizations appear to be weak partners in watershed management, which exacerbates the effects of the many conflicting interests relating to the use of resources within a watershed, is that watershed populations, especially in the case of the Andean hillsides, tend to be heterogeneous: different ethnic groups, disparity in access to resources, in resource utilization practices and among institutions governing resource utilization all affect the capacity for local organizations to control watershed management.

3. Conflicting interests relating to the management of the Río Cabuyal watershed

In August 1994, a month before the end of the dry season, the aqueduct ran dry in El Socorro. El Socorro is one of the lower-lying communities (14-1,500 meters a.s.l.) in the Río Cabuyal watershed (see map 1) that like many other communities in the watershed gets its drinking water from an aqueduct that has its intake in La Esperanza in the upper part (19-2,000 meters a.s.l.) of the watershed. People in El Socorro said that the aqueduct ran dry because people in the mid-altitude communities like Ventanas (15-1,600 meters a.s.l.) were using all the water for irrigating their tomatoes, a very profitable crop in the area. Others claim that there is less water now because people in the upper part of the watershed are cutting down all the forest in the area from which the aqueduct takes its water. People in the upper watershed defend themselves by saying that they have no alternative sources of income to clearing woodland. Moreover, they say that they are significantly disfavoured with respect to services such as roads, schools, piped water or electricity, so why should they give up their income to benefit other better-off communities.

Social and physical boundaries rarely coincide. While the Río Cabuyal watershed from a strictly physical point of view comprises an area of 3,200 hectares, the shaded area

in map 1, the area which in this paper is referred to as the Río Cabuyal watershed covers 6,500 hectares as it is delineated by the administrative (community or *vereda*¹ boundaries) within which the 'true' Río Cabuyal watershed falls. The 6,500 hectares area has a population of approximately 6,500 people living within 22 communities or communities.² The Río Cabuyal watershed is situated in the mid-altitude Andean hillsides at an altitude ranging from 1-2,000 meters a.s.l. The annual rainfall is approximately 2,000 mm with a pronounced dry-spell occurring between June and August. The watershed is relatively densely populated (100 persons per km²), however, with a pronounced variation among the communities.

Small-scale farming, either on owned or rented land or through day-labouring on local small-scale farms constitutes the principal source of income in the area with the average cultivated area being just below 2 hectares.³ Coffee, cassava, maize and beans, and in the upper watershed also fruits, are the principle crops in the watershed. Livestock production is of minor importance as only 14 percent of the households own livestock. The Panamerican Highway cuts across the middle of the watershed giving the population in lower and mid-altitude parts of the watershed relatively good access to markets in neighbouring townships as well as the bigger cities of Popayán and Cali. On average, 80 percent of the families have access to piped drinking water, although in upper part of the watershed the share is only 70 percent, while virtually all households use firewood as the primary source of energy for cooking.

Outside the Cabuyal watershed a US\$ 25 million proposal has been approved by the regional watershed management authority, the CVC, to divert the flow of the Río Ovejas to which Río Cabuyal is a tributary for hydroelectric power generation [6]. This obviously introduces other, external interests to the management of the Cabuyal watershed: it not only increases the competition for water but adds requirements to the quality of water and thus to farmers to minimize erosion in order to prevent siltation of the dam to be constructed.

However, the conflicts relating to the management of the Cabuyal watershed go beyond 'on-site versus off-site' or 'upper versus lower', i.e. geographical divides, and encompass dimensions of ethnicity and access to resources.

Ethnic conflicts over land as well as cultivation practices are endemic in the area. Land which was within the indigenous Paez reserve as defined by the authorities, has gradually been sold to and/or colonized by the mestizo population and is no longer under the control of the *Cabildo La Laguna*, the local indigenous governing body. Periodically over the last two decades, the Paez have invaded lands held by mestizo landowners, cutting and burning off the forest to cultivate traditional maize and beans crops. On occasions, the return of these lands to their mestizo owners has been negotiated between the local mestizo community leaders and the Paez, usually with the intervention of outside authorities, sometimes including the military, and the Paez have abandoned the invaded lands in return for promises by the Cauca Department political authorities to supply electricity, roads or extension services within the Paez reserve. On other occasions, the land has been ceded to the invaders, often through the intervention of the regional

indigenous organization, CRIC, and the national land reform institution, INCORA.

Also immigration of farmers from neighbouring department, Nariño, which has taken place since the early 1990s has given rise to ethnic conflicts over land and land use. The migrants came with capital from the sale of land in Nariño to rent land in the poorer parts of Cauca where good profits could be obtained from cultivating beans during the years when bean prices were favourable. The Nariñenses drove up the cost of short-term land rental so that local inhabitants found it difficult to obtain rented plots. The Nariñenses were especially prone to rent land from the indigenous community. They cultivated beans on steep slopes, practicing thorough ploughing and using high applications of fertilizer, and planting three or even four successive crops of beans on a plot before moving on to another. Local farmers, in particular the mestizo bean farmers accustomed to rent land from the indians, saw Nariñenses extracting profits from the land and ruining it with bad practices. In particular, three or more successive crops of beans left the plots infected with serious root rot and other soil borne diseases, never before experienced in the area. The unsuspecting local farmers who have planted plots previously used by Nariñenses have experienced major losses in their bean crop from these diseases. This situation led to a number of violent confrontations and the death of two recalcitrant Nariñense tenants and to the indian *cabildo* adopting a policy of denying rentals to the Nariñenses following persuasion from local mestizo community leaders.

