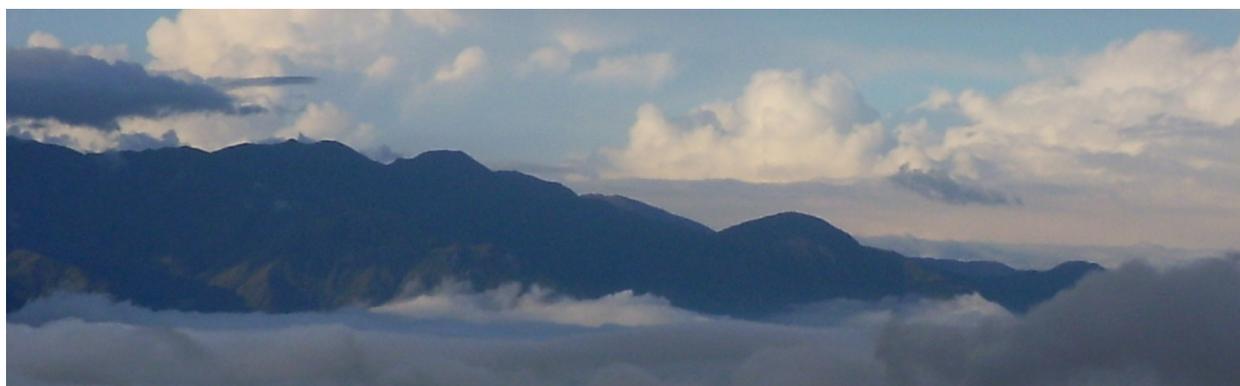




LUMES Lund University Master's Programme in
Environmental Studies and Sustainability Science

Towards Sustainable Water Resource Management

**Understanding the Relevance of Participatory Processes used as an integral part of
Water Resource Management strategies in the Ecuadorian Andes**



Thesis Project Report

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Abstract

The example of *fresh water resource management* has been used in this study to illustrate some challenges that today's societies face to reach sustainability. In particular, the tension in the relationship *satisfaction of human needs* and *depletion of natural resources* has been taken as an example of those challenges. In recent years, several models of *integrated water resource management* have included *local participation* as one of the key aspects for a successful management of the resource. It has been argued that participatory approaches could offer new ways of envisioning the solution to some challenges of sustainability.

This study aims at understanding the relevance of *participatory processes* used as an integral part of *water resource management* strategies in the Andes Mountains. Two cases in Ecuador, which include *participatory processes* in the development and implementation of their *water management strategies*, have been analyzed. This study has shown that there are unsustainable patterns in the use and management of water. Even though, water resource is not being *depleted* necessarily, *availability* to humans might be compromised.

Empirical evidence from the case studies has suggested that participation does not ensure a shift in those unsustainable patterns automatically. However, some side effects of participation might contribute towards a more sustainable management of water resources. It has been also shown that regardless the embedded difficulties for the application of participatory processes, the absence of local stakeholders' participation in the design and implementation of water resource management strategies seriously compromise the effectiveness of such strategies. In addition, a number of factors critical for the effective implementation of participatory processes have been identified. Finally, the relevance of preserving the natural conditions of one particular ecosystem has been pointed out.

Key words: Andes Mountains, co-responsibility, decision making, ecosystem, Ecuador, empowerment, environmental services, páramo, participation, sustainable development, water resource management, watershed.

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Esta tesis está dedicada a mi familia.

A mi esposa Mónica que ha sido soporte fundamental de esta experiencia.
A mi padre, hermana y cuñado que me han apoyado incondicionalmente desde la distancia.
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Marco A Chiu

List of Acronyms

CAMAREN	<i>Consortio Sistema de Capacitación en el Manejo de los Recursos Naturales Renovables</i> (System for Training on Renewable Natural Resources Management Consortium)
CAN	<i>Comunidad Andina de Naciones</i> (Andean Nations Community)
CNRH	<i>Consejo Nacional de Recursos Hídricos</i> (National Council of Hydrological Resources)
CONDESAN	<i>Consortio para el Desarrollo Sostenible de la Eco-región Andina</i> (Consortium for Sustainable Development of the Andean Eco-region)
CMP	Community Management Plan
GEF	Global Environment Facility
FBU	<i>Fundación Brethren y Unida</i> (Brethren & Unida Foundation)
HDI	Human Development Index
INAMHI	<i>Instituto Nacional de Meteorología e Hidrología</i> (National Institute of Meteorology and Hydrology)
INEC	<i>Instituto Nacional de Estadísticas y Censos</i> (Statistics and Census National Institute)
INERHI	<i>Instituto Ecuatoriano de Recursos Hidráulicos</i> (Ecuadorian Institute of Hydrological Resources)
IWRM	Integrated Water Resource Management
LG	Local Government
MAE	<i>Ministerio del Ambiente del Ecuador</i> (Environment Ministry of Ecuador)
MAGAP	<i>Ministerio de Agricultura, Ganadería y Pesca</i> (Agriculture and Fishing Ministry)
MANRECUR	<i>Proyecto “Manejo de los Recursos Naturales en los Andes del Norte”</i> (Collaborative Management of Natural Resources Project in Andean Watersheds in Northern Ecuador)
MEM	<i>Ministerio de Energía y Minas</i> (Energy and Mines Ministry)
MDG	Millennium Development Goals
MIDUVI	<i>Ministerio de Desarrollo Urbano y Vivienda</i> (Urban Development and Housing Ministry)
MP	Management Plan
MSP	<i>Ministerio de Salud Pública</i> (Public Health Ministry)
NR	Natural Resources
NRM	Natural Resources Management
NGO	Non-Governmental Organization
PES	Payment for Environmental Services
PMP	Participatory Management Plan
PP	Participatory Process
PPA	<i>Proyecto Páramo Andino</i> (Andean Páramo Project)
PPD	<i>Programa de Pequeñas Donaciones</i> (Small Grants Programme)
PRODERENA	<i>Programa de Apoyo a la Gestión Descentralizada de los Recursos Naturales en las tres provincias del Norte del Ecuador</i> (Programme to support the Decentralized Management of Natural Resources in the Three-Northern Provinces of Ecuador)
SENPLADES	<i>Secretaría Nacional de Planificación y Desarrollo</i> (Planning and Development Secretariat)
SD	Sustainable Development
SGO	Second Grade Organization
REA	<i>Reserva Ecológica El Ángel</i> (El Angel Ecological Reserve)
RR	<i>Corporación Grupo Randi Randi</i> (Group Randi Randi Corporation)
UN	United Nations
UNDP	United Nations Development Programme
WA	Water Agency
[WR]M	[Water Resources] Management

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1. Introduction

1.1 Justifying the Topic

The attempts to manage water resources (WR) are shaped by the local particularities of each region (UN Commission on SD, 2008:14). In Ecuador, where WR scarcity is not yet a problem (in most parts of the country), management is still an issue; especially *provision* and *post-use treatment*. The governmental apparatus has failed to secure an adequate provision of water for human consumption and for economic activities, in urban as well as in rural areas. At the same time, there is little attention paid to treat water, after it has been used and before it is placed back in nature (see SENPLADES, et al., 2007:248-50), with few exemptions.

In the context of sustainable development (SD) water management is one of the major current and future challenges (see UN, 2002:10-11, and UN Commission on SD, 2008:20-21). Water resource management (WRM) has been approached from different angles and disciplines. In recent years, several models of integrated WRM (IWRM) have included *local participation* as one of the key aspects for a successful management of the resource (see Johnson, et al, 2001, Munk, et al., 1999, and Said, et al, 2006), not only in the provision phase but also in the post-use phase. It has been argued that participatory approaches could offer new ways of envisioning the solution to many of the challenges of sustainability.

