

# CPWF Project Report

Sustaining inclusive Collective Action that Links across  
Economic and Ecological Scales in upper watersheds  
(SCALES)

Project Number 20

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for submission to the



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### **Acknowledgements**

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### **Program Preface:**

The Challenge Program on Water and Food (CPWF) contributes to efforts of the international community to ensure global diversions of water to agriculture are maintained at the level of the year 2000. It is a multi-institutional research initiative that aims to increase the resilience of social and ecological systems through better water management for food production. Through its broad partnerships, it conducts research that leads to impact on the poor and to policy change.

The CPWF conducts action-oriented research in nine river basins in Africa, Asia and Latin America, focusing on crop water productivity, fisheries and aquatic ecosystems, community arrangements for sharing water, integrated river basin management, and institutions and policies for successful implementation of developments in the water-food-environment nexus.

### **Project preface**

The Sustaining inclusive Collective Action that Links across Economic and Ecological Scales in upper watersheds (Scales) project fits mainly in People and Water in Catchments Theme (Theme 2) of the CPWF. Its goal is to contribute to poverty alleviation in the upper watersheds of the tropics through improved collective action for watershed resource management within and across social-spatial scales. Scales worked through an integrated program of collaborative action research, development, and capacity building in key catchments of the Nile and Andes basins, as well as through synthesis and dissemination of lessons and approaches across basins, and conceptual modeling and analysis. The project was led by the International Center for Tropical Agriculture (CIAT), and involved 9 partner organizations.

### **CPWF Project Report series:**

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## CONTENTS

<b>Acknowledgements</b> .....	<b>2</b>
<b>Program Preface:</b> .....	<b>2</b>
<b>Project preface</b> .....	<b>2</b>
<b>Project highlights</b> .....	<b>6</b>
<b>Executive summary</b> .....	<b>7</b>
<b>INTRODUCTION</b> .....	<b>9</b>
<b>OBJECTIVES</b> .....	<b>11</b>
<i>Objective 1. Improve understanding of the extent to which different forms of collective action can have a significant impact on poverty alleviation under different conditions and at different scales in watersheds.</i> .....	11
Methods .....	11
Results .....	14
Discussion and Conclusion .....	19
<i>Objective 2. Strengthen the participation of women, the poor and other vulnerable groups in collective management of watershed resources, where improved management of these resources has the potential to contribute to poverty alleviation at the local and watershed scales in pilot sites.</i> .....	21
Methods .....	22
Results and Discussion .....	22
Conclusion .....	26
<i>Objective 3. In the pilot sites, develop, operationalize and evaluate methods for improving the articulation of collective action for improved resource management from local to watershed scales in ways that contribute to reducing poverty, especially for women and marginalized groups.</i> .....	26
Methods .....	27
Results .....	28
Discussion and Conclusion .....	32
<i>Objective 4. Contribute to the building of a cadre of trained and experienced extensionists, planners, environmental authorities, local leaders, researchers and/or other development practitioners who can stimulate and support inclusive, pro-poor collective action in their work on watersheds.</i> .....	32
Methods .....	32
Results and Conclusion.....	32
<i>Objective 5. Based on lessons from experiences in the pilot sites, develop and disseminate generalizable tools, guidelines, policy recommendations and other lessons</i>	

## Contents **CPWF Project Report**

<i>learned to facilitate and promote effective and equitable collective action that contributes to poverty reduction in the watershed context. ....</i>	33
Methods .....	33
Results and conclusion .....	33
<b>OUTCOMES AND IMPACTS .....</b>	<b>34</b>
International public goods .....	35
<b>Partnership achievements.....</b>	<b>36</b>
<b>Recommendations.....</b>	<b>36</b>
<b>Publications .....</b>	<b>37</b>
<i>Scientific Papers (8) .....</i>	37
<i>Presentations (7) .....</i>	38
<i>Other (10) .....</i>	39
<b>BIBLIOGRAPHY .....</b>	<b>40</b>
<b>PROJECT PARTICIPANTS .....</b>	<b>42</b>
<b>Appendices.....</b>	<b>43</b>

**LIST OF TABLES**

Table 1. Irrigation Game versus CVM..... 28  
Table 2. Water Trust Game (see Cardenas, Johnson and Rodriguez, 2008a and 2008c for more detail). .... 30  
Table 3. Summary Description of the Project’s Main Impact Pathways..... 34

**LIST OF FIGURES**

Figure 1: Conceptual framework of multi-scale collective action in watershed management ..... 12  
Figure 2. Actors, action resources, collective action and outcomes in a watershed unit. 13  
Figure 3. Fuquene study site..... 15  
Figure 4. Geographic location of Tolima Province: Coello River watershed ..... 17  
Figure 5. SCALES research villages in the Nyando river basin..... 19

## **PROJECT HIGHLIGHTS**

The project's conceptual framework proposes a new way of looking at social and ecological interactions within watersheds. Watersheds are inherently multi-scale, and collective action can occur simultaneously within and across scales. Resource flows in watershed are not limited to lateral flows of soil and water but also include "reverse flows" of economic, social and political resources that often go from downstream to upstream in response to actual or potential hydrological externalities. In such a context, decisions with important outcomes for resource management can be made in multiple fora or "action arenas" in which the rules and resources that have value in influencing outcomes may differ. Projects that seek to strengthen the role of the poor in watershed management need to be aware of these issues so that they work in and/or create spaces in which the action resources of the poor have value. The article in which this framework was published (Swallow et al, 2006) was named best article published in *Water International*, the journal of the International Water Resource Association in 2006.

The relationship between water and poverty is complex, with some opportunities for improving welfare through better water management but many more potential trade-offs between poverty and the environment. Many activities that contribute to watershed degradation such as mining or crop and animal agriculture have also contributed to poverty alleviation. Watershed management policies that consider these indirect linkages via labor and product markets as well as direct linkages via water provision are likely to achieve outcomes that are more pro-poor. Further, the poor are not a homogenous block whose interests are necessarily opposed to those of better-off groups. Interests are likely to follow sectoral divides, spanning the deep socio-economic and cultural divides that often exist in Andean watersheds. As such, they could be an important entry point into dealing with other more divisive issues but to take advantage of this opportunity the willingness and capacity of the poor to participate in multi-stakeholder negotiation processes around watershed management will need to be strengthened since one of the things that currently characterizes the poor is their non-participation in community processes.

Individuals' incentives for cooperation in a watershed context, and the impacts of potential policy interventions were analyzed through the application of economic experiments under field conditions. Over 600 residents of the 4 watershed participated as "players" in "economic games." The results confirmed that upstream downstream asymmetries reduce incentives for cooperation compared to the symmetric conditions that characterize many common property resource management problems. Communication rather than regulation is the most effective way for people to improve levels of cooperation, though there may be exceptions to this in cases where there are deep social divisions within communities. Upstream communities have an important role to play in initiating watershed dialogue because downstream people, both in the games and in reality, appear to have a deep distrust of upstream residents that limits their willingness to initiate cooperation, though not to reciprocate if upstream people make the first move.

An innovative methodology, the *Conversatorio de Accion Ciudadana (CAC)*, for empowering communities to engage with authorities around issues of resource management and rural development was adapted and validated in the two sites in Colombia. According to internal and external assessments, the CACs had significant impacts on human and social capital of participants, and also led to important changes in relations between communities and institutions. They also laid the groundwork for longer term economic and environmental impacts; over 50 specific commitments were made by authorities to improve conditions in watersheds, including financial commitments of over USD 2 million.

## **EXECUTIVE SUMMARY**

The Scales project addresses the challenges of achieving and maintaining collective action in watersheds. The multiple, overlapping scales, and the ecological, economic, social and political asymmetries that typically characterize tropical watersheds substantially make it difficult to achieve cooperation around watershed management at anything but very local scale. Yet, high scale coordination and cooperation is essential to adequately address watershed problems. The goal of this project was to make explicit the relationships between collective action, scale and poverty in a watershed context, and use the knowledge to develop solutions overcoming barriers and fostering equitable and sustainable management of watershed resources.

### *Objectives*

1. Improve understanding of the extent to which different forms of collective action can have a significant impact on poverty alleviation under different conditions and at different scales in watersheds.
2. Strengthen the participation of women, the poor and other vulnerable groups in collective management of watershed resources, where improved management of these resources has the potential to contribute to poverty alleviation at the local and watershed scales in pilot sites.
3. In the pilot sites, develop, operationalize and evaluate methods for improving the articulation of collective action for improved resource management from local to watershed scales in ways that contribute to reducing poverty, especially for women and marginalized groups.
4. Contribute to the building of a cadre of trained and experienced extensionists, planners, environmental authorities, local leaders, researchers and/or other development practitioners who can stimulate and support inclusive, pro-poor collective action in their work on watersheds.
5. Based on lessons from experiences in the pilot sites, develop and disseminate generalizable tools, guidelines, policy recommendations and other lessons learned to facilitate and promote effective and equitable collective action that contributes to poverty reduction in the watershed context.

### *Methods*

The project used a combination of quantitative, participatory and action research methods to achieve its objectives.

### *Research findings and outcomes*

The identified relationships between poverty, scale and collective action in watersheds are extremely complex, both conceptually and empirically. There are some opportunities for improving welfare through better water management but many more potential trade-offs exist between poverty and the environment.

Improving communication among different stakeholder improves cooperation around water management, according to experimental results.

Upstream communities have an important role to play in initiating watershed dialogue because downstream people, both in the games and in reality, appear to have a deep distrust of upstream residents that limits their willingness to initiate cooperation, though not to reciprocate if upstream people make the first move.

## Executive summary **CPWF Project Report**

Action research in Colombia confirmed the potential of communication to improve collaboration, and demonstrates that it is possible to level the playing field and empower communities to engage with authorities around issues of resource management and rural development.

### *International public goods*

The project produced 8 scientific papers, 7 presentations and new methodology for economic experiments and a guide for implementing a multi-stakeholder training, negotiation and meeting process (i.e. CAC).

### *Key recommendations*

1. Projects that seek to strengthen the role of the poor in watershed management need to be aware of the multiple and overlapping scales at which resource management decisions are made.
2. Pro-poor outcomes can be achieved by increasing the ability of the poor to influence decisions at a specific scale or in a specific forum, or by shifting the scale or forum of a decision to one where the "action resources" of the poor have more value.
3. Watershed management policies that consider indirect linkages between water and poverty via labor and product markets as well as direct linkages via provision of water for domestic or productive uses are likely to be achieve outcomes that are larger and more pro-poor.
4. Communication may be more effective than regulation in promoting collective management, and when initiative comes from upstream rather than downstream communities.



## **INTRODUCTION**

The challenge of managing upper catchments is to ensure both adequate welfare levels for local residents, often among the poorest and most vulnerable, while at the same time providing valuable ecological functions and services to downstream populations. These objectives are reflected in new policies being formulated and/or implemented in many countries of the Nile basin and the Andes. A major component of such policies is the inclusion of local communities in decision making about how watershed resources are used, building on lessons from theory and practice about the benefits of decentralized, participatory decision making for natural resource management (Swallow, Johnson, Meinzen-Dick, 2001).

There is a lot of evidence on the efficiency of decentralized, participatory management of common property resources such as rangelands, forests, or irrigation systems (Meinzen-Dick, Knox and Di Gregorio, 2001). Success of devolution in practice depends on how schemes are implemented and the capacity of user groups to generate and maintain collective action. Theoretical arguments for giving authority and responsibility to those who most depend on the resources for their livelihood and who are in the best position to monitor and enforce rules about how resources will be used are also compelling. In the case of watersheds, however, the existence of significant externalities—where the effects of land or water use decisions by some individuals or groups affect the options available to others—means that decentralized decision making alone may not lead to optimal outcomes at the level of the watershed.