Access to resources constitutes third dimension along which conflicts over natural resources arise. Land is unevenly distributed: 16 percent of farmers cultivate less than 0.5 hectare amounting to 2 percent of the total cultivated area within the watershed. In contrast, 9 percent of farmers cultivating 4 hectares or more together operate 30 percent of the total cultivated area within the watershed (see table 1).

Through a process of conducting well-being rankings to elicit local indicators or criteria for different levels of well-being, and subsequently applying these criteria to the 1993 household questionnaire survey, a classification of households into different well-being categories was undertaken. According to this classification, 28 percent (274 households) fall into the category of households enjoying the highest level of well-being, 42 percent (420 households) were classified as enjoying a medium level of well-being and the remaining 30 percent (303 households) as enjoying the lowest level of well-being. In the following, these are the categories referred to by terms such as 'poorer', 'best-off', 'wealthiest', etc. It should be noted that these categories do not coincide with the categories 'indigenous-mestizo'. Although in the communities where there is a considerable Paez population there tends to be an over-representation of the indigenous population among the households suffering the lowest level of well-being, this category includes a significant share of mestizo households.

Flat land is increasingly a rare and expensive commodity, so poorer people tend to cultivate the steeper slopes. While 30 percent of the poorer households in the Cabuyal watershed consider all their plots too steep to plough, this is only the case for 10 percent of the better-off households ($p < .00001$, Chi-square test). Moreover, because the poorer households lack capital for investment or to purchase food for immediate consumption,

they tend to cultivate steep slopes extensively, i.e. without soil conservation measures, which enables them to offer their labour to better-off neighbours in return for immediate payment. Poor people are less able to maintain soil fertility by rotating cultivated with fallow land. Of the poorest segment of the population, 46 percent have land in fallow compared with 54 percent of the middle segment and 62 percent of the best-off segment ($p < .001$; Chi-square test). The poorer households are therefore associated with and blamed for causing soil degradation, not because soil degradation is their interest, but because they do not have the capacity to accept the trade-off existing between minimizing land degradation and maximizing immediate returns to labour and land.

Moreover, the poorer households have significantly less access to water and forest resources. While 31 percent of the poorer households have water springs on their fields, this is the case for 46 percent of the households in the middle category and 52 percent of the best-off households ($p < .05$; Chi-square test). Most forest resources in the Cabuyal watershed are privately owned, disfavoring the poor. Only 18 percent of the poorest households own forest compared with 48 percent of the best-off and 31 percent of the middle group ($p < .00001$; Chi-square test). Thus, the 274 households falling in the category of households enjoying the highest level of well-being command more than 50 percent of the forested area in the Cabuyal watershed while the 303 households suffering the lowest level of well-being command only 12 percent of the forested area.

Finally, conflicting interests with respect to the utilization of natural resources also exist at the level of the individual decision-maker. As an example, burning persists as a common means of land clearing both in continuous cultivation to get rid of weeds and crop residues and in semi-permanent farming to clear secondary growth after periods of fallow. Although most people recognize its harmful effects on the soil as well as more globally through siltation of water courses, and are aware that soil quality would improve if the organic matter was left to decompose, they continue to practice burning (Interviews with farmers made by FEBESURCA representatives 1994). The advantage of burning is that it speeds up land preparation, and allows the use of the entire field whereas various forms of composting take up space for trash lines and require more labour. Short-term economic gains conflict with benefits of preserving the quality and quantity and thus the continued use of natural resources.

4. Organizing for local-level watershed management - the case of Río Cabuyal⁴

It was in the context of such multiple conflicting interests that, in early 1993, an inter-institutional consortium for sustainable agriculture, CIPASLA, and within this a watershed user committee, FEBESURCA, were created.

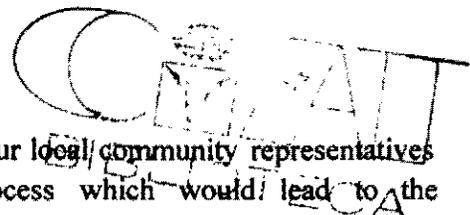
As is so often the case, the inhabitants of the Río Cabuyal watershed were at the time of establishment of CIPASLA confronted with a bewildering array of organizations, governmental as well as non-governmental, each of which having their own and often, seen from a watershed management point of view, strongly contradictory programmes. As an example, CVC, the regional watershed authority, had a long history of conservation efforts in the area, seeking to promote or enforce various land use conventions while

various public sector organizations and NGOs had been promoting credit programmes which were providing local farmers with incentives to flout these conventions. A case in point was the burning and clearing of secondary bush fallow as well as long-standing forest to plant cassava, notorious locally for its association with soil degradation, for which credit, technical assistance and market outlets were being promoted by agricultural development programmes. Efforts to tie credit to conservation practices had been rejected by farmers as they were perceived as unprofitable and downright obstructive to cassava cultivation.

The proposal to create CIPASLA emerged at two workshops bringing together a large number of government and non-governmental organizations, all working in the northern part of the Cauca department. Also local community leaders were present at the workshops, more specifically three paraprofessional extension workers ('technico-agricultor') and a representative from one of the marketing cooperatives present in the area, all selected because of their familiarity with the area. The workshops were held late 1992 and early 1993 at CIAT which had also taken the initiative with the purpose of exploring the feasibility of establishing a mechanism that would facilitate coordination among the many organizations working on issues directly or indirectly relating to natural resource management in the area.