1.2 Problem Formulation

WRM is an issue in many countries due to four main reasons. (1) Lack of infrastructure, (2) socio-economic issues, (3) lack of understanding on the water cycle, and (4) short-term vision about the use of the resource and the satisfaction of needs (see SENPLADES, et al., 2007:248-50). But, those are common characteristics which also can be related to other natural resources (NR) where part of the problems are: socio-economic disparities, the lack of understanding of natural processes by which those NR are available to humans, and an immediate vision for the satisfaction of human needs by exploiting NR. Those issues are some of the challenges that current societies face in order to reach sustainability.

Hence, the particular challenge being studied in this research is the “*sustainable use*” of NR. In the relationship *satisfaction of human needs - extraction of NR*, in many cases, it seems like the former has been favored undermining the stability and maintenance of the NR. That problem is more obvious regarding the so-called *non-renewable* NR, where the extraction and exploitation of those resources simply deplete the fixed stock available in nature. On the other hand, the so-called *renewable* NR have the ability to replenish themselves on a certain stock, sometimes helped by man-made technology and sometimes thanks to natural processes. Most of

the available fresh WR (renewable resource) today is provided to humans by natural processes, mainly through the *water cycle*. To examine deeper the problems with WR is a good example for illustrating some dynamics of the above mentioned sustainability challenges as well as to explore the alternatives offered by participatory approaches for a sustainable WRM.

1.3 Objectives of the Study

Ambition: To contribute to the knowledge on sustainability by providing light for possible solutions to the problems that current societies face to reach sustainability. By characterizing the meaning of “participation” for WRM this study seeks to specify factors which favor the process towards sustainable WRM, from the analysis of cases which might provide light out from empirical examples.

Overall aim: To analyze what can be learned from two WRM initiatives in the Ecuadorian Andes Mountains which have included participatory and community based methods. It is expected to build on ideas about what can be done at the community level (or any other level) where effective management can take place beyond /or in addition to other traditional institutional governance structures and to identify challenges and opportunities these new type of participatory WRM initiatives have.

Specific objective: To generate ideas, based on the analysis of *community and participatory* empirical examples, to help understanding how WRM and SD can be benefited towards a more sustainable WRM practice.

1.4 Specific Research Questions

- In what ways are participatory processes (PP) relevant for the implementation of projects which are developing WRM strategies in Ecuador? In what settings?
- Do these PPs and WRM strategies contribute to reach sustainable WRM? In what settings?
- What can be learned from experiences which have included a participatory approach in the path towards a sustainable water management practice?

2. Theoretical Considerations

Four subsections have been used to illustrate a set of ideas around the topic being studied. First, an overview around SD is presented with emphasis on what has been suggested in the literature respect of sustainable WRM. Second, various ideas around IWRM are presented. In these first two sections the notion of participation in reference to WRM and NRM is introduced. The third part presents a more traditional outlook on participation. Finally the fourth section offers a quick overview to get the research started.

2.1 Sustainable Development

The most commonly known definition of SD is offered by the Brundtland report. According to this definition SD “ensures meeting the needs of present generations, without compromising the ability of future generations to meet their own needs” (UN, 1987:24). The same report states that at least the natural systems that support life on Earth (atmosphere, the waters, the soils, and living beings) must not be threatened (UN, 1987, cited in Schmandt, 2006:2351). A more detailed definition of SD suggests that there are three key interrelated components or pillars of SD: *social*, *economic* and *environmental*. *Social progress* implies an equitable share of the benefits and burdens of resource use; *economic development* call for growth, employment and better living standards for all. *Environmental sustainability* is based upon recognition that SD cannot be achieved if (1) NR and energy are utilized faster than the earth can replenish them, or (2) waste and pollution are produced faster than the earth can accommodate them (UNITAR, 2005-07:2).

Agenda 21, launched by the UN in 1992, is considered as the blueprint for SD. In Chapter 18, Agenda 21 states that the general objective regarding WRM is to maintain *adequate supplies* of water. Another part of the same objective is to preserve the *hydrological, biological and chemical functions of ecosystems*, and to adapt human activities within the capacity limits of nature. (UN Division for SD, 2004).

In the previous concept, the relationship between *WR* and *ecosystems functions* has been established. Besides securing adequate *water supplies*, preserving the *functions of ecosystems* has been pointed out as the general objectives of WRM. This idea might be supported by the notion that NRM cannot be separated from the *viability of ecosystems* in which they are located (Swallow, et al, 2001:449). Thus, working in WRM might involve working on *ecosystem functions preservation*, particularly in the cases where a water supply is dependent on the viability of one or various ecosystems.

An alternative approach for management is suggested in Section C of the Agenda 21, in reference to the protection of WR, water quality, and aquatic ecosystems. In this section it is stated that the management of freshwater systems *should be holistic* (taking a catchment management approach) and it should pursue a *balance* in consideration of the *needs of people* and the *environment* (UN Division for SD, 2004). Therefore, from the theoretical point of view, there are two possibilities to approach WRM: by *catchments* or by *ecosystems*.

Regarding the link between WR and rural development, which is more closely related to the context of this study, Agenda 21 has stated four objectives. (1) To consider water as a *finite resource* with significant implications for *meeting basic needs*; (2) making local communities to *participate* in *all phases* of water management; (3) developing policies for WRM; and (4) recognize and supporting the role of rural populations (UN Division for SD, 2004).

Regarding IWRM, Agenda 21 suggests to consider water as an integral part of the ecosystem, and as a social and economic good. Regarding the use of WR, Agenda 21 suggest to give priority to the *satisfaction of basic needs* and the *safeguarding of ecosystems* (UN Division for SD, 2004). Furthermore, it has been proposed to use the *catchment basin* or *sub-basin* for the implementation of IWRM strategies. Those strategies, according to Agenda 21, should pursue four main objectives. (1) To identify and protect potential *sources of freshwater supply* (2) to plan the use of WR based on the needs and priorities of local communities within a national policy framework; (3) to implement WRM strategies based on a *full public participation* approach for policy and decision-making; and (4) to strengthen or develop the appropriate institutional, legal, and financial mechanisms to define an adequate WRM policy (UN Division for SD, 2004).

2.2 Integrated Water Resource Management

IWRM is linked to the concept of *watershed*. The *watershed* is understood as the “geo-hydrological unit, defined as the area within the confines of a drainage divide” (Jensen, 1996, cited on Munk, et al., 1999:257). Within it water is shed into streams and bowl-shaped *catchments*, and later it is collected downstream into a common outlet point (Swallow, et al, 2001:449). It has been suggested that within a watershed, people who are physically located far from each other, get connected by the movement of water, soil, nutrients, and pollutants among different parts of the watershed (Swallow, et al, 2001:450). Thus, it has been suggested to take the *watershed* as an area where its multiple resources and people constantly interact (Munk, et al., 1999:258).

Within IWRM there are various concepts in use. One of them is “*integrated watershed management*”. *Integrated watershed management* has been described as the process of planning, guiding and implementing actions in a *watershed* to achieve specific social objectives. In this process the *social, political, economic, and institutional* factors which operate within that watershed are taken into account (Dixon and Easter, 1991, cited in Dawei, et al., 2001:368). Another concept entailed to IWRM is “*watershed management*”. *Watershed Management* seeks to solve problems on a sustainable basis. Said et al. (2006) has suggested that the general problems facing water management can be classified into five categories: (1) lack of water (quantity), (2) water quality deterioration, (3) ecological impacts, (4) poor public participation, and (5) low output economic value for the investment in water-related activities. It has been further argued that in order to achieve a successful implementation of solutions to those problems, a broad set of *stakeholders should be involved* in the implementation of those solutions (Said, et al., 2006:2374-5). According to Said et al. (2006), the main benefit of using the previous type of integrated water management approach is its focus on combining different points of view between *decision-makers* and *stakeholders* (Said, et al., 2006:2375).