In practice, and in the study watersheds, we often see watershed management activities carried out at a range of scales—a group of neighbors rehabilitating a water source with new tree species, a women’s group working with an NGO to build a potable water system that draws water from a nearby river, or a producer’s association in the lowlands lobbying government to restrict land or water use in upper catchments to ensure a stable and plentiful supply of water for irrigation. These examples of collective action for NRM (all of which come from the proposed study sites) could lead to benefits for the participants at the specific scale at which they are undertaken, but whether or not these benefits actually materialize, and how big they are, will be affected, positively or negatively, by the actions of others. Experience has shown that centralized, top down management is not an effective or equitable solution to this coordination problem, but some type of articulation between activities undertaken at different scales could clearly lead to better outcomes for everyone. A good understanding of the biophysical interactions across scales within a watershed will be critical to achieving this coordination. In order to make progress on the ground in changing the way people make individual and collective decisions about resource management, we also need to know about articulations across social scales, at which actions are undertaken. Social scales include administrative hierarchies, as well as cultural and social institutions and markets.

Where the goals of watershed management are equity and efficiency, it is important not to lose sight of where the poor fit into these decentralized, collective processes. Poverty itself is the result of a dynamic, multi-scale processes, where outcomes at the individual scale both influence and are influenced by what happens at the community, regional or national scale (Barrett and Swallow, 2003). Collective action can help build assets that individuals and communities can draw on to reduce poverty, however little is known about the dynamic feedback effects across scales. The reason that it is important to understand where watershed management is closely linked to poverty, and where it is not, is that watershed management may require making tough choices between equity and efficiency, between increasing overall economic returns to water versus protecting and supporting the specific groups such as women, ethnic minorities or the landless. Understanding the extent of these tradeoffs, in both the short and long term, can help decision makers minimize their costs.

The extent to which improved watershed management can help alleviate poverty will hinge on whether increases in the availability or productivity of water can help poor households and communities undertake new livelihood strategies that will lead them out of the vicious circles of low investment, low productivity and resource degradation that are known as poverty traps.

## Introduction **CPWF Project Report**

Technologies that improve water productivity are one option, however as preceding discussion on participatory, community-based natural resource management suggested, ensuring that the poor have a voice in how decisions about how watershed resources are managed is also critical. Both information and awareness raising can be important here because people often don't recognize their interconnectedness or the options they have for influencing processes at other scales.

The basic hypothesis of this study is that investments in social capital and collective action can have a major impact on helping the poor in upper catchments to break out of poverty traps. To test this hypothesis we need to know about:

- what constitutes poverty in specific contexts;
- role of water and other linked watershed resources in the livelihoods of the poor in upper catchments;
- opportunities and incentives the poor, women, or other marginalized groups have to invest in collective action for water or watershed management;
- how these groups are likely to fare in participatory processes at various scales.

If collective action makes a major contribution to poverty reduction, we then need to know how best to support it at multiple scales to achieve equitable and sustainable watershed management. Tackling this question will involve identifying the factors that affect emergence and performance of collective action at different scales in watersheds—including economic incentives, power relations, and attitudes about equity and fairness—and working with communities to develop indicators for measuring the performance of collective action in terms of efficiency, equity and sustainability.

## OBJECTIVES

1. Improve understanding of the extent to which different forms of collective action can have a significant impact on poverty alleviation under different conditions and at different scales in watersheds.
2. Strengthen the participation of women, the poor and other vulnerable groups in collective management of watershed resources, where improved management of these resources has the potential to contribute to poverty alleviation at the local and watershed scales in pilot sites.
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4. Contribute to the building of a cadre of trained and experienced extensionists, planners, environmental authorities, local leaders, researchers and/or other development practitioners who can stimulate and support inclusive, pro-poor collective action in their work on watersheds.
5. Based on lessons from experiences in the pilot sites, develop and disseminate generalizable tools, guidelines, policy recommendations and other lessons learned to facilitate and promote effective and equitable collective action that contributes to poverty reduction in the watershed context.

***Objective 1. Improve understanding of the extent to which different forms of collective action can have a significant impact on poverty alleviation under different conditions and at different scales in watersheds.***

## Methods

### *Conceptual Framework*

The project significantly advanced conceptual and empirical knowledge about how collective action can contribute to poverty reduction in watershed context. The Theme 2 conceptual framework<sup>1</sup> was extended to capture the key elements of collective action in watershed management: the multiple stakeholders, multi-scale social interactions (among and between community groups, neighboring groups, and wider statutory organizations), different dimensions of poverty and human well-being, lateral flows of soil and water, and multi-directional flows of economic, political and social interaction (Swallow et al, 2006).

The conceptual framework has several important implications. *The first is that watershed management is inherently multi-scale, and that collective action around water management occurs at multiple scales, simultaneously.* Figure 1 presents a watershed divided into primary physical nodes with secondary and tertiary institutional nodes. Within primary nodes, local collective action can occur around management of springs, wells, potable water systems or small-scale irrigation schemes. Between primary nodes, upstream-downstream externalities—termed “water transitions” or changes in quality, quantity and availability of water—begin to emerge between primary nodes. Managing such externalities may be possible via secondary

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<sup>1</sup> Swallow, Johnson and Meinzen-Dick also developed the Theme 2 conceptual framework, prior to the initiation of the Scales project.

## Objectives CPWF Project Report

institutional nodes that span two primary nodes, or via tertiary institutional nodes that cover the watershed. The scale relationships are the same whether at sub-catchment, catchment or basin scale, though with increasing complexity.

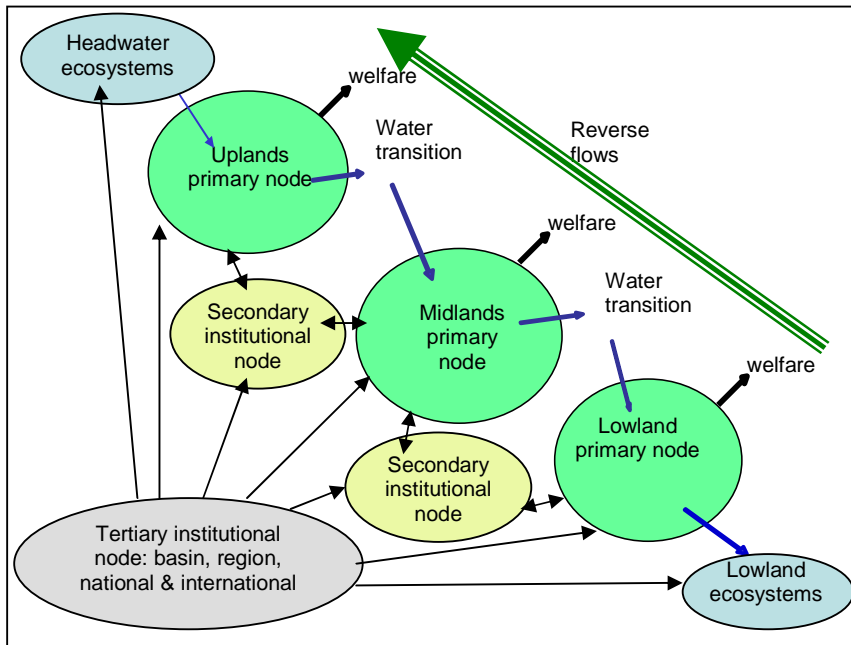


Figure 1: Conceptual framework of multi-scale collective action in watershed management  
Source: Swallow, Johnson, Meinzen-Dick and Knox, 2006, p. 365.

*The second key implication of Figure 1 is that lateral flows of soil and water that occasion water transitions are not the only resource flows in the watershed. Economic, social and political resources may flow from downstream to upstream as well. These "reverse flows" may be related to the size, and the welfare impacts, of the water transitions. For example, downstream water users could use political influence to push for strict regulation of land use in upper catchments in order to protect downstream water supplies at the expense of upstream livelihoods. Alternatively, a payment for environmental services scheme could achieve the same environmental outcomes with more positive impacts on upstream livelihoods. The form that reverse flow take, and their welfare implications, will be conditioned by the nature of social and economic relationships within catchments, and institutions at primary, secondary and tertiary scales.*

Figure 1 identifies the key hydrological and socio-political relationships across scales in watersheds, however it doesn't provide insight into how people, individually and collectively, are likely to behave in such a context. Figure 2 presents a framework for analyzing individual and group decisions (di Gregorio et al., 2004; Ostrom, 2005) adapted to the watershed context. Any decision takes place in an action arena—a socially defined space composed of actors, action resources, rules, and actions. The rules that govern what actions are possible derive from institutions, which can be formal or informal, and as described above, can operate at multiple, often overlapping, scales. In a given action area, what influences an actors ability to take actions or influence others are his or her "action resources" which include assets such as rights to natural, physical and financial capital, as well as the social and human capital that actors are able to draw upon. Personal characteristics such as leadership ability, charisma, ethnic origin, ideology or value systems are related to human and social capital, but are worth identifying separately because they go beyond the instrumental way in which assets are normally regarded; e.g., an ideology can influence one's own behavior or be used to create legitimacy or solidarity around a cause.

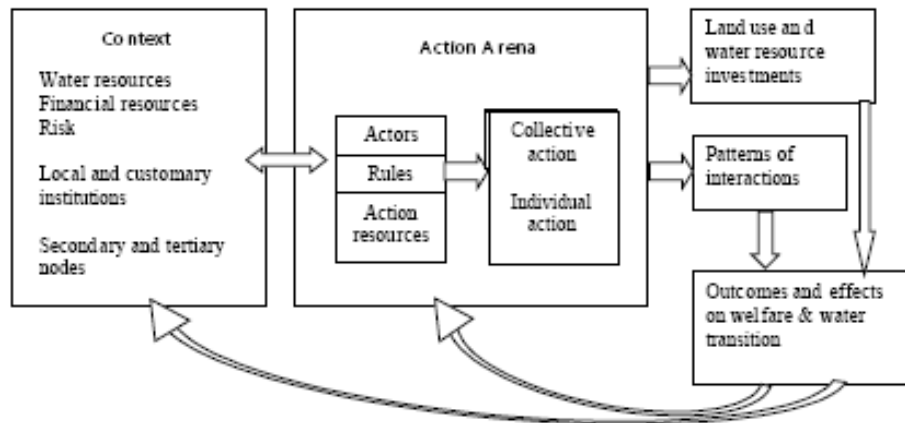


Figure 2. Actors, action resources, collective action and outcomes in a watershed unit.

Figure 2. Actors, action resources, collective action and outcomes in a watershed unit.

The framework gives rise to the third key implication of the Scales conceptual framework, namely *that in a watershed context, because of multiple and overlapping scales, the same decision can be addressed in multiple "action arenas" in which both the rules and the resources that have value in influencing outcomes may differ*. The poor are often not without action resources, but their resources may be more useful in some arenas than others. Which arenas these are is likely to be very context specific. The better off, meanwhile, may engage in "forum-shopping", looking for the arena in which they are most likely to obtain a result favorable to their interest. Projects that seek to strengthen the role of the poor in watershed management need to be aware of these issues so that they can orient their work towards increasing the relevant action resource of the poor as well as to creating spaces in which the action resources that the poor currently possess have value.

To identify the poor and understand the role of water in their livelihoods, we used the Stages of Progress (SOP) methodology (<http://www.pubpol.duke.edu/krishna/methods.htm>). SOP was developed to assess both the dynamics of poverty and the causes behind them. While national-level poverty rates are often slow to change, poverty is not a static situation. It changes as a result of seasonality, climate variability, household-level shocks (such as illness and death), lifecycle changes, and public policies. In addition, the group of poor people is itself constantly changing as individuals and households either escape from poverty or descend into it. Looking at the same households over time provides a better understanding of the conditions that keep people in poverty and those that move them out in order to identify general patterns and to assist policy targeting (eg Sen 2003, Barrett, Carter and Little 2006). It provides us with better insights into the processes that lead to patterns of disadvantage and inequality, and just as important identifies different ways by which the poor may improve their welfare. In both cases, public policy can be tailored to maximize protection and support for the most vulnerable without pulling back those who are escaping.

SOP is a participatory methodology that relies on community definition of poverty at a household scale. The poverty level of each household in the community is assessed, and explanations sought for changes in poverty status over time. The method takes its name from the stages or steps that a household passes through as it makes its way from poverty to prosperity. To define the stages, a representative group of community members must first come to agreement on a definition of poverty, based on a shared conception of "poorest family in the community." Once this is done, the group successively answers the question "What would this family do with additional resources?" until they reach the point at which the household would be considered prosperous. Because they are defined locally and in reference to a particular poor family, the stages vary by community and reflect the specific conditions and values of the community.