Among the four organizational options for creating such a consortium that had been made in the 1992 workshop and further examined in the time until the 1993 workshop, the option that was chosen consists of three committees: The first is the *inter-institutional support committee*, counting representatives from the various external organizations that had indicated interest in participating in CIPASLA. The task of the inter-institutional support committee is to plan and coordinate the activities of the participating organizations, and thereby to strengthen these organizations' ability to *support* the communities. The second committee is a *watershed user committee* for which the format at the 1993 workshop had not yet been specified. However, the tasks proposed for this committee were to provide knowledge about the problems and needs of the communities; to identify mechanisms through which concerted actions could be taken by the communities and the external organizations. Each of these committees command a separate fund. Thus, a further task of the user committee is to encourage and support the formulation of projects in the communities, to link the communities with the organizations in order for them to obtain the necessary technical support and to develop procedures for evaluating, prioritizing and implementing the projects presented by the communities. The third committee within the CIPASLA organizational set-up is the coordinating committee whose task it is to act as a coordinating body between the inter-institutional support committee and the watershed user committee and to provide technical and administrative support. The coordinating committee consists of three representatives: one governmental, one non-governmental and one CIAT representative.

In the following part of this section, we shall focus on the organizing process that led to the formal creation of the watershed user committee or FEBESURCA (*Federación de Beneficiarios de la Subcuenca de Cabuyal*), as it was later to be baptized.⁵



After returning from the 1993 workshop, the four local community representatives who had participated, initiated an organizing process which would lead to the establishment of FEBESURCA. Their first step was to make a complete list of local institutions present in the area and send out invitations to all of these to participate in a meeting where the idea of establishing a local watershed user committee could be further explored. In doing so, they followed the same procedure that had been used when organizing the 1992 workshop in which the proposal to form CIPASLA was first proposed. The local institutions that received such invitations included the community-based committees for planning and implementing community activities, the *Juntas de Acción Comunal* (JAC); the local indigenous government, the *Cabildo La Laguna*; the local aqueduct committee (*Junta Administradora del Aqueducto*, JA); women's groups; the teachers; the health centre; the local agricultural research committees, the CIALs; the church, etc. Not all of these institutions sent representatives to the meeting which was held in April 1993 and the organizing process thus continued with self-selected institutions that had shown interest by participating in the meeting.

To increase awareness and mobilize the communities around the importance of watershed management, a motivational campaign to the communities was proposed at the April meeting and conducted in May by the four local community leaders who had participated in the 1993 workshop. Based on their location, communities were grouped together so that meetings could be held with more communities at one time. The plan was to hold a total of six such motivational meetings. The purpose was to inform the communities about CIPASLA and the potential role of a user committee within it, its objectives and especially about the importance of conserving natural resources. These meetings were to elect representatives to go to the constituting meeting of the user committee to be held in June. The invitations for these motivational campaign meetings were made to the *Juntas de Acción Comunal* who were then expected to call the entire community to attend the meeting. However, partly because the meetings were intended to gather people from several communities and so people had to travel some distance to reach the meeting, the participation in these meetings varied greatly.

The constitutional meeting took place in June and FEBESURCA was formally created. Moreover, the meeting elected an executive committee, agreed on a zonation of the watershed in a lower, middle and upper zone, and made the first steps towards defining a working strategy. While the institutional representation in FEBESURCA was based on the principle that the institutions who wished to participate could have a representative in FEBESURCA, the principle upon which the communities were going to be represented was more unclear. The initial intentions were to keep the number of representatives as small as possible in order for the organization to be efficient. Upper most in the local organizers' criteria for setting up the representation in FEBESURCA, was the aim to reduce their transaction costs in bringing together a decision-making body. This criterion reflected their desire not to lose the momentum of the motivational campaign, and their focus on action in the short run. Hence, ideas had been forwarded that among the representatives elected from the *Juntas de Acción Comunal* within the

watershed, a single representative should be elected to represent all the *Juntas de Acción Comunal*, and thus be considered an institutional representative. Other ideas were that each zone - the upper, the middle and the lower - should elect a representative. However, the issue remained pending for a period to come.

As a result of the motivational campaign, a number of elected representatives turned up at the June meeting. Some of these were elected as representatives of a community whereas others represented a group of communities. Thus, in the absence of clear principles for community representation, the people who turned up for the meeting were allowed to continue not as community but as zonal representatives, with the result that the number of representatives by which each zone was represented varied between two and five.

The zonation of the watershed was done with the aim of being able to prioritize where to begin the work. Because the upper part was found to have received less technical assistance on how to develop a sustainable agriculture than the other zones and based on the assumption that the upper part of the watershed had strategic importance to the lower-lying parts, e.g because it is in the upper part of the watershed that the drinking water aqueduct has its intakes, it was decided that priority should be given to activities in that zone. Thus, it was decided to organize an excursion to the upper zone in order for the representatives from the lower parts of the watershed to familiarize themselves with the zone.

For almost all of the representatives from the lower and mid-altitude areas of the watershed, this was the first time they had gone to the communities in the upper reaches. Many were shocked at the much greater poverty they observed in those communities; the impassable cart-tracks, absence of schools, the low quality housing, the poor straggly crops and the extensive wasteland of bracken-covered fallow left after cropping. The agenda they heard from people in the upper watershed was very different from the one they had been proselytizing.

In the period following, the user committee started developing statutes for FEBESURCA as well as procedures for how to solicit projects from the communities and evaluate and implement these projects. In this process, FEBESURCA was drawing on outside organizational assistance provided by CIAT.