In addition, it has been brought forward that the success of the approaches that integrate stakeholders requires that the latter recognize that *participation* is not simply another way to deliver the same technological solutions.

It has been suggested that *participation* implies getting feedback from stakeholders about the development of WRM strategies. The previous is based on the assumption that local stakeholders would provide such feedback by working together to set criteria for sustainable management, identifying priority constraints, evaluating possible solutions, recommending technologies and policies, and monitoring/evaluating impacts (Johnson, et al., 2001:508). It has also been suggested in the literature that WRM projects which have involved local stakeholders in the design of its intervention seek to improve *appropriateness* of NRM technologies and policies. The previous is based on the assumption that such appropriateness might come along by recovering information from users about their understanding about resource degradation, the efficiency of NRM practices, and their criteria for the development potential new technologies (Johnson, et al., 2001:509).

Another way of looking at local stakeholder's participation for WRM takes place in the research process, which in some cases includes collecting data for the characterization of WRM problems. In this context, it could be anticipated that participation seeks to provoke changes among beneficiaries themselves. It has been further argued that as a result of participation in the research process, users may improve their *technical and analytical skills*. "*Participation* not only concerns generating appropriate technologies but also *developing the capacity* for innovation in individuals and communities over the *long-term*" (Johnson, et al., 2001:511). According to Johnson et al., (2001) empirical evidence has shown that giving users a *role in managing* their own watershed resources can lead to projects that are more *efficient* and *effective* than top-down approaches (Johnson, et al., 2001:517). Finally, Munk et al., (1999) has suggested to understand *participatory platforms* as a forum where different stakeholders analyze and negotiate diverse interests and agree on action strategies to solve NRM problems. It has been further argued that such participatory platforms are essential mechanisms for *coordinating collective action*. All stakeholders relevant to the *problem* or *resource* in issue should be represented according to Munk et al., (1999) in order to effectively negotiate various interests (Munk, et al., 1999:264).

2.3 The Traditional View on Participation

In the previous subsections the notion of *participation* attached to WRM has been introduced (within Agenda 21 and within the different propositions of IWRM). However, there are other ways of understanding participation. Participation is not a new topic and some critique has already been attached to it. The starting point which motivated the beginning of PPs in countries which experienced colonialism was political inequality. "Political inequality was common in colonial times as well as in the post-colonial period: the poor and disadvantaged retained their deprived status, excluded from the exercise of effective political power" (see Alastair, et al., 2007:218-9). In this context, the first forms of "participation" have appeared and evolved from *community development*, and *cooperatives*, to *Basic Christian Communities* and *Participatory Rural Appraisal* approaches (see Alastair, et al., 2007:234-5). During the 80s, the interest in participation and the experiments in

participatory approaches began to be examined by the International Funding Institutions, bilateral AID Agencies, World Bank, and the family of the UN. Participation had been discovered by the main stream and by the mid-90s “it had become an orthodoxy” (see Alastair, et al., 2007:236).

But, according to Alastair et al. (2007), participation has been criticized because the conclusion that poor people are not being empowered has been portrayed. Rather participation would involve merely consultation as the provision of information. Thus, it has been emphasized to “distinguish between participation as the *means* to accomplish project aims and an *end*, where the community sets up a process to control its own development” (Alastair, et al., 2007:237). Some of the most severe critiques of participation refer to the Participatory Rural Appraisal based on the argument that the poor are manipulated and cannot be empowered using participatory practices such as the Participatory Rural Appraisal (see Alastair, et al., 2007:238). According to Alastair, et al. (2007), much current thinking is concerned with linking participation to wider structures of *inequality* and processes of *social change*. The previous is based upon recognition that social and political aspects should be considered together for approaches which work on development and policy-making. Taking together social and political aspects is expected to offer possibilities for common citizens to contribute to decisions which affect themselves; an approach which has been called *citizenship participation* (see Alastair, et al., 2007:238-9).

2.4 Theoretical Point of Departure to Guide the Research

Participation of local stakeholders has been suggested to offer the possibility to design and implement more effective WRM strategies than traditional top-down approaches, based on the notion that local stakeholders will provide input, feedback, and will take proactive attitude for the implementation of those WRM strategies towards sustainable WRM. The watershed is the most popular working-unit used for the analysis and design of WRM strategies; but also it has been suggested to work at the ecosystem level. It is not clear yet in what ways participation contributes towards a more sustainable WRM practice, and also to what extent the watershed or the ecosystem represent appropriate work-units for implementing sustainable WRM practices.

3. Methodological Framework

3.1 Method and Analytical Tools

Qualitative research has been used as the main basis for this study. The general approach suggested by Ragin (1994) to do *qualitative research* was followed. Initial *sensitizing concepts*¹, given by the initial theoretical considerations (section 2) guided the selection of cases (Ragin, 1994:87). Later, this research envisioned to

¹ According to Ragin (1994) it is impossible to initiate a [qualitative] study without some sense of why the subject is worth studying and what concepts might be used to guide the investigations. Those concepts are called *sensitizing concepts* and they get the research started. (Ragin, 1994:87) That explains why this research starts by revising an initial set of concepts (theoretical considerations – Section 2).

clarify or expand those *sensitizing concepts* based on the analysis of empirical material, so then, *analytic frames*² (Ragin, 1994:85-91) were elaborated. Finally, those *analytic frames* provided elements to answer the research questions defined for this research.

Some *sensitizing concepts* extracted from section 2 and used along the research in different sections are: *In regards to SD*, “meeting needs of present generation without compromising future generations”; “not endangering natural systems that support life”; “preserving ecosystem functions”; and “implementing WRM strategies based on ecosystem or watershed considerations”. *In regards to IWRM*: “local communities must participate in all phases of WRM”; “priorities in IWRM are satisfaction of basic needs and safeguarding of ecosystems”; “ensuring full public participation”; “IWRM considers social, political, economic, and institutional factors for planning within the watershed”. *In regards to participation*: “integrating viewpoints between decision-makers and stakeholders”; “stakeholders providing feedback on the definition and application of a WRM strategy”; “increasing appropriateness of technologies/policies”; “improving users technical/analytical skills and developing capacities”; “giving users a role in management to make projects more efficient”; “analyzing/negotiating diverse interests and agreeing on action strategies”; and, “coordinating collective action”.

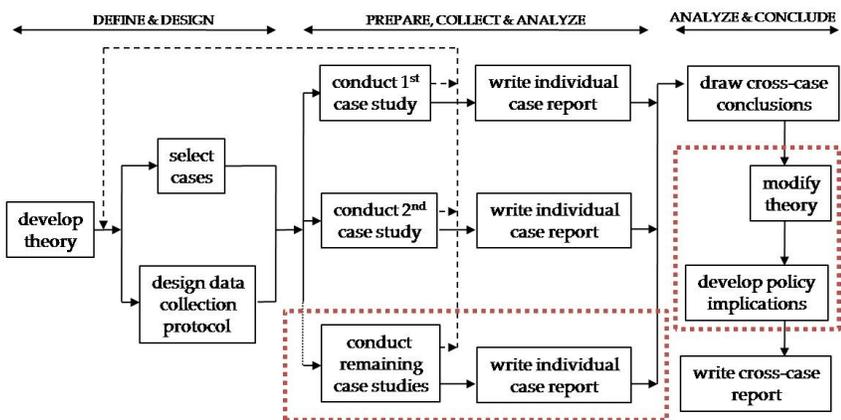


Fig. 1 Case Study Method: The dashed thin-black line shows the case when one of the case study did not suit the original design, case in which redesign is necessary. The dashed thick-red line indicates the section this study does not cover. (Source: COSMOS Corporation, cited on Yin, 2003:50)

The specific research design used in this study was a *comparative case-study*. This research followed the *replication* approach to multiple case study design (Fig. 1) suggested by Yin (2003). From the prior information-review conducted for each selected case, it was anticipated that *similar findings* might come along after collection of primary data. In that case,

according to Yin (2003), *literal replication* is a suitable approach to compare the case studies (Yin, 2003:47). *Literal replication* involves: (1) developing theory; (2) selecting cases; (3) defining data collection protocols; (4) analyzing each case separately, as if they were individual case-studies; (5) writing individual summary findings; (6) comparing those two summaries; and (7) drawing cross-case conclusions (Yin, 2003:49-50).