Once the stages are identified, the group then assigns each family in the community—based on a census which must be obtained or constructed—to the stage where they currently are and

## Objectives **CPWF Project Report**

the stage where they were at some point in the past, usually 10, 20 or 25 years ago. Families are then categorized as follows:

- A – Poor in the past, poor now
- B – Poor in the past, not poor now
- C – Not poor in the past, poor now
- D – Not poor in the past, not poor now

For a randomly-selected sub-sample of families, the community then identifies the reasons behind changes in poverty status. The final step in the methodology is to conduct follow-up interviews with a sample of families to confirm the results of the community analysis and to gather more information on specific issues. In the case of this study, interviews included questions on water use, conflicts, and management at the household and community scale.

In 2005, the SOP methodology was applied in 14 communities in the Fuquene watershed, 12 Coello watershed, 8 in the Kapchorean basin and 7 in the Awach basin. In all sites communities were purposively selected in the upper, middle, and lower parts of the watershed, on the basis of prevalence of poverty and the expected intensity of water conflicts. Site selection was based on available secondary data and on interviews with key informants. Information gathered in each community consisted of quantitative data from the SOP methodology—including movement in and out of poverty and their main causes—as well as qualitative data from interviews with households and key informants, and from observations by project staff in the field.

## **Results**

### *Empirical evidence on collective action, watershed management and poverty*

The Scales project (PN20) worked in 4 watersheds, 2 in the Colombian Andes and 2 in the Nyando, a sub-basin of the Nile in Kenya. Before presenting the result of the poverty analysis, a description of the study sites is presented.

#### Colombia, Andes Virtual Basin

The Lake Fuquene and Coello River watersheds are typical of the socio-environmental situation in the Andes (Ramírez and Cisneros 2006). Lake Fuquene *Watershed*<sup>2</sup> Fuquene Lake watershed encompasses the valleys of Ubaté and Chiquinquirá in the states of Cundinamarca and Boyaca, Colombia (Figure 1). Fuquene is located about two hours from the Colombian capital, Bogotá, on a good all-weather road. It covers an area of 187,200 ha, including 17 municipalities<sup>3</sup>, with a population of 229,000 (Rubiano 2005), about 59% of which is rural (DANE 2005). The altitude ranges from 2300-3300 masl, with an annual rainfall between 700 and 1500 mm. For the municipalities in the watershed, the 2003 Life Condition Index, a measure of welfare, ranged between “very low” and “high” (Sarmiento et al, 2006), reflecting the socioeconomic heterogeneity in the zone. Figure 3 shows the location of the watershed and the study communities.

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<sup>2</sup> For more information see <http://www.infoandina.info/andean/index.shtml?apc=Ba1e1-&s=B&e=h>

<sup>3</sup> The municipalities that belong to the Fuquene watershed are Carmen de Carupa, Ubaté, Tusa, Sutatausa, Cucunubá, Suesca, Villapinzón, Lenguazaque, Gachetá, Fúquene, Susa y Simijaca in Cundinamarca and San Miguel de Sema, Ráquira, Caldas, Chiquinquirá y Saboya in Boyacá.

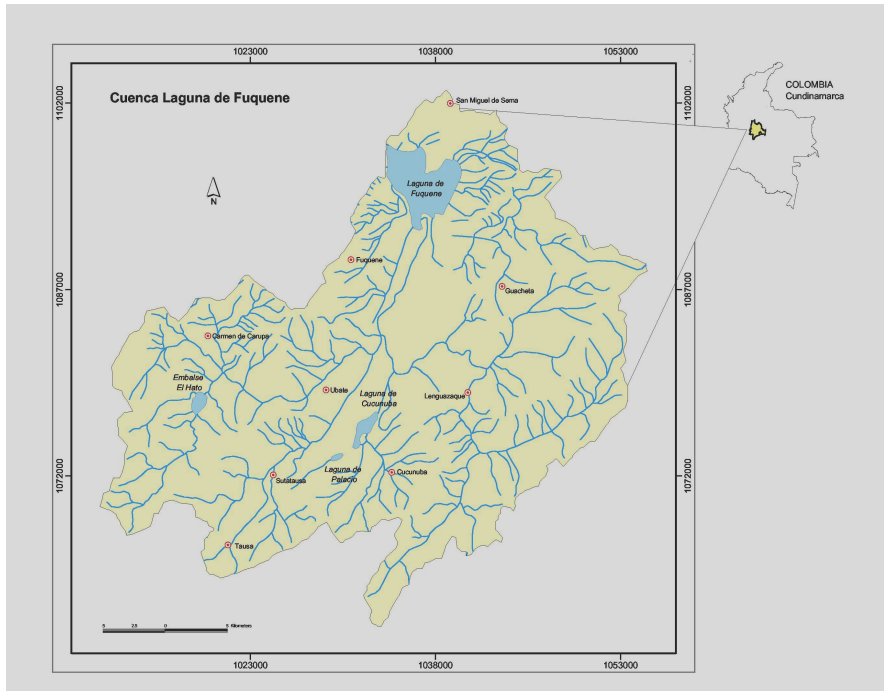


Figure 3. Fuquene study site

The largest land use in the watershed is pasture (59%), followed by agriculture (26%), forest (4%), páramo (2%) and lake (2%) (Rubiano *et al.* 2006). Land degradation is a serious concern, with 13,000 hectares classified as severely eroded and 40,000 ha as moderately eroded. In the past, major investments were made in soil conservation activities, however aside from stabilizing fragile areas, the impact of these investments on productivity has not yet been rigorously assessed. Conservation tillage has been widely promoted, however adoption was limited until recently when it began to be promoted under a payment for environmental services (PES)-type scheme (<http://www.condesan.org/Andean/projects.htm>).

The principal economic activities in the watershed are agriculture (crops and livestock) and mining. The medium and large scale dairy operations, located in the lower part of the watershed along the shores of the lake, are high input and highly productive. Land values in this area are among the highest in the country, and many hacienda owners are wealthy and politically well connected. Crops are grown mainly in the upper and middle parts of the watershed. Land ownership in upper and middle part of the watershed is generally by smallholders, however in the higher areas appropriate for potato cultivation, much of the land is rented out to large-scale producers who are better able to take this risks associated with this high risk-high reward crop. Despite the fact that it is against environmental regulations, significant cultivation occurs in the páramos, cold, high altitude topical wetlands which are ecologically fragile and play a key role in maintenance of ecosystem function, especially supply and regulation of water flow (Rangel, 2006).

Lake Fuquene,<sup>4</sup> located at the bottom of the watershed, is at the center of environmental controversy. The health of the lake, mainly for biodiversity but increasingly as a provider of environmental services such as tourism and urban water supplies and flood control, is currently driving change in the watershed. The national government and the regional environmental authority have placed high priority on resolving the problems of Fuquene,

<sup>4</sup> See <http://www.livinglakes.org/fuquene/>.



## Objectives CPWF Project Report

prompted in part by massive floods in 2006 that focused nation-wide attention on the issue (DNP, 2007).

The environmental authority for the Fuquene watershed, the Corporacion Autonoma Regional de Cundinamarca (CAR)<sup>5</sup> is responsible for developing and implementing the watershed management plan, and there is widespread discontent with their inaction. Local municipal governments have some responsibility for resolving water conflicts and for undertaking conservation activities. While some are more active than others, they are limited in what they can achieve given their purely local scope. There are few NGOs or civil society organizations working in Fuquene. Fundacion Humedales has been doing research and conservation around the lake, and is interested in moving its efforts upstream, given that many of the lake's problems originate there. Local universities and international organizations have a research presence, but little had been done in terms of mobilizing communities to address watershed level issues politically.

Within communities there are examples of how members come together to manage water resources collectively, and there have even been cases of collective action to defend legal right to water from springs when landowners have attempted to limit access. However attempts to manage upstream-downstream issues in the watershed via local collective action have not been successful. Despite the relatively good accessibility within the watershed, communication between people in different areas is limited, which makes it difficult to achieve a collective vision of the watershed and understanding of the challenges facing it (Cardenas et al, 2007). *Coello River Watershed* The Coello River watershed, located the state of Tolima in the central Andean Cordillera (Figure 2) covers an area of 190,000 ha, ranging from 280 to 5300 masl. Annual rainfall ranges from below 1000 mm to more than 3970mm. The watershed includes ecosystems ranging from dry forest to páramo to snow-capped peaks, and is home to national parks and private reserves. The watershed contains some or all of 8 municipalities<sup>6</sup> with a population of 622,395 in 2005, including the city of Ibagué (pop. 425,770). Including the city of Ibague, only 16% of the population is rural and even without Ibague urbanization rates are above 50%. The life condition index for municipalities in the Coello watershed range from "medium low" to " medium high," a slightly narrower range than for Fuquene, with urban municipalities scoring higher than rural ones (Sarmiento et al, 2005). The Pan-American Highway passes through the watershed, generating economic activity but at a cost of soil erosion and air pollution. Figure 4 shows the location.

Principal economic activities in Coello include agriculture and livestock. The upper part of the watershed is mainly forested, however land there is increasingly being converted for livestock, coffee and horticultural crops. In the middle altitude areas, sugar cane and fruit trees are common; this regional accounts for 30% of Colombia's fruit and vegetable production (Fujisaka, 2007). The lower part of the watershed includes 30,000 ha of large-scale, irrigated rice, cotton, and sorghum as well as beef cattle. Rice demands the largest share of water channeled through the rivers and irrigation systems (500 million m<sup>3</sup>) followed by fruit (41 million m<sup>3</sup>) and coffee (1.5 million m<sup>3</sup>) (ibid).

Colombia's internal conflict between the government and guerillas impacts Coello much more than Fuquene. Fuquene is very safe, however in Coello guerrilla groups are present in the upper parts of the watershed, and as a result many families have had to flee the zone.

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<sup>5</sup> See <http://www.car.gov.co>

<sup>6</sup> The municipalities that make up the Coello River watershed are Ibagué, San Luis, Rovira, Cajamarca – Anaime, Espinal, Flandes, Valle del San Juan y Coello.



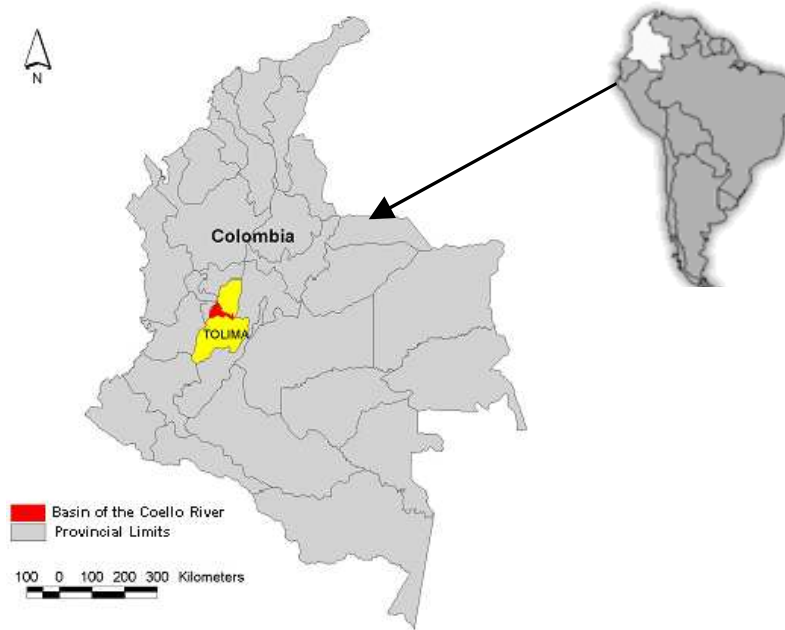


Figure 4. Geographic location of Tolima Province: Coello River watershed  
Source: CORTOLIMA, Scale 1:50,000

Water has not traditionally been scarce in Coello, however there is growing awareness that inappropriate land use in the upper watershed combined with growing demand for irrigation, domestic water and hydroelectric power in the lower areas are rapidly leading to a situation that is not sustainable. Water quality is also an issue as contamination is increasing due to agrochemical use, and domestic and industrial waste. High sediment loads—from soil erosion throughout the watershed—are not only threatening the irrigation scheme, but also possibly reaching the Rio Magdalena, Colombia’s major and navigable river. This has been identified as a national problem, and one that may now be affecting ports in Central America (Fujijsaka, 2007).