In the statutes, which were approved in April 1994, it was finally determined that rather than having zonal representation, each community should have its own representative and a delegate. This was decided in order to facilitate communication between FEBESURCA and the communities. Today 18, out of the 22 communities have formally nominated their representatives. Moreover, the work included the development of a format according to which projects should be presented to FEBESURCA and a set of criteria according to which proposed projects should be evaluated by a project evaluation committee set up within FEBESURCA. According to these criteria and the weights assigned to them, projects benefitting the 'community' were given priority to those only benefitting individual families or smaller groups of families; projects relating to forests and water conservation were given higher priority than those relating to

conservation measures undertaken at field level; projects taking place in the upper zone were given priority to those taking place in the middle zone which in turn were given priority to those in the lower zone; and long-term projects were given priority to short-term. Thus, apart from a number of school garden projects which were approved before the introduction of the set of criteria, projects which have been approved by FEBESURCA have aimed at conserving water sources primarily in the upper zone through reforestation and the creation of buffer zones (in cooperation with CVC) and the recuperation of a lake within the watershed.

5. Emerging issues of stakeholder representation

Already at the second FEBESURCA meeting, held in October 1993, lack of participation from the lower part of the watershed was noted. One reason for this might be the generally low level of institutional participation in the lower part of the watershed. The proportion of households participating in institutions like the *Juntas de Acción Comunal* or the local drinking water committee which appoint representatives to FEBESURCA, is significantly lower in the lower zone than in the middle and high zone with only between 10 and 20 percent participating as compared to 30 to 40 percent for the upper and middle zone. Only for the more production-oriented institutions such as the cooperative or the local agricultural research committees, is the pattern different (see table 2).

Another and probably more important reason might be that people in the lower zone felt that there was not a lot to gain from participating in FEBESURCA. The initial decision to focus on activities in the upper zone which was later spelled out in the criteria for evaluating projects proposed by the communities, clearly limited the lower zone's chances of getting projects approved. Moreover, efforts to protect water sources in the upper zone were by lower-zone farmers first and foremost seen to be of benefit to the population in the middle zone who as explained by farmers in Socorro were likely to use the aqueduct water not only for domestic purposes but also for irrigating crops such as tomatoes. They judged that the aqueduct would continue to run dry part of the year before reaching the lower zone. Actually, farmers in Socorro together with communities outside the Río Cabuyal watershed, are involved in constructing an aqueduct which will take its water from the mountains outside the Cabuyal watershed.

Hence, the formulation of the FEBESURCA agenda seems to a very large extent to have been captured by a coalition between middle and upper-zone farmers where middle-zone farmers have used FEBESURCA as a mechanism for attracting services from outside organizations and for trading these for a commitment from upper farmers to protect water sources. Thus, although the lack of participation from the lower-lying communities was noted already at an early stage of the organizing process, no corrective measures were taken. In other words, the participation from the lower-lying communities was apparently not sufficiently important to make its absence prevent the mid-altitude and upper communities for pursuing their agenda.

It is important to observe, however, that the logic behind this agenda only holds

when viewing the Río Cabuyal watershed in terms of the goals of local inhabitants to protect their water supply. If external interests are taken into account, it is the amount of water flowing *out* of the watershed which is important the strategic importance of the lower zone becomes more evident. Studies undertaken by CIAT show that tributaries to Río Cabuyal originating in the lower and middle zones are just as important for determining the amount of water that Río Cabuyal carries out of the watershed as are tributaries originating in the upper zone (Rubiano, personal communication). Taking external interests into account could therefore substantially change FEBESURCA's priorities to the advantage of farmers in the lower zone. Another important point is, however, that to argue this case, information about water flow within the watershed is essential. Thus, this case illustrates the potential role that access to information about resources within the watershed has for the definition of strategies and further for the negotiation between stakeholders within as well as outside the watershed.

Yet, there are other factors for which lack of participation does matter. At least, this was the lesson learned by FEBESURCA representatives in August 1994. August and September is the season of fires in Cabuyal. Some fires are 'natural', caused by the relentless sun and the dry vegetation. Others are intended, meant to clean fields for crop residues, weeds and/or fallow vegetation as part of the land preparations. Usually, these fires are controlled and confined to the field, but of course accidents happen, fires go wild and spread. According to many people in the Cabuyal watershed and especially according to FEBESURCA representatives, the fires were particularly serious in 1994. To a large extent, this impression probably owed to the fact that one of the apparently 'natural' fires took place in the upper part of the watershed right next to an area where FEBESURCA together with CVC in the first half of 1994 had created a buffer zone and planted trees in order to protect three water springs. A fire partly destroyed this work.

Speculations started mounting among local people that perhaps the fire had been started deliberately as some kind of protest against the creation of the buffer zone. The fire took place in an area largely inhabited by indigenous people. One interpretation was that people around the water source were unhappy with the fact that the protection of the area did not conform with the rules developed by the Cabildo which prescribes a buffer zone of 30 meters around water springs but instead with the rules of CVC which prescribes a buffer zone of 50 meters.⁶ Other speculations suggested that perhaps the indigenous people and/or their local organization, the Cabildo, had not been sufficiently involved in FEBESURCA and perhaps therefore they were resentful towards and were trying to undermine FEBESURCA's activities. Still other speculation suggested that the fire was caused by individuals in search of land who were seeing their opportunities for being allocated land by the Cabildo shrinking due to the creation of the buffer zone.