² Defining *analytic frames* is understood as the product of unifying clarified concepts (key components of analytic frames) and empirical categories in a reciprocal manner. It often takes place at the last phase of qualitative research (Ragin, 1994:88-90). They are used in this research as a preliminary step (section 6) prior to answering the leading research questions (section 7).

For this study, the first step (developing theory) was replaced by the use of the above mentioned sensitizing concepts as well as the theoretical point of departure (section 2.3). They led the research and also guided the selection of case studies (see section 3.2) and the definition of questionnaires (see section 3.4).

The individual analysis of each case (step 4), followed three stages based on some *grounded theory*'s principles (Fig. 2). First, relevant data was collected through interviews and secondary data review (see section 3.3). Then, that information was *coded* (breaking down information into component parts and giving it names or codes). Finally, *constant comparison* (maintaining a close connection between data and conceptualization) took place, so that the correspondence between concepts and categories with their indicators (empirical material) is not lost (Bryman, 2001:391). As shown in Fig. 2 the expected outcomes of the previous process are *concepts*³ and *categories*⁴.

The *concepts* and *categories* resulting from step 4 were used to write individual summary findings (step 5). But also they helped to compare the case studies, as it was easier to compare concepts and categories from each case instead of comparing the entire individual summaries with each other. The previous also facilitated drawing cross-case conclusions (step 7) which were used to develop the *analytic frames* (section 6) based on which the research questions were seek to be answered.

In sum, the entire process included collecting data (secondary and primary), coding, comparing, and categorizing. The comparative analysis treated each study case separately first, and then compared them to draw cross-case conclusions. Finally, those conclusions were also compared with the theoretical framework, which has given room for the discussion as well as for answering the research questions.

Finally, to compliment the analysis along the research *data triangulation* has been used. It is understood as a way of using independent pieces of information to get a better fix on something (SD and participatory approaches for WRM) that is only partially known or understood (Ragin 1994:100). Through *data triangulation*

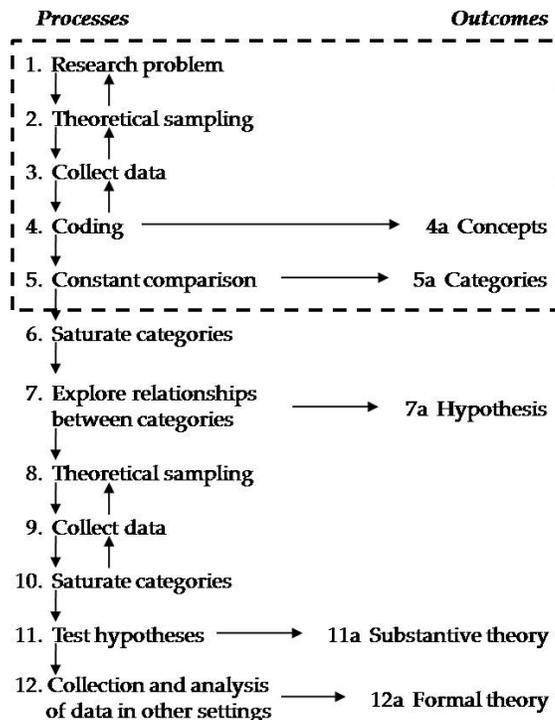


Fig. 2 Processes and Outcomes in Grounded Theory: Dashed line shows the section covered in this research. (Source: Bryman, 2001:394)

³ Concepts are labels given to discrete phenomena and are considered the building blocks of theory (Bryman, 2001:391-392).

⁴ Categories are concepts which have been elaborated so that they are regarded as representing real-world phenomena. A category could be composed by two or more concepts, and they are at a higher level of abstraction than concepts (Bryman, 2001:391-392).

all the material collected for the research (secondary and primary) was used to draw conclusions and to stimulate the discussion.

3.2 Selection of Case-Studies

According to Yin (2003), when using comparative case-study design, the cases must be carefully selected so that they either predict similar results, or contrasting results, but for predictable reasons (Yin, 2003:47). In the same way, Bryman (2004) suggests that the key of the *comparative design* is its ability to allow the distinguishing characteristics of two or more cases to act as a springboard for theoretical reflections about *contrasting findings* (Bryman 2004:55). For this research, it was decided to perform *comparative case-study* design regardless it lead to similar or contrasting findings. It seemed reasonable to conclude that the results of the analysis coming from cases holding slightly different backgrounds or settings would make the findings richer than the results coming from a single case. In addition, those results can also broaden the scope for generalization.

Based on the sensitizing concepts mentioned in section 3.1 it was envisioned to select *ideal case* studies. The next step was to look for case studies that are as similar as possible to an *ideal case*⁵ as well as feasible to study in terms of logistics and practical matters. The process of selecting cases for acquiring knowledge from empirical examples included several steps, from an internet-based quick research for gathering information about WRM initiatives in Ecuador, to narrowing down the cases as only those which included participatory and community-based WRM strategies. The responsible persons of those initiatives were contacted by phone, in order to ensure their predisposition to take part on this research and to define a general plan for the fieldwork.

Three WRM initiatives were chosen because of their similarity with the *ideal case*. Those three initiatives were run by two Quito-based environmental non-governmental organizations (NGOs): one by *Group Randi Randi Corporation* (RR) and two by *EcoCiencia Foundation*. During the first part of the fieldwork one of the EcoCiencia's initiatives was dismissed due to logistical reasons (see description of the two selected initiatives in section 4). RR, and EcoCiencia, including their partners⁶ are running projects⁷ which contain aspects of participation, community-based WRM strategies design, work-unit related to a watershed or an ecosystem, a variety of stakeholders involved, among others. Those projects were deemed to provide a suitable context for answering the research's questions (what Bryman calls the *exemplifying case*, Bryman, 2004:51).

⁵ Being consistent with the sensitizing concepts provided by section 2 of this study the *ideal case* should include at least the following characteristics: a place where WRM strategies are being applied or have been applied, strong features on participation, community-based WRM strategies design, work-unit related to a watershed or an ecosystem, a variety of stakeholders involved, among others.

⁶ MacArthur Foundation (Ríos, 2008), International Development Research Center (IDRC) for RR (Poats, 2008); and Altrópico Foundation, Brethren Unida Foundation, Páramo Working Group, Arco Iris Foundation, GEF, CONDESAN (Campaña, 2007) and others for EcoCiencia.

⁷ According to Bryman (2004) this type of cases are named the "exemplifying case" (Bryman 2004:51)

It was clear by then that, instead of taking specific projects as “case studies” to gather empirical material from interviews, it was more reasonable to take the experiences of those two organizations (RR and EcoCiencia) on the application of PPs “as case studies”. However, it was envisioned to acquire a broad view of those experiences, so then, it was defined that getting empirical material from local stakeholders who have participated in those PPs was also necessary. Therefore, considering that those organizations handle projects all over the country, it was required to take two specific initiatives at two specific sites in order to interview stakeholders. Two initiatives being implemented by RR and EcoCiencia offered logistic advantages because the project sites are located relatively close to Quito (Fig. 3).