As in Fuquene, the driver for change is the environment, however in Coello the process is “top down” in the sense that it focuses on conserving the upper part of the watershed. Wildlife Fund (WWF), Semillas de Agua and other NGOs are working to preserve the *páramos* and in doing so are seeking to link with downstream stakeholders who are or could benefit from the environmental services the *páramos* provide.

The environmental authority responsible for the Coello watershed is the Corporacion Autonoma de Tolima (CorTolima (<http://www.cortolima.gov.co>)). Progress on a comprehensive plan has been slow. There is a wider range of actors with a continuing presence in Coello than in Fuquene. Nonetheless, there is no articulation in terms of addressing watershed problems, and the same lack on collective vision and understanding of problems that is present in Fuquene is also evident in Coello.

#### Nyando Basin, Kenya, Nile Basin

The Nyando river basin is located in Western Kenya where it drains into the world’s second largest freshwater lake, Lake Victoria. In turn, Lake Victoria is an important component of the Nile river system. While the Nyando is small compared to some of the other basins that make up the Lake Victoria and Nile systems, it has a heavy influence on the ecology of Lake Victoria. Large amounts of sediment and other pollutants are carried along the three main tributaries of the Nyando, contributing disproportionately to the sedimentation and eutrophication of the

## Objectives CPWF Project Report

Lake Victoria ecosystem. The Nyando basin spans from the Mau forest in the upper reaches, through a range of farming systems, to an alluvial plain and wetland where the river enters Lake Victoria. Altitudes vary from about 1100 meters above sea level (masl) in the flood plain near Lake Victoria to almost 3000 masl in some parts of the Mau forest in the upper-most areas. The basin has three main tributaries, the Awach in the south, the Kapchorean in the middle and the Ainabgetuny in the north. The basin is heavily modified, with large-scale deforestation in the upper basin and wetland conversion in the lower basin (World Agroforestry Center, 2006; Onyango et al., 2007).

The Nyando river basin covers an area of approximately 3,517 square kilometers and had a population of approximately 650,000 people as of 1999 (Swallow et al 2008). At that time, the average population density was 212 persons per square kilometer across the basin, with some areas supporting up to 750 persons per square kilometer and other areas with as few as 50 persons per square kilometer. As of 1997 the incidence of poverty, as measured by food purchasing power in Kenya's poverty mapping study, was generally high in the Nyando basin, with an average poverty incidence of 58 percent in Kericho District, 63 percent in Nandi District, and 66 percent in Nyando District, compared to the national average of 53 percent (Central Bureau of Statistics, 2003). Poverty incidence is variable across space, with an estimated incidence ranging from 36 percent to 71 percent across the administrative locations of Nyando district (Central Bureau of Statistics, 2003). HIV / AIDS prevalence is 28 percent in Nyando District, 7 percent in Nandi District, and 12 percent in Kericho District (Swallow, 2005b). The basin is primarily inhabited by two ethnic groups: the Luo who occupy the lowlands and part of the midlands and the Kalenjin who occupy the highlands. Small numbers of a third ethnic group, the Ogiek, occupy parts of the forest margin at the uppermost parts of the basin. Almost all the basin falls in the three administrative districts of Nyando, Nandi and Kericho, with small portions of the basin in other neighboring districts (Onyango et al., 2007).

Kenya's formal water resource management institutions have been radically transformed with the passage and implementation of the Water Act of 2002. Under that act, water resource management and water allocation is the responsibility of the Water Resources Management Authority, while regulation of water services providers is the responsibility of the Water Services Providers Board. The Water Resource Management Authority (WRMA) is responsible for formulating catchment management strategies for the management, use, development, conservation, protection and control of water resources within each catchment area.

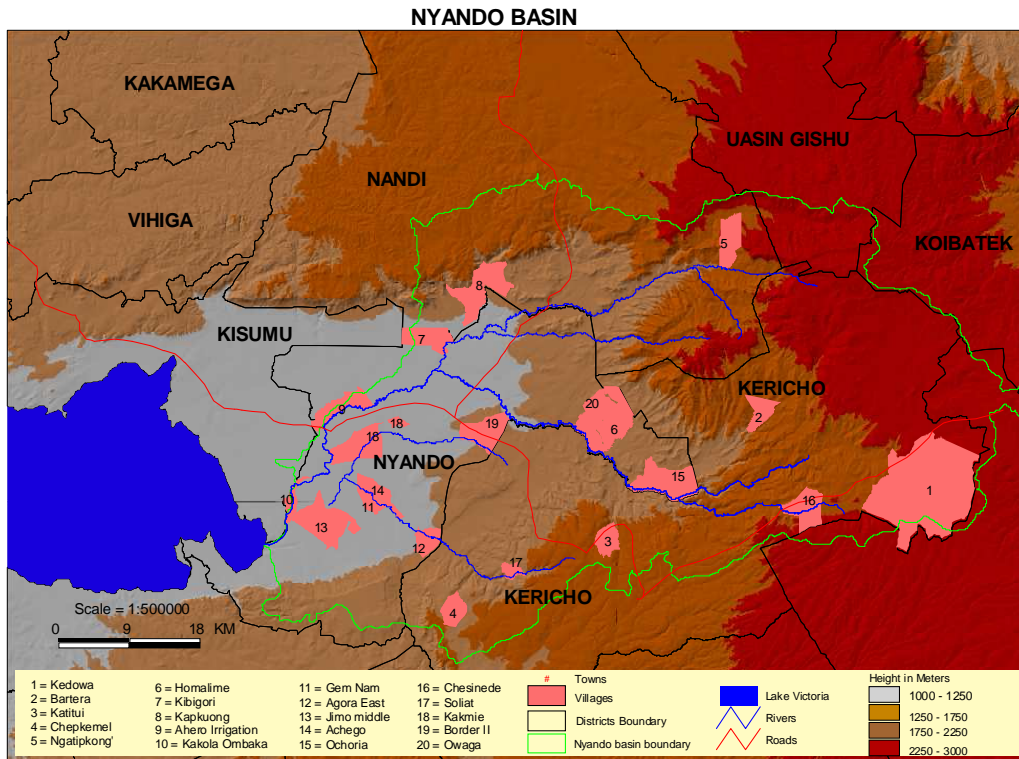


Figure 5. SCALES research villages in the Nyando river basin

The two sub-basins in which the Scales project focused are the Awach, which measures approximately 350 km<sup>2</sup>, and the Kapchorean, which measures approximately 800 km<sup>2</sup>. While immediately adjacent to each other, the two sub-basins have some distinct differences. Figure 5 shows the main tributaries of the Nyando, the elevation zones in the basin, the administrative districts of Western Kenya, and the locations of study villages. From the place where the Awach joins the main Nyando river in the floodplain at 1141 masl, the Awach runs very flat for about 10 kilometers, before it rises about 800 meters over a distance of about 30 kilometers. Maximum altitude in the Awach basin is about 2000 masl. The Kapchorean rises much more gradually and steadily from the point where it joins the main Nyando river, from about 1200 masl to 2400 masl over a distance of about 50 kilometers. The Kapchorean is much more sparsely populated than the Nyando, containing a number of large scale commercial sugar cane farms. The Awach basin is very densely populated, in large part due to its colonial designation as a native reserve area.

## Discussion and Conclusion

### *Colombia*

The results from Colombia show significant reductions in poverty over the past 25 years in most communities (Johnson et al, 2008), which is consistent with government poverty data in terms of general trends, if not necessarily current distribution (Peralta et al, 2007). While water is obviously a critical resource for any household, rich or poor, the opportunities to alleviate poverty by improving the quantity or quality of water available to poor households may be limited. Just under a third of communities consider improved access to water to be a step on the ladder out of poverty, and in those only 13% of households would be in a position to benefit from improvements, meaning that they don't already have them. Keeping in mind that these data come from communities purposively selected because of poverty and water problems, the results would likely overstate the potential impact for the watershed as a whole.

## Objectives **CPWF Project Report**

In terms of poverty reduction, the most successful livelihood strategies for getting households out of poverty over the last 25 years have been related to livelihood diversification and off farm employment. Interventions that increase the access of poor households to human and especially social capital will likely have a bigger impact on poverty than those that focus exclusively on natural or physical capital.

The study did find evidence of important indirect linkages between poverty and watershed management. The industries such as mining or intensive dairying generated stable employment for the poor also contribute to the environmental problems of the watershed. The same is true for small holder farming in Coello, though not in Fuquene. In Fuquene small scale farming does contribute to environmental degradation but is not a pathway out of poverty. Thus, there is a potential for poverty-environment trade offs rather than win-win situations. Policy makers, planners and others who seek to intervene in watershed management in these watersheds need to be aware of the indirect linkages between poverty and the environment via labor, product and service markets so that they can design programs that contribute to poverty alleviation where possible but, equally if not more important, do so without harming those who have managed to escape poverty, even if it was at the expense of the environment.

Colombian legislation allows for stakeholder participation in watershed management decisions. While it is increasingly recognized that stakeholder participation is an important part of integrated water resources management (IWRM), effective participation presumes a good understanding of the issues, especially the socio-economic and biophysical linkages within watershed systems. Results from studies such as this one can contribute to improving the community knowledge base, and therefore to helping stakeholder groups better identify the issues that are important to them, and their potential allies in reaching their goals. The results of this study suggest that such interests are likely to follow sectoral divides, spanning the deep socio-economic and cultural divides that often exist in Andean watersheds. As such, they could be an important entry point into dealing with other more divisive issues.

Even though these results suggests that the poor are not a homogenous block whose interests are necessarily opposed to those of better-off groups, they do show that one thing the poor do have in common is that they tend not to participate in community level processes. Participation is considered to be a component of wellbeing, and in many communities the poor are identified as being those who do not participate. Building willingness and capacity of the poor to participate will not only improve the equity outcomes of participatory multi-stakeholder negotiation processes around watershed management, it will also have a direct impact on the welfare of the poor. In fact, this could well be the biggest direct impact that such programs have on the poor.

### *Kenya*

The result of poverty analysis in Western Kenya are very different, with poverty worsening significantly in 11 of 15 villages and improving in only 3 (Onyango et al, 2008; Jensen, 2008). Alongside lack of assets like land or education, health problems and natural disasters like droughts and floods are given as the reasons for falling into poverty. Insecurity and vulnerability are high in these communities, limiting people's ability to acquire and maintain assets as well as engage in livelihoods strategies. Lack of access to water is mentioned as a community level cause of poverty, though it is lower in priority than other problems (Onyango et al, 2008). The main water source of the poor is the river, which has low water quality due to agricultural, industrial and domestic waste (Ibid). Most water development activities require participation in groups and some contribution, which excludes the poor.

There appears to be a correlation between number of livelihood activities and poverty, suggesting distress diversification as people take on new activities in the face of failure of more reliable ones. Remunerative activities like formal employment and livestock keeping have declined in importance over the last ten years and been replaced by activities like petty business and casual labor, tomatoes and tea. The latter are associated with high elevation agroecological zones, and improving welfare levels, however the former are definitely not (Jensen, 2008). In depth case studies analysis of two villages shows that even though the

upper catchment village is much better off, the trends are worse there with more people falling into poverty relatively than in other community. Sale of livestock is an indicator of this (Jensen, 2008).

As in the Colombia case, several potential trade offs between livelihood and environment were identified. Livestock keeping is an important livelihood activity, especially in upper areas where it is the only strategy associated with keeping households out of poverty (Jensen, 2008). Yet livestock are associated with water resource degradation in several ways, contamination of water sources, overgrazing, and creating tracks that lead to formation of gullies. Farmers groups and cooperatives have been identified as a possible solution, however since men control land and animals and women have responsibility for water, it is not clear whether the group members will have the incentive to handle the problem themselves. Rainfed agriculture also contributes to watershed degradation, especially when practiced in fragile areas and along waterways.