These speculations were aired at the FEBESURCA meeting held in September 1994. Different options for dealing with the problem were discussed. Some wanted to introduce sanctions and wanted CVC to enforce these. CVC, however, refused this, claiming that they would be seriously threatened by local people if attempting to impose such sanctions. Others leaned to the opinion that the role of FEBESURCA was to raise

awareness rather than to impose sanctions.

The incidence gave rise to the formulation of a special agreement between FEBESURCA and the Cabildo which was already member of FEBESURCA specifying some procedures for protecting water sources in areas under the jurisdiction of the Cabildo. Moreover, the incidence of fires made it clear how vulnerable FEBESURCA was to individuals or groups who did not feel their interests sufficiently accommodated in FEBESURCA.

And indeed, analysis shows that FEBESURCA only represents a certain section of the multiple interests relating to the management of the Cabuyal watershed. Viewed on the basis of information available from the questionnaire survey, conducted in 1993, the participation in the institutions responsible for electing representatives to FEBESURCA does not as an average exceed 34 percent of the families within the watershed (see table 2). Unfortunately, the questionnaire survey from which this information stems did not inquire about participation in the *Cabildo La Laguna*, the local indigenous governing body. However, based on inventories made in 11 out of the 22 communities during 1994, participation in the bi-weekly Cabildo meetings appears to be high, especially, of course, among the indigenous population, but also among the non-indigenous population who at times turn to the cabildo as a conflict resolving body e.g. for settling debt cases among neighbours, marital disputes, land disputes, thefts etc.

On a whole, 53 percent of the households did *not* participate in neither the *Junta de Acción Comunal*, the drinking water committee, the cooperative nor the local agricultural research committees, varying from 44 percent in the upper part of the watershed to 53 percent in the middle and 65 percent in the lower part of the watershed. Non-participation is, however, more widespread among the poorest households with 61 percent not participating in any institution than among households enjoying the highest level of well-being (45 percent). Only 21 percent of the poorest households participated in two or more of the above mentioned organizations as opposed to 30 percent of the best-off ($p < .01$; chi-square test). Participation in the sense that it was measured in the questionnaire, however, comprises everything from participating in an assembly once every second year to regularly being in contact with representatives or being a representative.

With respect to mere awareness of the *existence* of the above organizations, only 10 percent of the poorest households were aware of the existence of all four, while this was the case for 24 percent of the best-off and 14 percent of the middle category ($p < .00001$; chi-square test).

Looking at the well-being status of the actual members of two of the above organizations and thus at the origin of the interests that are most likely to be represented, a similar and even more pronounced pattern emerges.⁷ Of the members of the JACs and the CIALs, close to 60 percent belong to the category of households enjoying the highest level of well-being while barely 10 percent belong to the category of poorest households. Furthermore, a considerable degree of overlap between the members of the JACs and the CIALs occurs with 29 percent of the members being members of both organizations.

Perhaps even more telling is the fact that including the representatives to FEBESURCA does not add any the total number of representatives. In other words, all FEBESURCA representatives are already members of other local institutions.

This means that the interests and more specifically the possibilities for meeting these interests of families having only little and often very poor and sloping land, with poor access to forests and natural water springs at present are poorly represented in FEBESURCA. This means that FEBESURCA faces the risk that its agenda will only partially mobilize support on issues such as burning.

6. Six functions for local-level watershed management organizations

Based on these experiences, six functions emerge as essential for local-level watershed management organizations. Of these, at least three appear to be specific to watershed management. Besides being important in themselves, these functions provide some principles for the process of organizing for local-level watershed management.

Identifying stakeholders and ensuring their representation in management effort

The first of these functions is to identify the distinct local-level interests or stakeholders that relate to the use and management of resources within the watershed and ensure their representation in management efforts.

Local-level organizations can be either community or interest group based. With the majority of its representatives being appointed on a community basis, FEBESURCA is an example of a community-based organization. In cases where the individual resource manager's interests are determined by his or her geographical location, community-based organizations are likely to be representative. However, when other factors such as ethnicity or a resource manager's access to resources are important determinants, chances of community-based organizations being representative of such diverse interests are limited, since a representative might have to represent interests different and perhaps entirely in conflict with his or her own. Our analysis confirms a caveat expressed elsewhere, that organizational participation in community-based organizations tends to be skewed towards resource-rich households, e.g. [3][9], as is the case in Cabuyal. This case study illustrates that the likelihood is that in community-based organizations, certain stakeholders are left unrepresented and perhaps even unrecognized.

In many cases, this might not hamper institutional effectiveness. A credit project, for example, does not depend on 100 percent participation for being effective seen as a *credit project*⁸ as long as the number of participants is large enough to allow for an efficient management of the credit. The case of watershed management, however, is different due to the interdependency that exists among different users: i.e. one group's use of a resource directly or indirectly affects other groups' possibilities for using the same or other resources within the watershed. This makes the participation of all interest groups or stakeholders, and thus stakeholder-based rather than community-based organization essential to effective watershed management. This, for instance, became clear to FEBESURCA representatives in the case of the presumed intentional fires that threatened

the FEBESURCA efforts to protect important water sources during 1994.

Because of the tendency of local organizations to be community-based and representative only of a certain set of stakeholders, building organizations that include *all* stakeholders will often require strong efforts to circumvent this 'default' situation and instead to guide the organizational process so that the various stakeholders get identified and subsequently represented. Only then will local-level watershed management be effective. Our case study shows that when local representation is organized in a 'participatory' fashion that allows for self-selection by the established elite, then the definition of relevant stakeholders is likely to be incomplete. Such processes require input (from outsiders) in the form of methods for stakeholder analysis, which facilitate identification of all relevant stakeholders.