3.3 Data Collection

Two processes of data collection have been used for this research: (1) *Secondary data collection* and (2) *Observations and interviews*. Secondary data has been collected in order to briefly characterize the current situation regarding SD and WRM in Ecuador as well as in both case study sites. Secondary data was also used for gathering the initial theoretical considerations (data collected mainly from books and scientific journals).

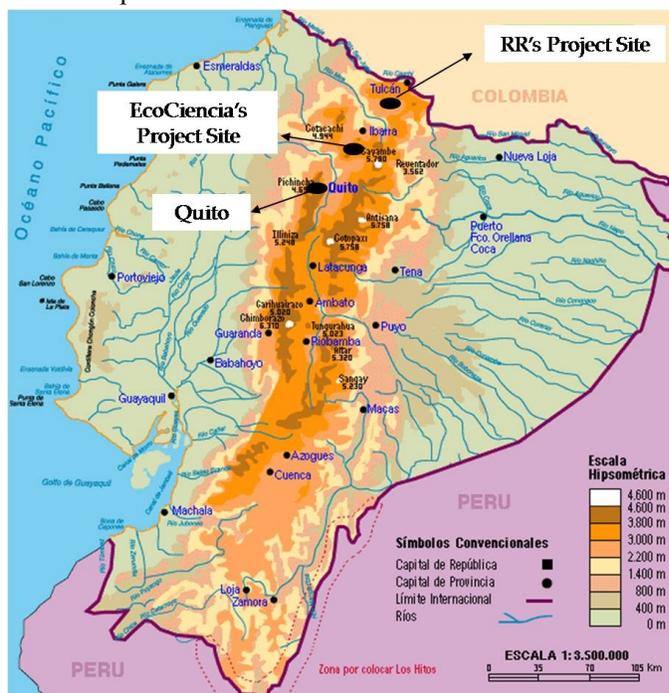


Fig. 3 Approximate Location of Case-Study Sites: Physical map of Ecuador (original map-scale has been modified) showing the approximate location of the two case-study sites (Physical Map Source: Pfluegl, 2004)

As an additional step, fieldwork was carried out, with the specific objective of doing *observations* and making *interviews* during site visits. Also, additional secondary data was collected during the fieldwork with the purpose of gathering information that was not available from the internet and which could be relevant for the comparative analysis and for characterizing the local context. Secondary data was collected at 4 different levels: (1) *governmental institutions*, (2) *international organizations*, (3) *books and scientific journals*, and (4) *environmental NGOs*.

Fieldwork was the most important source of collecting empirical material (primary data). In order to accomplish that, 33 interviews were performed. The interviews were *structured* and *semi-structured*, and were done mainly with target individuals (See Appendix 1 for the full list of interviewees, and Appendix 2 and 3 for questions). Tab. 1 shows information sources of primary and secondary data primarily from the fieldwork⁸.

⁸ This does not include only fieldwork because some information has been collected from websites at different stages of the research.

Tab. 1 Fieldwork Information Sources (Primary Data and Additional Secondary Data)

Source	Institution / Organization	Secondary Data	Primary Data
NGOs	• <i>Corporación Grupo Randi Randi</i> ⁹ (Group Randi Randi Corporation – RR)	Yes	Yes
	• <i>Fundación de Estudios Ecológicos EcoCiencia</i> * (EcoCiencia Foundation)	Yes	Yes
National Governmental Entities	• <i>Consejo Nacional de Recursos Hídricos</i> (National Council of Hydrological Resources – CNRH)	Yes	No
Local and Regional Governmental Entities	• <i>Gobierno Provincial de Imbabura</i> (Provincial Government of Imbabura)	Yes	No
	• <i>Gobierno Cantonal de Mira</i> * (County Government of Mira)	Yes	Yes
	• <i>San Rafael Parish Council</i> *	Yes	Yes
Other institutions	• <i>Consortio Sistema de Capacitación en el Manejo de los Recursos Naturales Renovables</i> * (System for Training on Renewable Natural Resources Management Consortium – CAMAREN)	Yes	Yes
	• <i>Instituto Nacional de Estadísticas y Censos</i> (Statistics and Census National Institute – INEC)	Yes	No
	• <i>Programa de Apoyo a la Gestión Descentralizada de los Recursos Naturales en las tres provincias del Norte del Ecuador</i> * (Programme to support the Decentralized Management of Natural Resources in the Three-Northern Provinces of Ecuador – PRODERENA)	Yes	Yes
International Organizations	• <i>United Nations Development Program-Ecuador Office</i> * (UNDP)	Yes	Yes
	• <i>UN Programa de Pequeñas Donaciones</i> * (UN Small Grants Programme – PPD)	Yes	Yes
	• <i>Consortio para el Desarrollo Sostenible de la Eco-región Andina</i> * (Consortium for Sustainable Development of the Andean Eco-region – CONDESAN)	No	Yes
Interviews	• <i>El Ángel County Government</i>	No	Yes
	• <i>Otavaló County Government</i>	No	Yes
	• <i>Pedro Moncayo County Government</i>	Yes	Yes
	• <i>Agencia de Aguas Oficina Regional para Carchi e Imbabura</i> (Water Agency, Regional Office for Imbabura and Carchi Provinces – WA)	No	Yes
	• <i>Ministerio de Agricultura, Ganadería y Pesca</i> - El Angel Regional Office (Agriculture and Fishing Ministry – MAGAP)	No	Yes
	• <i>Ministerio del Ambiente</i> (Environment Ministry of Ecuador – MAE)	Yes	Yes
	• <i>Oficina Regional de la Reserva Ecológica El Ángel</i> (El Angel Ecological Reserve – REA)	No	Yes
	• <i>San Isidro Parish Potable Water Council</i>	No	Yes
	• <i>Gonzales Suárez Parish Water Council</i>	No	Yes
	• <i>La Espezanza Parish Water Council</i>	Yes	Yes
• <i>Brethren Unida Foundation</i>	No	Yes	

3.4 Fieldwork Design

Fieldwork was carried out between December 19th 2007 and February 1st 2008. Three different grounds were defined to be carried out interviews on: (1) *PP leading NGOs* (proponents), (2) *Stakeholders* in currently running WRM projects (receptors), and (3) *relevant actors on WRM* at the national level in Ecuador. The questionnaires were defined according to the roles the interviewees play. For the “stakeholders” a different questionnaire was defined (Questionnaire B). For the other two grounds the same questionnaire was applied (Questionnaire A). The questionnaires were *structured* since they have a number of specific questions and topics to be covered in the interview. But often, during the interview it was necessary to emphasize or to go deeper into specific topics depending on the interviewee’s role; therefore a *semi-structured* questionnaire was used for some interviews. It

⁹ * Also includes one or more interviews. Interviews were recorded directly on a portable computer using Windows Movie-maker.

is crucial to consider the different roles that the interviewees have in the studied projects; therefore a slightly different set of questions have been formulated for both.

Questionnaire A includes three sections: (1) “Relationship SD – WRM”, (2) “Relationship PP – WRM”, and (3) “Lessons learned”. The definition of questions in this questionnaire was oriented towards acquiring interviewee’s knowledge and perception about those topics as well as towards answering the research questions of this research. For *questionnaire B*, it was envisioned to define questions oriented towards acquiring the perception about PPs from stakeholders who have been involved on those PPs. *Questionnaire B* holds two sections: (1) “Relationship SD – WRM” and (2) “Lessons learned”. The first section envisions getting the understanding of stakeholders about SD and the problems of WRM in their areas. The second section seeks to characterize the perception of stakeholders about the PP in which they have been involved.