Irrigation schemes in the lower part of the watershed were associated with significant reductions in poverty in the period 25 years ago to 10 years ago; when the schemes became dysfunctional in the mid 1990s, poverty rates in those areas soared. This shows the potential for alleviating poverty via better water management, however addressing it will require tackling the problems that caused the schemes to fail, many of which were political in nature since this region is a stronghold of the opposition political party (Swallow et al 2007). There is evidence that smaller schemes like bucket irrigation from rivers or from springs are more profitable and sustainable (Were et al 2008) though it is not clear to what extent they are currently available to the poor. Increasing ability of poor to participate in these schemes could be an opportunity for poverty alleviation if it helps them to engage in high value crop production or livestock keeping.

***Objective 2. Strengthen the participation of women, the poor and other vulnerable groups in collective management of watershed resources, where improved management of these resources has the potential to contribute to poverty alleviation at the local and watershed scales in pilot sites.***

It is widely recognized that effective and equitable watershed management requires the participation of all relevant stakeholders. Since upstream land use affects downstream water quality and quantity, downstream residents may suffer (or benefit) as a result of actions of those living upstream (Swallow et al, 2006) Regulation is one way to manage potential conflicts, but the high costs of monitoring and enforcement means that compliance is often low. In theory, stakeholder participation in watershed management can be a solution to these challenges. If stakeholders are involved in the decision making, they are more likely to reach agreements that are mutually acceptable and therefore respected (FAO, 2006). In practice, the power inequities between different stakeholder groups often make it difficult for them to interact on a level playing field.

The *conversatorio de accion ciudadana* (CAC) is a politico-legal mechanism for achieving meaningful participation by civil society. It is based on the idea of civil society and authorities conversing in familiar terms about issues of importance to both, and arriving at agreements for action. The methodology, which consists of three phases—preparation, negotiation and follow up—is designed to address the inequities in power and information between communities and government institutions that often prohibit communities from exercising their constitutional rights to participate and to hold their representatives accountable.



## Objectives **CPWF Project Report**

Developed by Asdes<sup>7</sup>, a Colombian NGO, and first implemented with support from WWF-Colombia in the late 1990s (Beardon, 2008), the CAC's point of entry is the constitution and the rights and responsibilities that citizens are entitled to but often do not know how to use. Training in concrete legal instruments that ordinary individuals can use to obtain information or compel government agencies to fulfill their obligations in a timely manner is accompanied by efforts to build social capital and improve people's knowledge of their natural resources. While the focus is on the community, training courses are also offered for public servants since in reality many of them are also unaware of their roles and responsibilities under the constitution, especially in relation to citizen participation.

The three pronged (environmental, social and legal) capacity building or "preparation" phase culminates in a one day public meeting to which communities invite representatives of the authorities whose mandates include the key social and environmental issues identified by the communities in the preparation phase. A structured negotiation takes place leading to signed agreement by representatives of institutions to undertake specific actions to improve social welfare and natural resource management. In the follow up phase of the CAC, community representatives ensure that institutions comply with their commitments.

CACs were conducted in three Colombian watershed between 2004 and 2007<sup>8</sup>, two under the Scales project (Fuquene, Oct 2005-Feb 2007) and Coello (December 2005-May 2007) and one led by WWF and partners (Güiza, October 2004- Oct 2006). This paper assesses the impacts of the processes and identifies lessons for improving and scaling up the methodology.

### **Methods**

The information presented in this paper comes from a variety of sources including project documentation and direct observation of the processes and interaction with participants. In 2007, the Scales project commissioned an external review of the three CAC processes (Cantillo and Gonzalez, 2008a, 2008b, 2008c, no date) The evaluation methodology consisted of 5 steps or "Moments": 1) Definition of scope and focus of the study with the project partners, 2) Reconstruction of the experience, again with the main partners 3) Analysis of secondary data, 4) Collection of primary data, including interviews with participants from the communities, representatives of institutions, and elected officials in the watershed and 5) Analysis. Several other evaluations were conducted as part of the BFP impact assessment project (Cordoba, De Leon and Douthwaite, 2008; Fujisaka and Claros, 2007; De Leon, 2008)

### **Results and Discussion**

While the CACs followed the same general methodology, each was implemented in a slightly different way due to differences in the lead organizations, the social, political and biophysical contexts, the available resources, and the level of support from organizations like ASDES and WWF. Why these differences occurred and how they affected the outcomes will form part of the discussion of impacts. The types of impacts considered are 1) agreement signed on the day of the meeting 2) human and social capital impacts among participants from communities and 3) relationships between communities and institutions. Impacts on poverty and the environment are not addressed since these are of a long term nature, however implications for these kinds of impacts can be inferred from the shorter term impacts that are presented.

**Signed agreements** The CAC in Güiza, held on October 28, 2006 was the best attended. In addition to the institutional representatives, the state governor and 2 mayors were in attendance. The relatively high profile of the Güiza CAC is likely to due to the fact that the

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<sup>7</sup> La Corporacion Asesoría para el Desarrollo (Asdes)

<sup>8</sup> These dates cover preparation and negotiation phases since the follow up is ongoing

first and only other CAC ever implemented had been held in the same region several years earlier. Also, the meeting was held in the state capital rather than in the watershed itself due to security concerns relating to Colombia's armed conflict. Thirty agreements were signed with 13 institutions including municipalities, the environmental authority, and departments such as health, agriculture, and planning (Cantillo and Gonzalez, 2008c). Though most agreements were non-monetary, a total of more than USD1.7 million was committed for activities such as watershed planning, water and sanitation, health, and agriculture.

The CAC in Fuquene was held on February 28, 2007 in the regional capital, Ubaté. Eleven institutions attended, however organizers were somewhat disappointed by the turnout since mayors did not attend and several sent representatives without sufficient authority to make commitments. Unlike in Güiza, in Fuquene there had been no prior experience with CACs, relatively little work on community organization prior to initiating the process, and no history with WWF or ASDES on which to build. Thus Fuquene, in spite of its advantages in terms of accessibility and security relative to Coello and Güiza, was in some ways the most difficult of the three environments. Nonetheless, 25 agreements were signed with 10 institutions (Cantillo and Gonzalez, 2008a). More than USD13 million were committed for a range of activities including water treatment, conservation of protected areas and productive projects with communities, however 85% of this was from a federal emergency aid package that was announced after damaging floods in April 2006 but has yet to be disbursed.

In Coello, the CAC was held on May 10, 2007 in the state capital of Ibagué, which is located within the watershed. Attendance was relatively good, including institutional representatives, elected officials and even members of the general public. Thirty agreements were signed with 14 institutions. A total of USD600,000 was committed, less than in the others but as in the case of Güiza the funds represented "new" commitments for actions to be initiated in the current fiscal year, in this case for the purchase of land environmentally sensitive parts of the watershed.

The total Scales project investment in the two CACs it supported was approximately USD150,000. To fully cost the CACs we would need to estimate both the partners' contributions—significant in Coello and Güiza—and the considerable time invested by the communities. The return on that investment would include not only the money committed on the day of the CAC, but also the non-monetary commitments to implement policies and programs, or in some cases to involve communities explicitly in decision making processes, which arguably could lead to much greater economic benefits over the long term.

***Human and social capital impacts on participants*** The CACs appear to have had major impacts on the human and social capital of the participants (Cantillo and Gonzalez, 2008a,b,c; Fujisaka and Claros, 2008; Cordoba, de Leon and Douthwaite, 2008; de Leon video). Baseline information is not available on human and social capital levels prior to the project, so the assessment is based on what was observed by project implementers over the course the project and what the participants themselves say. In the Scales-supported CACs, an explicit attempt was made to target poor communities (Johnson et al, 2008), however within those communities participation in the project activities was voluntary so those who chose to be involved are likely to have been among the more educated, innovative or socially-active people in the target communities. In Coello, women played an important role in implementing the CAC and in the process raised their profile as natural resource management in the watershed (Cordoba, de Leon and Douthwaite, 2008). In Güiza, most of the CAC participants had previously been involved in WWF-led course and were known to be people with leadership skills and an interest in environmental issues.

The specific interventions that the CACs undertook to increase human capital included trainings on legal rights and how to exercise them; hands-on analysis of environmental issues such as water quality, soil erosion or loss of biodiversity; workshops on identifying and analyzing problems and formulating solution; and, especially for those who were "questioners" in the CAC itself, coaching on how to formulate questions, arguments and counter-arguments, and how to speak in public.

In some cases such as Fuquene, the main contribution to social capital occurred when participants from different communities came together to do training activities. Fundación Humedales developed a series of games to demonstrate legal and environmental concepts to people with low levels of formal education. In Coello, the coordinators were able to undertake activities such as a regional Water Forum, and the highly successful Coello Expedition, in which 40 people from all parts of the watershed spent 4 days following the river from its origin in the páramo to its outlet, learning first-hand about the watershed and about each other.

In both Scales communities, economic experiments were conducted both as a research activity to better understand the factors that support or inhibit collective action in watersheds, and as a development activity in which watershed residents participate as “players” in “games” or scenarios designed to reflect the actual incentives people face when deciding how to use resources that have both individual and social costs and benefits (Cardenas and Ostrom, 2004). The games made explicit the incentives for and against cooperation and generated discussion on how to address the constraints to collective action.

In all cases, changes in human and social capital were observed and were documented through interviews, including increased skills, knowledge and confidence (Cantillo and Gonzalez, 2008a,b,c; Fujisaka and Claros, 2008). Concrete applications by individuals of legal instruments such as *tutelas* or *derechos de petición* led to the resolution of personal and community problems, providing benefits to participants and perhaps more importantly building confidence and commitment to the CAC process. In Fuquene, a two-decades old conflict between two communities about access to a water source in which the municipality had long denied responsibility was resolved when participants in a CAC training were able to compel a revision of the case which led to a reversal of the mayor’s position and a commitment to build necessary infrastructure to allow the downstream community to access the water.

Impacts were observed in all three sites, however where education levels were low, progress was slower and methodologies had to be adapted to make them accessible. In Fuquene, fewer people benefited since budget constraints prevented inclusion of more communities—Fuquene and Guiza focused on 3 municipalities while Coello covered six—and limited number of times the full group could meet. Interviews conducted with non-participants say that knowledge of the CAC declines as distance from the process increases (Fujisaka and Claros, 2008) which suggests that spillover benefits are likely to be small, at least in the short run. Political violence in Coello and Guiza also reduced participation of some people in the process.

***Changes in relations between communities and institutions*** As a result of the process, some community members have changed their perceptions of institutions and vice versa. Many community participants previously had a negative perception of institutions, fueled in part by their perceived inaccessibility. As a result of the CAC experience, they have gained confidence in dealing with institutions, and in some cases have gained greater understanding of and sympathy for the constraints that the institutions themselves face in trying to carry out their obligations.

Representatives of institutions experienced similar changes in perceptions of the communities. Prior to the CAC, they often viewed communities as uninformed and hostile. As a result of the CAC, that perception changed to one of seeing the communities as constructive partners with whom institutions could collaborate in order to achieve shared objectives. This occurred not only with public sector institutions, but also with private sector ones such as the USOCOELLO irrigation district which provides water to one of the major commercial agricultural zones in Colombia in the lower part of the Coello watershed.

Impacts at the level of institutions seemed to be greater in Coello than in Fuquene, where the limited prior interaction with the institutions led some to feel that they were “put against the wall” in the CAC. There was more criticism in Fuquene than Coello on the part of the institutions, however one representative acknowledged that some of this was due to the fact that some of the institutions in the Fuquene were particularly ineffective and untransparent and therefore felt threatened by the community’s empowerment.





## **Conclusion**

The CAC methodology as implemented in three Colombian watershed between 2005 and 2007 led to 76 concrete commitments on the part of institutions to make improvements in welfare on watershed residents and the management of watershed resources. An assessment in late 2007 showed that compliance rates were relatively high, especially in the communities which had stronger follow up processes. The CAC methodology also had significant human and social capital impacts on community members who participated, and led to changes in the ways that communities and institutions perceive each other, in some cases moving from antagonism to respectful collaboration. Relative to the size of the investment made in carrying out the CACs, the impacts appear to be large, indicating a high rate of return.