Provide forum for analysis and negotiation of diverse interests

Once the diverse stakeholders are identified and have found representation, the second function which local-level watershed management organizations should perform is to provide a forum or platform as suggested by Roling [11] where these interests can be analyzed and negotiated. In the first place, this means specifying time and place for such negotiations as well as who should participate.

Because the conflict of interests relating to watershed management are not easily overcome, such negotiations cannot realistically aim for everyone to share the same common goal. Again turning to the case of the 1994 Río Cabuyal fires, subsequent stakeholder analyses conducted by FEBESURCA representatives on the initiative of CIAT researchers, showed that very concrete interests lead particularly poorer households, who are either short of labour or are renting in land and therefore do not have incentives to engage in long-term land improvements, to prefer burning as a method of cleaning fields despite their awareness of the harmful effects of burnings. In such cases, it is almost Utopian to imagine a shared sense of a common goal. More realistically, and to some extent happening in FEBESURCA, such negotiations need to take as their point of departure, the existence of conflicting interests and aim at identifying compromises between these as well as at exploring mechanisms of compensation.

In such negotiations, participatory techniques which do not insist upon identifying common goals and objectives but rather draw the attention to the conflicts, constantly contrasting different interests, and in which the principal role of the facilitator is that of the 'devil's advocate' are important tools. Examples of such techniques are described e.g. in [5]. In most cases, the facilitation skills necessary to lead such negotiations do not exist locally, but will, at least in the early stages of organization have to be provided from outside. This underlines the importance for local-level organizations of not only being in contact with external organizations which can provide technical advice on how to control soil erosion, measure water flow or calculate rates of return to different management efforts, but also with organizations which can provide advice and skill formation with respect to the organizational process as such. We shall return to this point below.

Define rules and norms for the use of resources within the watershed

Apart from identifying mechanisms of compensation, an important outcome of such analyses and negotiations is the definition of norms and rules for the use of specific resources within a watershed as well as sanctions for not complying with these. This is the third function of local-level watershed management organization and is shared with other types of local-level resource management. Thus, Ostrom [8] ascertains that rules regulating resource use through specifying e.g. time, place, technology and quantity of resource units as well as rules specifying resource input obligations to support management activities relating to common-pool resources, need to be carefully tailored to the local conditions. Uniform rules established for an entire nation or region cannot take into account such specificities and are therefore bound to fail, she argues.

Experiences with creating buffer zones to protect water springs and water courses in Río Cabuyal provide a case in point. CVC has for many years attempted to create such buffer zones in the area, applying national laws prescribing a buffer zone of 50 meters around water springs and 20-30 meters along water courses, although with little acceptance from the local population and thus with little success. As a result of the involvement of FEBESURCA in the creating of buffer zones during the second half of 1994, adherence to these general rules was relaxed and negotiated on a case by case basis, often being determined by the existing boundary between natural vegetation and cultivated area. This has significantly increased the creation of buffer zones by the local population: as an indication, a considerable amount of community labour was mobilized to actually create these buffer zones. However, neglect of mechanisms to monitor and enforce continued protection undercut this effort.

Initiate a process of local-level resource monitoring research

A fourth function that should be undertaken by local-level watershed management organizations is to initiate local monitoring research. Rather than monitoring individual resource users' performance and compliance with agreed norms and rules on the basis of which sanctions might be made, the primary function of such monitoring research should be to allow assessments to be made of the state of resources within the watershed. Monitoring research has specific importance in watershed management due to the complexity of and the often poorly understood interdependence between different resources within the watershed. This means that efforts to regulate use or to protect resources in a watershed are often decided on the basis of weak information. The previously mentioned example of the relative importance of upper versus lower tributaries in determining the water flow of Río Cabuyal at the tail end of the watershed is a case in point.

The experience of burning new plantations of trees illustrates the need to minimize dependence on external institutions to define and undertake such monitoring. FEBESURCA mobilized local input (labour) into the creation of protected areas and reforestation, but did not set up any monitoring by locals of enforcement on these. And once, the need for sanctions based on monitoring was recognized, the problem of where

in the organizational structure to locate enforcement had to be resolved. This was only brought to light by the involvement of FEBESURCA in interviewing locals about their reasons for burning. This illustrates that such monitoring should, to the extent possible, be determined and undertaken locally. Moreover, the Río Cabuyal experience shows that the provision of information about the state of resources in itself is an important part of the negotiation of conflicting interests and the definition of compromises and rules for resource use.

Formulating and exerting demand for services from external institutions in support of local management efforts

The fifth function which should be undertaken by local-level watershed management organizations is to formulate and exert demands on external organizations such as NGOs and government organizations providing services to local communities. As was the case in Río Cabuyal when CIPASLA was formed, local populations are so often confronted with an array of organizations each having their own agenda, resulting in a supply-driven rather than demand-driven provision of services, be they technical, social or organizational.

One of the tasks of local-level watershed management organizations is to attempt to change this situation by formulating agendas, identifying problems and/or defining concrete proposals for action to which external organizations can respond. To be successful, this obviously requires a willingness on the part of the external organizations to listen and respond to such demands as well as an institutional mechanism through which such demands can be communicated. The creation of CIPASLA and within it, of FEBESURCA and the inter-institutional support committee as two equal bodies were attempts to foster such willingness and an institutional mechanism through which such communication could take place. The creation of a mechanism through which local organizations could 'pull in' services (or the promise of services) lacking in the upper-watershed communities was critical to the success of their motivational campaign to protect the upper-watershed water sources.