Questionnaire A was used on *PP leading NGOs* and *relevant WRM actors* at the national level as it was assumed that they had the possibility to provide the theoretical understanding about PPs as well as being able to provide information on lessons learned. That assumption was based either on their professional background or on their experience of implementing PPs in different projects. The *stakeholders* are the actors who have been invited or involved in the PP carried out by RR and EcoCiencia. As a consequence these *stakeholders* play a different role compared to the *leading NGOs* (RR and EcoCiencia). Leading NGOs have promoted the application of PPs, so they can be seen as the “*proponents*”, whereas *stakeholders* have been invited to participate in those PPs, so they can be seen as “*receptors*”.

Regarding the selection of *interviewees*, a group of individuals was selected from each of the three grounds mentioned above. Within leading NGOs (RR and EcoCiencia) four different levels were considered at the time of defining interviewees (9 interviewees in total): (1) Top managers, (2) project managers, (3) technicians, and (4) local technicians. The experience of each of them is different in relation to the implementation of PP therefore it was envisioned to include at least one individual from each of those levels. The view from each of them might help to broaden the scope for generalizations. Top managers can also be taken as part of *ground 3* (relevant actors on WRM at the national level). From *ground 2* (stakeholders) at least one individual from each stakeholder group was selected. They include: water users, LG representatives, water authority, environmental authority, and local NGOs. The number of individuals interviewed in this group (17) was highly dependent on time availability and logistics; however, at least one individual from each stakeholder group was included.

Ground 3 included a set of individuals (7 in total) who play a relevant role on WRM activities at the national level. They belong to different organizations, work on a broader perspective (compared to the two previous groups), and they are related to WRM in different ways. The information from interviews in *ground 3* was

treated as if it was a separate case-study (that is coding, categorizing, and comparing with sensitizing concepts). However, the summary of findings from this ground was not compared with the summary of findings in ground 1 and 2 (which constitute de two case studies). Rather, this information was used to stimulate the discussion (section 6), where all the information collected from literature review and the empirical material (from the three grounds) is condensed, as a previous step to answer the research questions. The information from ground 3 was also used to broaden the scope for generalizations.

All the information collected through the interviews was *coded* and *categorized*. That process included various steps. (1) Interviews were transcribed; (2) some of those transcriptions were translated into English since the interviews were conducted in Spanish¹⁰; (3) the information from the transcripts was broken down into component parts and given names (codes); (4) some of those codes were elaborated as concepts according to the relevance respect to the topic being studied (categories); and (5) those categories were elaborated as to explain ideas which could help answering the research questions.

The results of the analysis are presented in section 5. Subsections 5.1 and 5.2 present the cross-case summary findings from the comparative analysis of the two case studies. Subsection 5.1 presents the view of the leading NGOs (proponents - ground 1) and 5.2 presents the view of the stakeholders involved in the PPs (receptors - ground 2). Subsection 5.3 presents a summary of findings from analyzing the view of relevant actors on WRM at the national level (ground 3). Within each subsection the information has been organized so it attends to each research question: (1) Characterization of the relevance of PPs in the implementation of WRM strategies, (2) Characterization of the relationship between SD and the previous PPs applied for WRM strategies, and (3) Lessons learned (see Appendixes 6, and 7 for additional findings not included or not explained in section 5). The results from the analysis in grounds 1 and 3 cover those three research questions, and ground 2 covers questions (2) and (3).

3.6 Limitations

This study faces the problem that case-studies generally do: *external validity* or “*generalizability*”. “How can the findings of specific case studies possibly be representative so that it might yield findings that can be applied more generally to other cases?” (Bryman 2004:51) Certainly the results of this research will not provide the basis for specific actions that other cases could implement in order to progressively reach sustainable WRM. However, this study seeks to use the findings of the particular case-studies to develop general criteria, ideas, and patterns, which may be used as basis for possible actions to set a path towards sustainable WRM.

¹⁰ Not all the interview-transcripts were translated into English because at the end of each interview, each respondent was asked if s/he was willing to check the transcription before its information was used. Most of the respondents answered positively. Therefore, since most of them cannot check the information in English then only those interview-transcripts which could be reviewed in English were translated from Spanish to English.

Following the guidance provided by *grounded theory*, this research went as far as *constant comparison* (Fig. 2). The following steps proposed by that research strategy (Bryman, 2001:393) were not contemplated for this study because they include additional phases of collecting empirical material, which was not possible in this case due to logistic limitations. It was not possible to go back-and-forth from Sweden to Ecuador to continue collecting information. In addition there was limited time for fieldwork; therefore not all the stakeholders involved in the processes being studied were interviewed. However, at least one individual was interviewed in each stakeholder-group, so it could be safe to conclude that the results represent the view from the diversity of stakeholders. As a consequence, according to Bryman (2001), it is not possible to go further than developing *categories*, which represent a previous step to *hypothesis* and *theory generation* (Bryman, 2001:394).

Another known limitation regarding the use of *grounded theory* is the use of *comparative design* for the analysis in this research. It is not usual in *grounded theory* to collect data on different settings because it concentrates on a specific setting (Bryman, 2001:394). For this research however, it was deemed to be useful to compare the two cases with slightly different settings to broaden the scope for generalizations. Ground 3 was included, as a separate case, to stimulate the discussion and possibly to broaden the scope for generalizations.

4. Case Studies

4.1 Background of the Situation at the National Level

4.1.1 WRM in Ecuador

Even though, far from representing an accurate indicator of the situation in the country - particularly regarding inequality issues, some national indicators on Ecuador could provide a grasp of the situation of the country. Ecuador's 2005 human development index (HDI) of 0.772 was below the regional average of 0.803 for Latin America and the Caribbean countries. However, it was above the average HDI for all developing countries of 0.691 and for medium HDI countries of 0.698 (UNDP Ecuador, 2007:4-5). Regarding water access, the proportion of houses with access to piped water has increased progressively from 37% in 1995 to 48% in 2006¹¹ (SENPLADES, et al., 2007:21). The status of two of the eight Millennium Development Goals (MDGs): *eradicating extreme poverty* (Goal 1) and *guaranteeing environmental sustainability* (Goal 7) are mentioned in this section as they are related to the objective of this study. Goal 1 presents a serious drawback in the period 1995-2006. There are no significant indicators showing a progress towards reaching the goal. Neither *reducing inequality* (specific objective within goal 1) shows any progress (SENPLADES, et al., 2007:15).

¹¹ As of 2006, there was still inequality in the relationship urban-rural. In urban areas there was access to piped water for 66% of houses versus 14% in the rural areas. The same occurs with the poorest fifth of the population where there is only 11% of coverage versus 87% in the richest fifth. Coverage of sewage systems has moved from 84% in 1995 to 90% in 2006 (SENPLADES, et al., 2007:21).

The situation is not much better regarding Goal 7. Land-use changes have caused a reduction of the natural vegetation cover in the country as well as an accelerated process of degradation and fragmentation of the landscape. Thus, in the last 30 years integrity and viability of each ecosystem and its ecological functions has been compromised. Ecuador is among the countries in the region with the highest levels of natural vegetation loss and deforestation (SENPLADES, et al., 2007:20). As of 2001 the remnant vegetation cover was 55.26%, and as of 2005 eroded soils represented 5.3% (SENPLADES, et al., 2007:32).