The main lesson from this experience is that a CAC takes time. The Scales project initially estimated that the preparation phase would take between 3-6 months when in reality it took a year and a half and even then had it not been for the Scales project deadlines, more time could have been used to properly prepare the communities and make the institutional contacts.

In addition to the dedication of sufficient time and resources, perhaps the most critical determinant of success is the presence of a committed local institution with experience in community organization. In both Fuquene and Coello the lead NGOs were relatively local in their scope prior to the CAC but were interested in working at higher scales to address watershed issues. As such, both succeeded in increasing the recognition at the watershed scale and increased their visibility.

Scales project partners had experience in both Fuquene and Coello prior to the initiation of the Scales project. In Fuquene, the experience was more of a research nature and as a result there was more information and analysis available on the environmental and socioeconomic issues in the watershed. In Coello, past experience had had both a research and a community development components and this appears to have provided a stronger base for the CAC.

Another key lesson was to link early with the institutions to be invited to the CAC since involving them in the process seems to lead to more meaningful participation in the negotiation phase. This is important both for public and private sector actors. In neither CAC did the major private sector actors—eg dairy and potato farmers in Fuquene or rice farmers and CEMEX in Coello—play a major role. The basic CAC methodology is focused on communities and institutions, however the private sector is, as was apparent in the poverty analysis, increasingly important in watershed management and innovative ways of engaging them need to be explored.

Finally, the impacts of the CAC will be larger and will likely be more widely distributed if more community members can be involved. A core team will always lead the process, however more emphasis can be put on having them share progress and seek feedback from their communities. Increasing the presence of the general public at the CAC itself will also make it clear to the institutions that the people asking questions have the support of their communities.

***Objective 3. In the pilot sites, develop, operationalize and evaluate methods for improving the articulation of collective action for improved resource management from local to watershed scales in ways that contribute to reducing poverty, especially for women and marginalized groups.***

The SCALES project tested two methods for simultaneously understanding and supporting collective action. One, which is further down the development continuum, is the CAC which was described under Objective 2 above. While primarily a development intervention, the project sought to better understand how it worked and to refine the methodology for broader

dissemination. As such, the implementation in two sites and the comparative analysis across three sites (one non-Scales watershed) using different methods generated insights about the method and also about the nature of supporting cross scale collective action. Results were reported under Objective 2

## Methods

Another type of interventions that is closer to the research end of the R&D continuum is the implementation of “economic experiments” in the four Scales watersheds (Fuquene, Coello, Awach and Kapchorian). Economic experiments, sometimes referred to as economic games, simulate real world situations by providing participants (players) with the same kinds of incentives that they would face in real world decision making situations. The experimental context allows researchers to vary the incentives (the rules of the game) and see the impacts of the outcomes of individual decisions and collective outcomes. Participants in the games also observe their own and the collective outcomes, and how changes in rules can affect these. The impact that this can have on individuals, and on the group as a whole especially when community-level feedback sessions are held, can be powerful tools to enable people to understand collective action dilemmas and can be a starting point for change (Cardenas and Ostrom, 2004). In Colombia the economics games were conducted as part of the CACs, while in Nyando there were run independently due to problems with the implementation of the action research agenda in Kenya.

Collective action around water involves both the provision and the appropriation of the resource. The cooperation in the provision can be affected by the rival nature of the appropriation and the asymmetries in the access to the resource. To look at collective action around provision and appropriation, we used three experiments, the well known public goods or VCM (Voluntary Contribution Game) game, a new experimental design called the *Irrigation Game* which explicitly incorporated upstream-downstream relationships, and the *trust game*, a standard game which we implemented in a specific context, looking at trust levels between upstream and downstream residents in watersheds.

The *Voluntary Contribution Mechanism* (VCM) allows players to contribute to a public good. At the beginning of each round, each player has an endowment of 25 tokens that can be contributed to the public good or kept in a private account. Participants play in a group of five people and the public good is distributed in equal shares to all players of the group at the end of each round.

A field experiment approach was used in order to achieve a better understanding of the effect of participants’ location on water systems and the factors that influence provision decisions on this context. Two field experiments were conducted: the “*Irrigation Game*” a new experimental design that includes the provision and appropriation nature of the resource and the “*Water Trust Game*” an adapted version of the Trust Game framed around water that presents the dependence among players related to water and compensation (reverse) flows.

*The Irrigation Game:* This game introduces the asymmetries in the access to the resource among players. In the first part of the game players make the decision of how many tokens of their endowment of ten, they want to contribute to a project to maintain water canals, so the amount of available water depends on the total contributions according to a monotonic function of water production. Non contributed tokens are kept in a private account which yields private returns as well. The second decision of the players is the individual water extraction from the total water produced. This decision is taken according to the location of the players along the water canal, which is defined randomly and is represented by a letter: A for the player in the first position and E for the player in the last position.

## Objectives CPWF Project Report

After the first ten rounds of both the VCM and the Irrigation game, rules were altered for some groups. Some groups were permitted to communicate; other faced external regulation treatments and other groups continued playing with the baseline conditions. In the **face-to-face communication** treatment, players were allowed to communicate with the other players in the group before returning to their places to make their own private decisions. Likewise in the baseline, they know the aggregate decision but not the individual decisions after each decision round. In the **external regulation** or **penalty treatments** players were told that there would be a chance of being monitored each round. The experimenter rolled a dice in front of the participants each round and if the number obtained was 6, all the participants were inspected, implying a probability of inspection of 1/6. The monitor checked the decisions of the players and the players who had taken more water than their fair share (1/5 given that there were five players) were fined. In the high penalty treatment, the fine was the extra amount taken plus six units of the cumulate earnings; in the low penalty treatment the fine was just the amount taken in excess of their one fifth share.

*The Water Trust Game:* Based on the standard trust game (Berg et al 1995), we constructed our *water trust game (WTG)* framed around water access and distribution between two people located in different positions of a watershed. At the beginning of the game both players are endowed with 8 tokens. Player 1 (proposer) can send a fraction of her initial endowment to player 2 (responder). The amount sent by player one is tripled before it reaches player 2 who then decides how to split the tripled amount plus her initial endowment between herself and player 1. In our framing, however, we explicitly framed the decision of player 1, if upstream, as the quantity of clean water sent to player 2 downstream, and player 2's decision as an economic compensation for the water provided by player 1. If the game started with a downstream player, also such decision was framed as an economic compensation for the water provided by player 1.

We implemented the trust game using the strategy method, that is, players 2 were asked the complete strategy of responses to each possible offer by player 1. Therefore player 2 had to respond, without knowing yet the amount offered by player 1, how many tokens she would return to player 1 for each possible offer by player 1 (0, 2, 4, 6, 8 units). During the session we also asked each of the players the amount the expected from the other player.

## Results

We recruited around 639 watersheds inhabitants from upstream, midstream and downstream locations of Coello River and Fuquene lake watersheds in Colombia and Awach and Kapchorean rivers in Kenya. The CVN and *Irrigation Games* were conducted with a sample of 500 (Table 1) participants and the *Water Trust Game* with a sample of 284 participants (Table 2) from both countries.

Table 1. Irrigation Game versus CVM  
(see Cardenas, Johnson and Rodriguez, 2008b for more details).

Game	VOLUNTARY CONTRIBUTION MECHANISM			IRRIGATION GAME			
	Kenya	Colombia		Kenya		Colombia	
Country							
Watershed	Kapchorean River	Fuquene Lake	Coello River	Awach River	Kapchorean River	Fuquene Lake	Coello River
Session	12	25	13	12	12	27	20
Total players in sessions	60	125	65	60	60	135	100
Total Observations	1200	2500	1300	1200	1200	2700	2000

As expected, the overall levels of cooperation achieved were higher in the VCM than in the Irrigation game. In VCM, players reached between 70 and 82% of possible earnings, while in Irrigation game the maximum winnings only reached 67% of what would have been possible under full cooperation. The overall results replicated the patterns of previous public goods or CPR games where predictions of non-cooperative game theory were not a common result.

Similar patterns were observed in both games in response to the experimental treatments. In the irrigation game, contribution was on average 4.82 tokens, 48.2% of players' endowment, for the ten initial rounds. For the second stage of the game, the groups that continued playing with baseline institution got an average contribution of 4.71 tokens (47.1% of their endowment), the groups that could communicate reached a contribution of 5.9 tokens on average, and the penalty treatments groups obtained an average contribution of 4.83 for high penalty and 3.96 for the low penalty groups (Figure 6). One interesting observation was the communication did not increase cooperation in the Kapchorean catchment. This is an unusual result, but may be due to underlying social tension among communities in the zone. Six months after these games were conducted, this community was one of the most affected by post-election violence in Kenya which was strongly linked to ethnic divisions.

The average contributions shown in the four panels in Graph 1 hide an important piece of information for our analysis. These are averages of five players who are located asymmetrically along the watershed. Disaggregating by location along the irrigation scheme, it emerges that, the higher the location of the player in the irrigation system, the greater are both the contributions and the withdrawals (Figure 7). These are precisely the kinds of inequities that lead to overall lower levels of cooperation than in symmetric games.

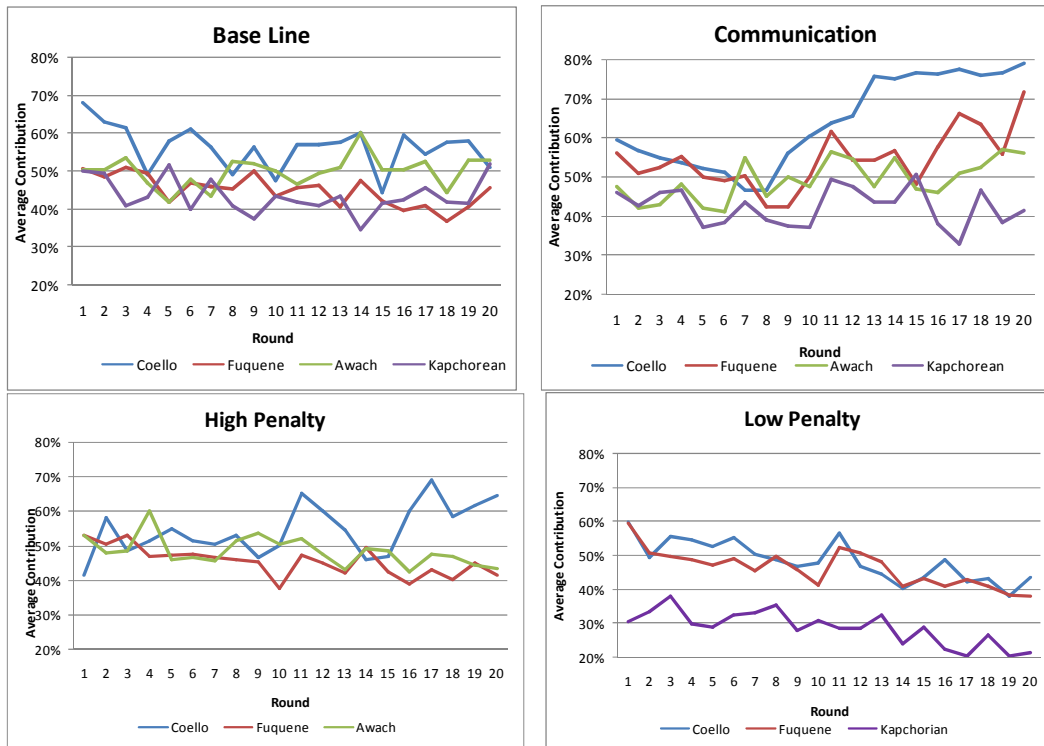


Figure 6. Irrigation Game contribution by treatment

## Objectives CPWF Project Report

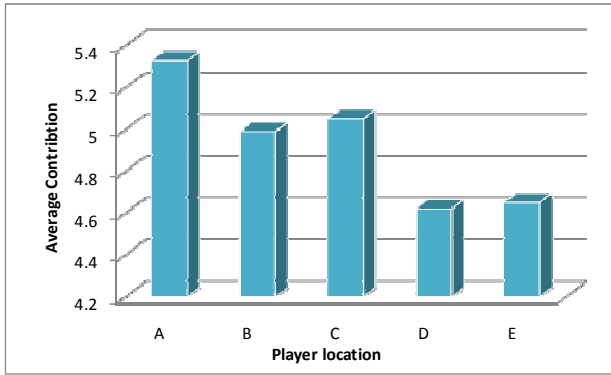


Figure 7. Irrigation Game contribution by player location

Table 2. Water Trust Game (see Cardenas, Johnson and Rodriguez, 2008a and 2008c for more detail).