Negotiating internal versus external watershed interests

Without the process of organizing for local-level watershed management, described in the first four functions, and thus of ensuring that all internal interests are represented in the negotiation with external interests, attempts to accommodate external interests in watershed management are likely to fail.

The sixth fifth and final function to be carried out by local watershed management organizations is to negotiate internal versus external interests relating to the management of the watershed. As already emphasized, interests in improving watershed management in Río Cabuyal and elsewhere originate as much from stakeholders outside the watershed such as urban populations in need for drinking water or producers of hydro-electrical power, as from stakeholders within the watershed. Just as in the case of negotiating interests originating within the watershed, the likelihood of reaching a shared sense of a

common goal is limited. Instead, based on a process of acknowledging the existence of legitimate but often conflicting interests within as well as outside the watershed, compromises will have to be made that provide incentives for watershed farmers to erode less, for urban and semi-urban populations to consume less charcoal, etc. The search for such compromises rather than for modes of enforcement should be the aim of such negotiations.

7. Conclusions

Analysis of the process of organizing for local-level watershed management in the Río Cabuyal provides several insights into the strategy for organization which needs to be followed. In summary, 'participation' needs to be structured in relation to a stakeholder analysis conducted by local people, and facilitated by outsiders. Community-based participatory approaches are likely to reproduce the representation of already organized and usually, more well-to-do elites which characterizes the existing local power structure. When this stakeholder analysis is overlooked or incomplete, the capacity of the resulting organization to provide an effective forum for conflict resolution, is likely to be truncated. As the Río Cabuyal case shows, conflict is likely to arise between the elite stakeholders included in the organization, and those who are under-represented, perpetuating difficulties of resource management in the watershed. Stakeholder-based participation is therefore, a crucial element in an organizational strategy for watershed management.

A second feature of such strategy, which the Río Cabuyal experience brought to light, is the importance of institutionalizing monitoring of the status of resources which is implemented locally, but which is able to 'draw down' information from external agencies, not necessarily available to locals. The involvement of external agencies in regulating watershed management will need to be redefined as a support role (providing information and other services), but cannot be dispensed with. In addition, technical information about the watershed resource system needs to be fed into local people's analyses of their situation, particularly once the trade-off between external versus internal interests becomes relevant to local people's objectives for managing the watershed. Shaping the institutional mechanisms for managing the interface between local organizations and external agencies, therefore emerges as a vital part of a process for strengthening local capacity for watershed management.

Footnotes

1. The *vereda* is the smallest official administrative unit in Colombia.
2. This excludes the semi-urban community, Siberia, a township situated within the watershed.
3. This and following figures on distribution of resources among households in the watershed and their involvement in various activities stem from a questionnaire survey that was administered to the entire population of the Rio Cabuyal watershed in September 1993.
4. This section is based upon interviews made by María del Pilar Guerrero Arango with key informants concerning the creation of FEBESURCA as well as on participation in and minutes from meetings held in CIPASLA and FEBESURCA.
5. Although it was not until July 1994 that the watershed user committee actually got the name FEBESURCA, we shall use it here for the sake of convenience.
6. It should be noted, however, that CVC later agreed to relax its rules with effect for the buffer zones that were created in the second half of 1994.
7. It has only been possible to identify 35 percent of the JAC members (39), 68 percent of CIAL members (41), and 72 percent of FEBESURCA representatives (13).
8. Yet, if in addition broader social objectives are attached to the project, such as the objective of improving the conditions of the poorest, the case might be different.

References

1. Ashby, Jacqueline A., The Social Ecology of Soil Erosion in a Colombian Farming System, *Rural Sociology* 50(3), 377-396 (1985).
2. Bardhan, Pranab, Analytics of the Institutions of Informal Cooperation in Rural Development. *World Development*, 21(4), 633-639 (1993).
3. Bebbington, A., Merrill-Sands, D., and Farrington, J., Farmer and Community Organisations in Agricultural Research and Extension: Functions, Impacts and Questions, *Odi Network Paper 47*, Overseas Development Institute, London, 1994.
4. Blaikie, Piers, and Brookfield, Harold, *Land Degradation and Society*, Methuen & Co., New York, 1987.
5. Guba, Egon, and Lincoln, Yvonna S., *Fourth Generation Evaluation*, Sage Publications, London and New Delhi, 1989.
6. Knapp, E.B. in *CIAT Hillsides Programme Annual Report 1993-1994*, Centro Internacional de Agricultura Tropical, Cali, forthcoming.
7. Korten, David, Community Organization and Rural Development: A Learning Process Approach, *A Ford Foundation Reprint from 'Public Administration Review'*. 1980.
8. Ostrom, Elinor, Neither Market nor State: Governance of Common-Pool Resources in the Twenty-First Century, *Lecture Series 2*, International Food Policy Research Institute, Washington DC, 1994.
9. Pretty, Jules N., and Chambers, Robert, Towards a Learning Paradigm: New Professionalism and Institutions for Agriculture, *IDS Discussion Paper 334*, Institute of Development Studies, Sussex, 1993.
10. Rasmussen, Lise Nordvig, and Meinzen-Dick, Ruth, Local Organizations for Natural Resource Management: Lessons from Theoretical and Empirical Literature, Draft, International Food Policy Research Institute, Washington DC, 1994.
11. Roling, Niels, Communication Support for Sustainable Natural Resource Management, *IDS Bulletin* 25(2), 125-133 (1994).
12. Uphoff, Norman, *Local Institutional Development: An Analytical Sourcebook With Cases*, Kumarian Press, 1986.
13. White, S., and Maldonado, F., The Use and Conservation of Natural Resources in the Andes of Southern Ecuador, *Mountain Research and Development* 11, 3755 (1991).