WRM is also problematic in the country. Within the 31 hydrological systems in Ecuador, approximately 146,789 hm³ of water are generated yearly, which represent a privileged situation comparing with water availability in other countries in the region. From that water volume 88.5% is generated by the Atlantic system, though 90% of the irrigation demand is located in the Pacific system. Hydrological deficit exists in 9 out of the

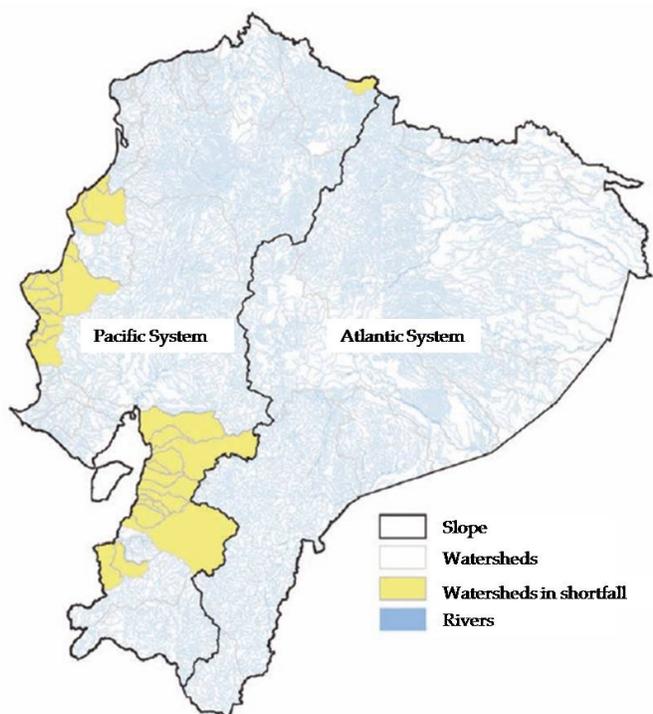


Fig. 4 Hydrological Structure in Ecuador: The thick blue line crossing the country from north to south represent the drainage divide. It separates the eastern slope which drains water to the Atlantic and the western slope which drains water to the Pacific. (Source: CNRH and MAE on SENPLADES et al., 2007:250 – original map-scale & legend have been modified)

79 watersheds in the country (Fig. 4). Other problems at the national level include quality and quantity loss due to: (1) overexploiting water sources; (2) an increment of waste and pollution (less than 5% of water used is treated); (3) the use of antiquated technology; and (4) accelerated deforestation. In addition, there is inequity in the distribution of the resource for human consumption and for irrigation. As of 2001 only 35% of the agriculture productive units with area below 2 Has (43% of the total productive units) were irrigated. It is in those areas where most of the indigenous population is located and where there are high poverty levels, besides low access to basic services and education. As of 1989 water consumption in the country (excluding hydroelectricity) was as follows: 81% irrigation, 12.3% households, 6.3% industry, and 0.3% various.

From the irrigation system 81% was used by privately owned extensive agricultural systems. Poor irrigation infrastructure determined losses between 15 and 25% (SENPLADES, et al., 2007:248-9).

4.1.2 Institutional Structure around Water

There are a number of actors and institutional competencies involved in fresh WRM in Ecuador. CNRH is the national institution in charge of control, quality, and distribution of water for irrigation. However, other

institutions like MAGAP and a number of regional consortiums also have a say on irrigation distribution. Control and distribution of information corresponds to The National Institute of Meteorology and Hydrology (INAMHI). The Urban Development and Housing Ministry (MIDUVI) and LGs are in charge of quality control for human settlements and control of sewage systems. The Energy and Mines Ministry (MEM) has the control over pollution due to oil exploitation and mining activities. Pollution by agrochemicals is controlled by MAGAP, Public Health Ministry (MSP), and MAE. Finally, solid waste pollution is controlled by MIDUVI, MSP, MAE, and LGs (SENPLADES, et al., 2007:280). The general normative body is the *Water Law* launched and published in the Official Registry No 69 on May 30th 1972 (see CEP, 2007). However, there are other laws which also influence WRM e.g. Hydrocarbons Law, Biodiversity Law, among others. In addition, studies to make addendums to the Water Law have been undertaken. As a result of that work, the establishment of the *National System for Integrated Management of Hydrological Resources* is being discussed. That system envisions doing WRM in an integrated and sustainable fashion by watersheds, sub-watersheds, and micro-watersheds in accordance to the Water Law (CNRH, 2007:3).

4.2 Case Studies Description

4.2.1 Case Study 1: The Experience of Randi Randi Corporation in El Angel River Watershed

4.2.1.1 Background on the Working Site

This study takes the work of RR in *El Angel River Watershed* as case study 1. RR is a non-profit NGO legally established in Ecuador in year 2000. The general scope of action for RR is *conservation and development*. Within that framework the organization also does research, and executes projects by contracts and professional services in order to fulfill different goals on *community-based conservation and watershed management*. The organization has explicitly established in its vision that one of the topics in which it works is *watershed management* under *participatory* and *gender* approaches (Poats, 2008).

El Angel river watershed - and its water-use influence area (85,833 has), (Poats, et. al, 1998:2) is located in the northern Ecuadorian Andes Mountains (Fig. 5). It belongs to the Mira River basin, which flows all the way down by the Andean western slopes towards the Pacific

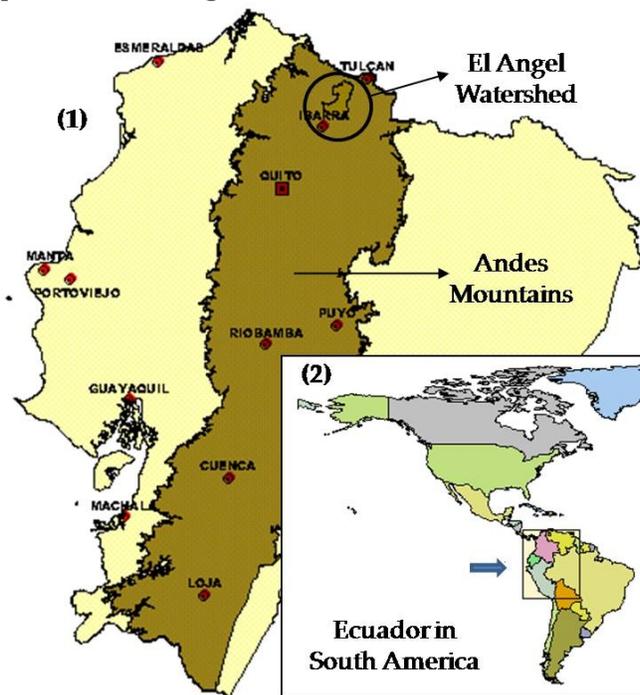


Fig. 5 Geographic Location of El Angel Watershed: Geographic location of: (1) RR's project site in Ecuador and (2) Ecuador in the American Continent. Original map-scales have been modified. (Source: Corporación Grupo Randi Randi, 2005)

Ocean. The altitude range in El Angel watershed goes from 1,500 m.o.s.l., at the lowest point, and reaches over 4,000 m.o.s.l. at the highest point in the páramo ecosystem (Poats, et. al, 1998:2). Since altitude is one of the most important factors determining bio-geographical conditions in tropical ecosystems, the approx. 2,500 m difference in height has given origin to a big diversity of landscapes and ecosystems (Poats, et al., 1998:2).

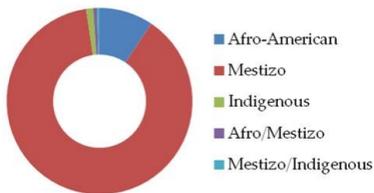


Fig. 6 People's Ethnicity in El Angel Watershed: (Source: Poats, et. al, 1998:3)

Within El Angel Watershed there are three politic-administrative units at the county level: Espejo, Mira, and Bolivar (Ponce, 2008). Part of the upper watershed is under protection as *El Angel Ecological Reserve* (REA), within the MAE's National System of Protected Areas: The aim of REA is to protect El Angel páramo ecosystem. The relevance of this ecosystem lies on its biodiversity and the fact that within this area are located most of the water catchments, springs, and head waters of the most important creeks and streams in the watershed (Poats, et. al, 1998:2).