Game	WATER TRUST GAME		IRRIGATION GAME			
Country	Kenya	Colombia	Kenya		Colombia	
Watershed	Kapchorean River	Fuquene Lake	Awach River	Kapchorean River	Fuquene Lake	Coello River
Session	62	80	12	12	27	20
Total players in sessions	124	160	60	60	135	100
<i>Upstream players</i>	62	80	50	50	29.63	35
<i>Midstream players</i>	0	0	0	50	37.04	30
<i>Downstream players</i>	62	80	50	0	33.33	35
Total Observations	62	80	1200	1200	2700	2000

Regardless of the location, the Nash prediction in the trust game is for player one to send zero and player two to return zero. The Maximum Social Efficiency is for the first mover to send all her endowment what means 32 units to be distributed among both players. Both player one and player two contributed an amount above Nash prediction and below Maximum Social Efficiency quantity.

The following graphs compare the results of average amount offered by player 1 to player 2 by treatment (UU=player 1 and player 2 are both located upstream; UD=Player 1 is upstream and player 2 downstream; DD= player 1 and player 2 are both located downstream; DU=Player 1 is downstream and player 2 upstream). Players 1 sent on average 41.8% of their endowment to player 2. We can highlight the consistency for the three watersheds where the games were conducted, with the treatment DU (downstream participants being player 1 and upstream participants as players 2) showing a systematically lower levels of offers, that is, lower trust in their counter-parts. Recall that in all treatments both players were informed of the actual location of the other player in the watershed.

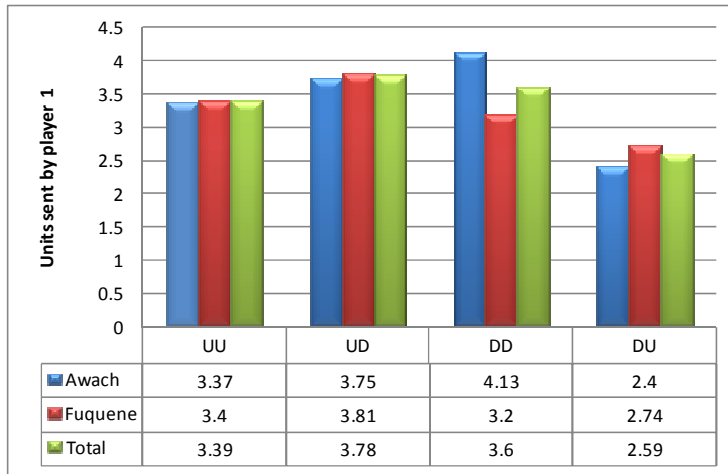


Figure 8. Average amount of units sent by player 1 to player 2

Figure 9 shows the amount sent by player 1 and the amount returned by player 2 as a response to the different options that player 1 could offer to player 2. We are able to build this graph because we used the strategy method where players 2 had to respond the amount returned to player 1 for each possible offer. The results show that trust is followed by reciprocity with higher amounts returned from player 2 to player 1. People being trusted showed higher levels of reciprocity by returning with positive returns the initial investment, consistent with much of the literature using the trust game (Cardenas and Carpenter, 2008).

Players 2 returned on average 26.2% from their initial endowment including the amount received, which is very common in the trust game where players 2 usually capture more of the social pie produced in the game, but with reciprocity present in the way players 2 return higher amounts to players 1 who send higher offers (Figure 9).

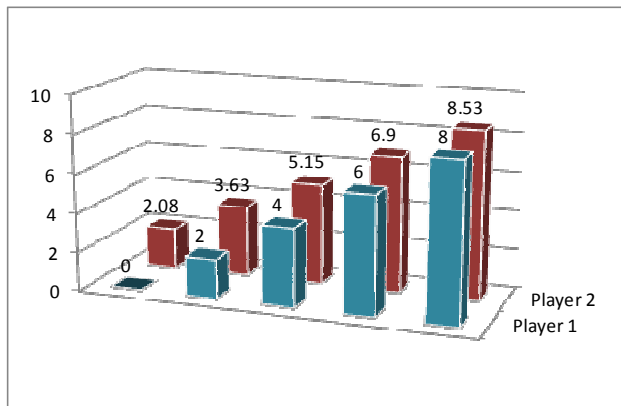


Figure 9. Amount sent by player 1 and returned by player 2

When we compare the amounts offered by players 1 across the four possible permutations between upstream (U) and downstream (D) players, only one level of offers seems to be statistically different from the others and that is when the water trust game starts downstream, that is, when players 1 are located downstream and send their offers to players upstream.

This phenomenon could explain in part why we observed in the irrigation game such lower contributions by players downstream; players downstream suffer more explicit effects of water extraction by players upstream and therefore are more sensitive to such unidirectional externalities. Experience with such externalities can drive a reduction of trust among

## Objectives **CPWF Project Report**

downstream inhabitants towards the rest of watershed users, and it is well reflected with both the experimental and actual location of the players in both games.

### **Discussion and Conclusion**

The challenge of vertical collective action emerges from the asymmetry in the location of players along the irrigation system or the watershed. Head enders or upstream players have better opportunities to capture the benefits because they have an earlier access to the resource. As a result, players downstream are willing to contribute less than upstream players to the public project, and develop a deep distrust of those living upstream. The good news is that communication appears to be effective in increasing overall levels of cooperation, and also the equity of distribution of winnings among the players' locations. And while downstream players are distrustful in initiating interaction with upstream players, they will reciprocate if upstream players show trust. This suggests that upstream residents have a key role to play in initiating a watershed dialogue.

***Objective 4. Contribute to the building of a cadre of trained and experienced extensionists, planners, environmental authorities, local leaders, researchers and/or other development practitioners who can stimulate and support inclusive, pro-poor collective action in their work on watersheds.***

### **Methods**

The participatory approach used in the project involved communities and local NGOs in implementation and preliminary analysis, which increased their understanding of the methods and their use of the results. In addition the following specific trainings were held and students supported:

Training in the Stage of Progress method for NGO partners in Colombia in March 2005 led by trainers from Peru and including classroom and field component. The partners then led implementation in Fuquene and Coello.

The *Conversatorio de Accion Ciudadana* processes included trainings for both communities and representatives of public servants in both of the Colombian sites.

### **Results and Conclusion**

SANA conducted a series of water and sanitation trainings in Nyando, as well as public awareness campaigns regarding the new water laws in Kenya. More detail is not available at this time but a final reports is expected.

The project supported two Studios at Maseno University in 2005 and 2006. Studios are undergraduate group projects, and a total of over 50 students were involved.

Peris Teyie initiated her Phd studies as part of the Scales project

Marcela Quintero and Jill Jensen used Scales data and results in their MSc theses at University of Florida, in the Soil and Water Conservation and Interdisciplinary Ecology programs, respectively.



**Objective 5. Based on lessons from experiences in the pilot sites, develop and disseminate generalizable tools, guidelines, policy recommendations and other lessons learned to facilitate and promote effective and equitable collective action that contributes to poverty reduction in the watershed context.**

### **Methods**

A methodology for designing and implementing a *conversatorio de accion ciudadana* was adapted and validated in this project and a guidebook is being produced.

The irrigation game, a new experimental game designed to study asymmetries was developed and tested in part in the Scales project.

The Scales Project together with the Andes Basin Coordination, hosted the *Andean Forum on Water and Food January 29th-31st, 2008, Bogotá, Colombia*. This high level workshop attracted policymakers and practitioners from the Andean region. Two presentations were made based on Scales project results, and Scales project participants (researchers, development workers and community members) participated actively in the panels and discussions throughout the workshop.

### **Results and conclusion**

A generalized guide for conducting a *Conversatorio de Accion Ciudadana* was produced by Scales partners so that the methodology can be more widely disseminated. The final version was available for the IFWF2 in November.

In addition to the lessons and recommendations published in the Scales-publications, a major policy workshop was held, and a guide for implementing a *Conversatorio de Accion Ciudadana* is in the process of being produced.

**OUTCOMES AND IMPACTS**

Table 3. Summary Description of the Project’s Main Impact Pathways

Actor or actors who have changed at least partly due to project activities	What is their change in practice? I.e., what are they now doing differently?	What are the changes in knowledge, attitude and skills that helped bring this change about?	What were the project strategies that contributed to the change? What research outputs were involved (if any)?	Please quantify the change(s) as far as possible
Research partners	Using concepts from the conceptual framework in their work	New knowledge about the concepts	Publication and presentation of the concepts	
Development partners	Working with a watershed perspective and a greater appreciation for the importance of human and social capital in watershed processes	First came a willingness to work beyond their traditional areas of expertise (broader geographical area and more directly with communities), followed by the knowledge of how to do so, ie via the conversatorio process.	Involvement of partners in initial characterization activities to help them get a sense of the watershed (this involved research outputs in site characterization and poverty analysis), financial and technical support in implementing activities, but substantial latitude for creativity in adapting to their own situation	
Communities	More empowered to interact with authorities and institutions, at local scale and above	Knowledge about their rights and responsibilities as citizens and how to put them into practice; technical knowledge about their context; confidence to express their ideas	Capacity building, including research outputs on environmental issues, and the factors that influence collective action (more from participating in the games than from the results of the analysis which came later).	See project impact assessments: Cantillo and Gonzalez; Cordoba, de Leon and Douthwaite; Fujisaka and Claros, de Leon film
Local institutions	More willing to listen to communities and to consider them as partners in development	Knowledge of their obligations, followed by a demonstration of the capacity of communities	Some capacity building, invitation to conversatorio	Over 50 agreements and 2 million dollars committed

Of the changes listed above, which have the greatest potential to be adopted and have impact? What might the potential be on the ultimate beneficiaries?

The Conversatorio de Accion Ciudadana (CAC) as a methodology has the potential to be widely implemented in countries with similar political contexts as Colombia, ie where citizen participation is permitted.

What still needs to be done to achieve this potential? Are measures in place (e.g., a new project, on-going commitments) to achieve this potential? Please describe what will happen when the project ends.

The method needs to be validated outside of Colombia and with other supporting institutions beyond WWF. The project will produce a detailed methodological guide which will enable other organizations to implement CACs, learning from the experiences of the 4 CACs to date.

*Each row of the table above is an impact pathway describing how the project contributed to outcomes in a particular actor or actors.*

Which of these impact pathways were unexpected (compared to expectations at the beginning of the project?) Why were they unexpected? How was the project able to take advantage of them?

None of the pathways was unexpected, though the effort required to achieve the CAC was larger than expected. We were able to follow through with it by being flexible with financing and shifting money to CAC partners in the early part of the project.

We expected to have a similar pathway in the Kenyan sites but this did not occur.

What would you do differently next time to better achieve outcomes (i.e. changes in stakeholder knowledge, attitudes, skills and practice)?

Link the research activities more closely with the development activities. In Colombia there was some linkage but it could have been more effective had we been able to plan better and obtain commitments of principal investigators researchers to participate more actively rather than just share results.

### **International public goods**

Key research insights:

***The relationships between poverty, scale and collective action in watersheds are extremely complex, both conceptually and empirically.*** There are some opportunities for improving welfare through better water management but many more potential trade-offs between poverty and the environment. The poor are not a homogenous block whose interests are necessarily opposed to those of better-off groups. Interests are likely to follow sectoral divides, spanning the deep socio-economic and cultural divides that often exist in tropical watersheds. As such, they could be an important entry point into dealing with other more divisive issues but to take advantage of this opportunity the willingness and capacity of the poor to participate in multi-stakeholder negotiation processes around watershed management

## Outcomes and Impacts **CPWF Project Report**

issues will need to be strengthened since one of the things that currently characterizes the poor is their non-participation in community processes.