TABLE 1
Distribution of cultivated land, Río Cabuyal watershed

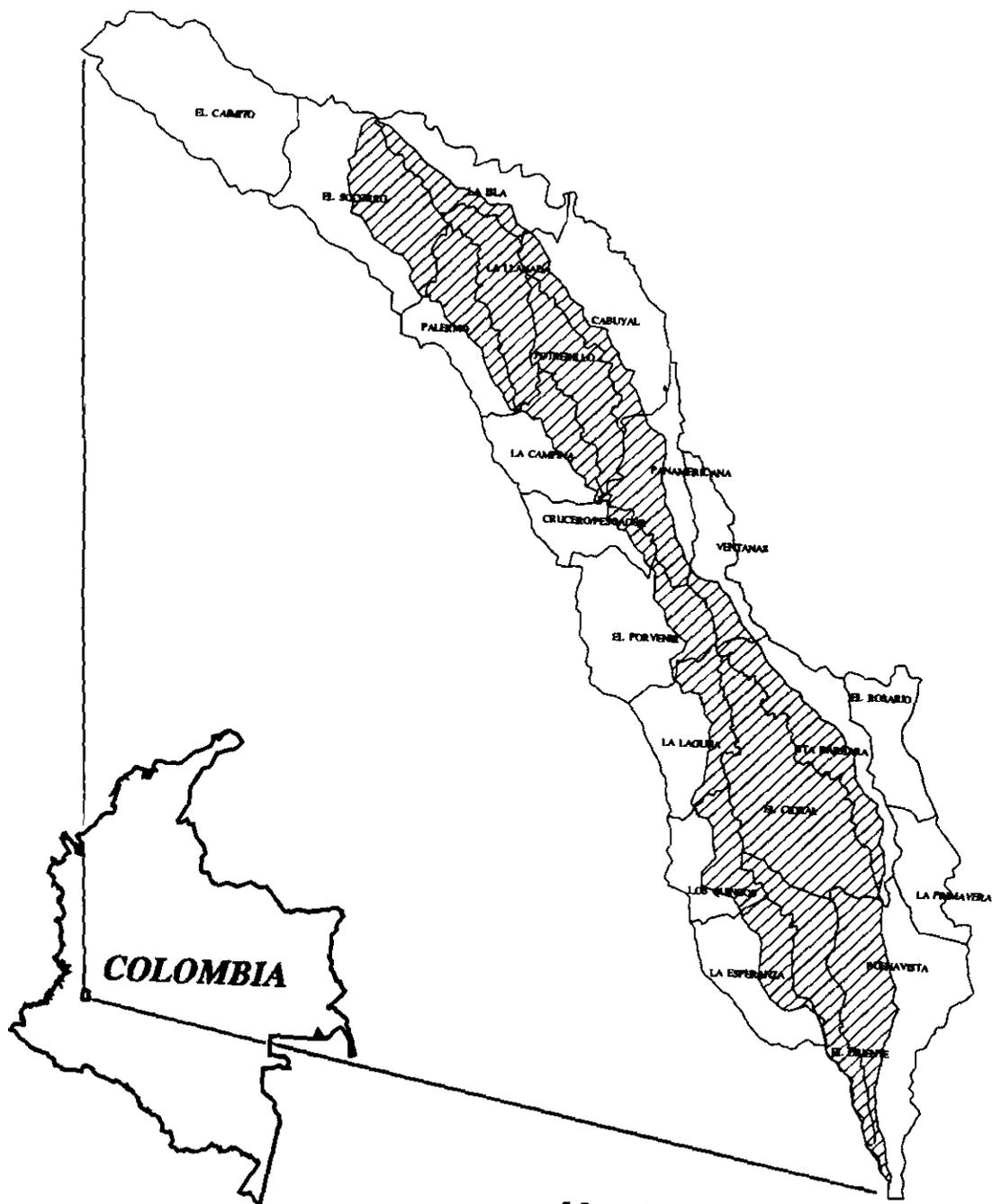
Cultivated area (hectares)	Mean cultivated area per household (hectares)	Distribution of households (percent)	Distribution of cultivated area (percent)
< 0.5	0.2	16	2
0.5-0.9	0.8	24	10
1-1.99	1.5	29	24
2-2.99	2.5	14	19
3-3.99	3.5	9	17
⇒ 4	6.2	9	30
Total	1.9	100	100

Source: 1993 household questionnaire survey, Río Cabuyal watershed, Cauca Department.

Table 2
Participation in selected local organizations
Percent households participating

Organization (significance level in brackets)	Lower zone (n=327)	Middle zone (n=370)	Upper zone (n=388)	Total (N=1087)
JAC ($p < .00001$)	20	36	43	34
JA ($p < .00001$)	10	27	34	24
Cooperative ($p < .00001$)	10	11	1	8
CIAL ($p < .001$)	10	4	12	9

Source: 1993 household questionnaire survey, Río Cabuyal watershed, Cauca Department.



Map 1
Rio Cabuyal Watershed and its communities
The shaded area shows the extension of the 'true' watershed