***Improving communication among different stakeholder improves cooperation around water management, according to experimental results.*** Upstream-downstream asymmetries reduce incentives for cooperation compared to the symmetric conditions that characterize many common property resource management problems, but results generally improve when people are allowed to communicate. Regulation, especially when penalties are not meaningful, can worsen rather than improve cooperation. Upstream communities have an important role to play in initiating watershed dialogue because downstream people, both in the games and in reality, appear to have a deep distrust of upstream residents that limits their willingness to initiate cooperation, though not to reciprocate if upstream people make the first move.

***Action research in Colombia confirmed the potential of communication to improve collaboration, and demonstrates that it is possible to level the playing field and empower communities to engage with authorities around issues of resource management and rural development.*** An innovative methodology called the *Conversatorio de Accion Ciudadana (CAC)*, was adapted and validated in the two sites in Colombia. According to internal and external assessments, the CACs had significant impacts on human and social capital of participants, and also led to important changes in relations between communities and institutions. They also laid the groundwork for longer term economic and environmental impacts; over 50 specific commitments were made by authorities to improve conditions in watersheds, including financial commitments of over USD 2 million.

### **Partnership achievements**

In both Kenya and Colombia, the project was building on existing research partnership by bringing in development partners. In Colombia, the result was very positive. Research partners learned from development partners and incorporated those lessons into their scientific outputs of the project. Development partners used the research results in the design on interventions, with the result that they were better targeted and more effective. One thing that made this possible was that we had the flexibility within the project to re-allocate resources to build on early successes, and this not only allowed us to achieve more than what was originally planned—for example the CAC evaluation and methodological guide—but also reinforced the commitment of the partners to the project when they saw that the efforts they were making above and beyond their contractual commitments were recognized and rewarded.

In Nyando, the Scales project outcomes were less positive in general, and the partnership results were no exception. Early problems with cost overruns and partner non-compliance were later complicated by the political situation in Kenya that caused substantial delays in field work during the critical period when development interventions were to take place. As a result, though we were able to obtain some valuable research results from the poverty analysis and, especially, the economic games, and will likely see some development impact as a result of the SANA interventions, we were never able to pull the different parts together to achieve the kinds of synergies that we did in Colombia.

### **Recommendations**

***Projects that seek to strengthen the role of the poor in watershed management need to be aware of the multiple and overlapping scales at which resource management decisions are made. Pro-poor outcomes can be achieved by increasing the ability of the poor to influence decisions at a specific scale or in a specific forum, or by shifting the scale or forum of a decision to one where the "action resources" of the poor have more value.*** The CAC methodology essentially did both of these. The legal tools (*derecho de peticion; tutela*) that individuals learned were new action resources than enabled

people to gain information they had previously been denied, and to compel authorities to respond within a fixed amount of time to specific concerns which they had previously ignored. This helped with specific issues, but wasn't sufficient to help communities gain systematic influence on policy making within institutions. By bringing the institutions together in a public forum at the watershed scale where constitutional principles of public participation supported their communities' demands, they were able to achieve not only concrete commitments but also fundamental changes in attitudes that made possible subsequent interaction at lower scale (i.e. between individuals and specific institutions) as follow up.

***Watershed management policies that consider indirect linkages between water and poverty via labor and product markets as well as direct linkages via provision of water for domestic or productive uses are likely to be achieve outcomes that are larger and more pro-poor.*** The poor are not a homogenous block whose interests are necessarily opposed to those of better-off groups. Interests are likely to follow sectoral divides, spanning the deep socio-economic and cultural divides that often exist in tropical watersheds. As such, they could be an important entry point into dealing with other more divisive issues but to take advantage of this opportunity the willingness and capacity of the poor to participate in multi-stakeholder negotiation processes around watershed management issues will need to be strengthened since one of the things that currently characterizes the poor is their non-participation in community processes.

***Communication may be more effective than regulation in promoting collective management, and when initiative comes from upstream rather than downstream communities.*** This was the result of the experimental games, and was confirmed in the conversatorios. By creating spaces for people from different parts of the watershed, from different sector of the economy and from institutions responsible for different aspects of management of watershed resources to get to know each other, the CAC led to better mutual understanding of interconnectedness and also of the constraints and opportunities facing different groups. This allowed them to overcome distrust and work together. Consistent with the prediction of the economic games, outcomes were better when the initiative came from upstream (Guiza, Coello) rather than downstream (Fuquene) communities.

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## Outcomes and Impacts **CPWF Project Report**

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**APPENDICES***Abstracts of all key publications*

Candelo, C. L Cantillo, J Gonzalez , AM Roldan and N Johnson, 2008, Empowering communities to co-manage natural resources: impacts of the *Conversatorio de Acción Ciudadana*, paper to be presented at IFWF2

Community participation is recognized as an essential part of equitable and sustainable watershed management, however meaningful participation is difficult to achieve when communities are unorganized, unaware of their legal rights and responsibilities, and lacking the information, education and confidence necessary to interact with other more powerful stakeholders. The *Conversatorio de Accion Ciudadana* (CAC) is an innovative methodology for empowering communities to participate actively and effectively in the governance and management of natural resources. This paper presents the results of three CACs conducted Colombian watershed between 2005-2007. The experiences are analyzed based on participant observation, process documentation, and an *ex post* evaluation. The three CACs led to over 75 specific commitments on the part of authorities to improve conditions in watersheds. Important human and social capital impacts were also documented, as well as changes in relations between communities and institutions.

Cardenas, JC, N Johnson and LA Rodriguez, 2008, Vertical Asymmetries and Collective Action in Watershed Management” paper to be presented at IFWF2

Watersheds have the characteristic of connecting people vertically by water flows, making relationships among users of water more complex. The location of the people along the watershed defines their roles in the provision and appropriation of water. Verticality in watersheds thus imposes a challenge to collective action. This paper presents the results of field experiments conducted in four watersheds of two different countries: Colombia (South America) and Kenya (Africa). We recruited around 639 watershed inhabitants from upstream, midstream and downstream locations in these basins and conducted field experiments to study the role that location and verticality plays in affecting cooperation at the provision and appropriation decisions. Two field experiments were conducted: the “*Irrigation Game*” a new experimental design that includes the provision and appropriation nature of the resource, and the “*Water Trust Game*” an adaptation of the Trust Game where we explicitly announce the actual location upstream or downstream of the two players. The results show that reciprocity and trust are very important motivations for upstream-downstream cooperation and that the role of upstream players has important implications in water provision decisions. Results from both experiments suggest that the lack of trust from downstream players towards upstream players restricts the possibilities of cooperation among the watershed users.

Jensen, Jill, 2006, Linkages between livelihood strategies and poverty outcomes across watershed scales, paper to be presented at IFWF2

**Abstract**

Integrated Water Resources Management (IWRM) is premised on the sustainable development model of economic efficiency, social equity and environmental conservation. However, translating these policy objectives into successful water management projects has proven difficult. Repeatedly, poverty-environment trade-offs are observed and argued to be the result of underweighted attention paid to the connections between water, poverty and livelihoods. In Nyando Basin of Western Kenya, the Theme 2 SCALES Project as its first goal sought a better understanding of the livelihood strategies associated with poverty traps across social and ecological scales. The current research was aimed at meeting that goal through a comparative case study of two villages. Combining findings from a participatory poverty assessment with a livelihoods analysis, the dependence of an upland village on small-scale farming to attain consistently non-poor livelihood outcomes was uncovered. This contrasts with the necessity to adopt off-farm strategies in the lowland village in response to a substantially eroded and hydrologically vulnerable area. Farming systems analysis provided deeper insight into the relative intensity of various livelihood activities, and the levels of asset endowments required to attain levels of investment and productivity such that a poverty trap could be avoided. This understanding is essential when fostering

## Appendices **CPWF Project Report**

collective action around water management as it highlights the diversity in related goals, objectives and incentives people across a watershed have given their link to livelihood outcomes.

Johnson, A J García, JE Rubiano, M. Quintero, RD Estrada, E Mwangi, A Peralta and S Granados, 2007, "Watershed management and poverty alleviation in the Colombian Andes," in review at *Water Alternatives* (a revised version of paper presented at the International Forum on Water and Food, Vientiane, Laos, Nov 12-17, 2006)

Watersheds, especially in the developing world, are increasingly being managed for both environmental conservation and poverty alleviation. How complementary are these objectives? In the context of a watershed, the actual and potential linkages between land and water management and poverty are complex and likely to be very site specific and scale dependent. This study analyzes the importance of watershed resources in the livelihoods of the poor in two Andean watersheds. Results of the participatory poverty analysis reveal significant decreases in poverty in both watersheds over the past 25 years, achieved largely by diversification of livelihoods outside of agriculture. Water is an important resource for household's welfare; however opportunities for reducing poverty by increasing the quantity or quality of water available to the poor may be limited. While improved watershed management may have limited direct benefit in terms of poverty alleviation, there are also important indirect linkages between watershed management and poverty, mainly through labor and service markets. The results also suggest that the interests of rich and poor are not necessarily in conflict. Sectoral rather than socio-economic differences may define stakeholder groups. The findings have implications for policymakers, planners and practitioners in various sectors

Peralta, A J García, A. Moreno, S. Granados, LF Botero, H Rodriquez, JA Rubiano, N Johnson, JE Rubiano, M. Quintero, RD Estrada, 2007, Dynamics and definitions of poverty in the Colombian Andes: participatory vs objective approaches, *Desarrollo y Sociedad*, Issue No. 58, pp 209-243 (in Spanish)

The objective of this study is to examine the consistency of results of a participatory poverty assessment methodology applied in two Colombian watersheds with those from more objective approaches. The results suggest that there is a set of elements that are considered basic to both types of poverty assessment, however at the same time there are others that depend on household and community preferences. Moreover, the results indicate that the concept of poverty is context specific: a household that is considered poor in one community may not be considered poor in another. The results of the participatory methodology are useful to identify who the poor are, why they are poor, and they provide a better understanding of the nature and dynamics of poverty. However it may not be appropriate to generalize on the basis of the results of such methodologies since there may differ in both nature and magnitude from the results of objective poverty measures.

Swallow, B, Johnson, N., Meinzen-Dick, R. and Knox, A. 2006. The Challenges of Inclusive Cross-Scale Collective Action in Watersheds, *Water International* 31(3): 361-375.

Increasing attention to watershed management is part of an international policy trend toward integrated water resource management. Integration is multidimensional—across sectors, administrative regions, ministerial portfolios and levels of hydrologic structure and socioeconomic organization. Collective action is key. Individuals need to work effectively together to share common water points; upstream land users and downstream water consumers need to manage and resolve potential conflicts over water quantity and quality, while all the industries, farming communities, urban residents and public agencies that have interests in resource use and environmental quality need to agree on development and conservation objectives and approaches at the basin level. Initiatives that seek to foster collective action in watersheds need to account for the very different interests in water and watershed management. While there may be relatively straightforward ways to foster collective action at a local scale, some forms of collective action may, in fact, be detrimental to other stakeholders. In the developing world in particular, there are often geographic pockets and social groups that are chronically disadvantaged in collective and public processes. Water-users' associations and basin authorities may exacerbate these disparities and further marginalize already poor people. New statutory institutions may intentionally or inadvertently disempower effective customary local institutions. To enable project and program designers to address these challenges better, this paper lays out a framework for assessing the potential for, and implications

of, individual and collective decisions in a watershed context. The framework integrates concepts drawn from the biophysical and social sciences, including new perspectives on watershed components, poverty, and collective action. Collective action is seen as a fractal process: collective action for water management at one level of social-spatial organization can have spillover effects at lower and higher levels of social-spatial resolution. To be pro-poor, watershed-management institutions must be genuinely inclusive, deliberately recognizing the interests, perspectives and knowledge of groups that may be systematically excluded from other political and social processes. Researchers, evaluators, watershed-management practitioners and others who apply the framework should be better placed to lay the foundations for that illusive goal: pro-poor, inclusive and resource-conserving development.