Regarding ethnical composition most of the people are mestizos (88,4%) in El Angel Watershed (Fig. 6). The main economic activity in the area is agriculture. Rural population in the upper and mid watershed is composed by: small and mid-scale agriculture farmers, craft-makers, milk-merchants, mid-scale agro-industrial farmers¹², and mid-scale landowners. In the lower watershed people work mainly with agriculture. (Poats, et. al, 1998:2-3)

The situation of poverty (Fig. 7) in the region is different depending on *land-owning* and *geographic location* within the watershed. Poverty is more critical in families who do not own land. 88% of these families have an income under the poverty line¹³ versus 60% among the owning-land families. Mean while, 47% of the population is under the *chronic* or *recent* poverty group in the western watershed, whereas the equivalent number for the eastern watershed is 70% (Corporación Grupo Randi Randi, 2005).

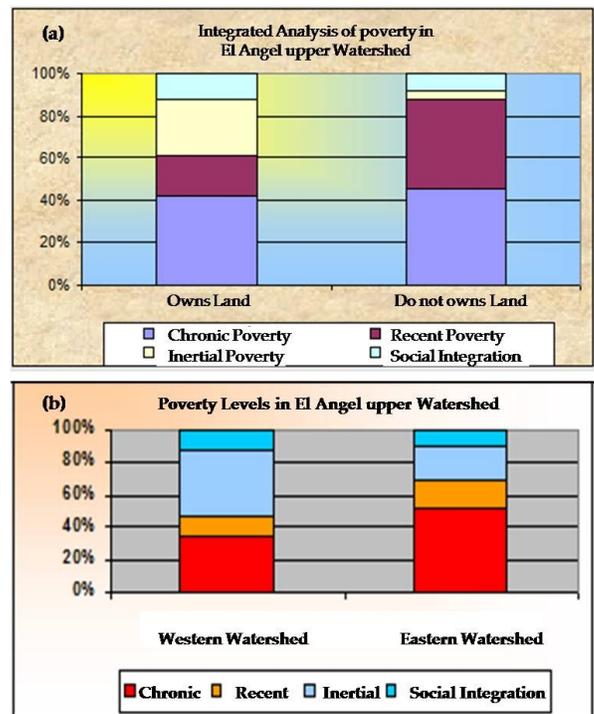


Fig. 7 Poverty Characterization in El Angel upper Watershed: (a) Integrated Poverty Analysis and (b) Poverty Levels by Watershed Slope. Original graphs have been modified to English. (Source: Corporación Grupo Randi Randi, 2005)

¹² They work on flowers and fish-farming in the upper watershed; and fruits and poultry-farming in the mid and low watershed. (Poats, et. al, 1998:3)

¹³ The poverty analysis done for the upper watershed has used the *Poverty Integrated Analysis Method*, which combines the direct and indirect methods (*Chronic* and *recent* poverty is the one located under the poverty line, and *inertial* and *social integration* are located above). The *direct method* is based on the characterization of severe *un-satisfaction of basic needs* in terms of education, health, nutrition, and housing. The *indirect method* characterizes poverty using the *poverty line* which is defined based on the minimum cost of a basic goods and services provision to cover a family needs. (For more details see Corporación Randi Randi, 2005).

4.2.1.2 Background on WRM and PPs in Case Study 1

RR's motivation to work at the watershed level comes as a legacy from prior experiences. During the 90s, a number of projects, whose work was focused at the watershed level, were executed by different organizations¹⁴ in El Angel Watershed (Ríos, 2008). Most of those organizations implemented a joint project during the second half of the 90s (Fundación para el Desarrollo Agropecuario, 2001) named *Collaborative Management of Natural Resources in Andean Watersheds in Northern Ecuador* (MANRECUR), which became the earlier stages of RR, (Castillo, 2008). For this study, most of the PPs referred to in the interviews for case 1 correspond to the work of MANRECUR project. Nevertheless, those interviews also reflect the interviewees' experience on participation in reference to the work RR does today.

Currently, RR works in two directions. One includes working together with MAE to consolidate the *conservation* efforts of the REA. The other follows more traditional lines of *production* particularly in regards to farming systems. This includes activities such as pest control, species analysis (Poats, 2008), and agro-chemical management (Castillo, 2008). In general terms, the work RR does is still managed at the watershed level and keeping participation as a transversal line of work (Poats, 2008). However, at the moment, the first line of work uses specific communities as the main geographical unit. This line of work is being handled mostly through participatory *community management plans*¹⁵ (CMP) with emphasis on NR management, land-use planning, and farm-planning. The second line of work is often being done at the farm level, thus working through more personal commitments on farm-planning. Scaling up those initiatives, "RR has also supported LGs on the definition of [development] *strategic plans* at the parish and county levels" (Castillo, 2008).

There is an additional set of activities which are often triggered by those mentioned above. For instance, "currently a study is being performed to define a legal framework for the establishment of strategies such as *Payment for Environmental Services* (PES) in the working area" (Poats, 2008). The role of RR is to facilitate the engagement of various stakeholders - LGs, communities, NGOs, (Castillo, 2008). Often local people have been engaged on the development of studies, e.g. environmental characterizations, which has facilitated the consequent execution of some activities (Ponce, 2008).

Appendix 4 summarizes the most relevant WRM problems in El Angel Watershed according to interviewees. In general terms, those problems are related to: inequitable distribution, unrealistic water concessions, recent perceived need for irrigation, water-use without concessions, ecosystem-ES threatening, pollution, and poor

¹⁴ Agrarian Development Foundation (FUNDAGRO), Consortium for Sustainable Development of the Andean Eco-Region (CONDESAN), Latin American Faculty of Social Sciences (FLACSO) among others (Ríos, 2008).

¹⁵ Though, *CMPs* emphasize on NR management, they also include other axis like *health, education, socio-political organization* and so on. The basic logic underlying the implementation of those plans includes defining "zones" as an approach to organize the territory. This way *zones* are defined for: cropping; grazing and cattle farming; reforestation; and protecting [ecosystems] in an effort for optimizing land-use in the community and for preserving the water catchment and "water-producing" areas. The same principle is also applied at lower scales for *farm planning*. For the development of *CMPs* participation is critical. (Castillo, 2008)

irrigation infrastructure. In addition, other problems which indirectly might affect WR (also according to the interviews) are: lack of stakeholders’ access to decision-making, weak leadership, weak political will, and individualism.

4.2.1.3 Stakeholders Involved in Case Study 1

The stakeholder definition process for RR is problem-focused. “The process starts by defining a problem, and after that, the particularities of the problem define the geographical boundaries (“where”) and the involved stakeholders (“who”) for the implementation of a WRM strategy” (Poats, 2008) Tab. 2 summarizes who are, in general terms, the stakeholders normally involved in work related to WRM in El Angel river watershed.

Category	Stakeholder	Role
Users	Irrigation users	They could affect or be affected by the WR problem. They hold traditional hierarchical structures (Poats, 2008).
	Potable water users	They could affect or be affected by the WR problem. They are less used to traditional hierarchical structures than irrigation users (Poats, 2008).
	Irrigation Water Councils	They represent the users’ interest (Ríos, 2008).
	Land-owners in páramo areas	This includes private land-owners, associations, communities, REA, MAGAP. They are the land-owners [of part] of the area where water is being generated [páramo]. Any activity in páramo should consider their opinion and approval. (Ríos, 2008)
	Agricultural Centers	They have an interest in water since they are supposed to manage the agricultural sector (from the government) as part of MAGAP (Ríos, 2008).
Local Governments	Parish Councils	Constant stakeholders. They all are related to water in one way or the other (Poats, 2008). They are decision making entities; sometimes they offer economical support; and have the capacity to do regulation for management – through ordinances or ruling (Ríos, 2008). Local governments also have the ability to keep up on different initiatives after NGOs leave the area (Castillo, 2008).
	County Governments	
	Province Government	
Local Water Authority	Water Agency (Local Office)	Local representation of CNRH (The national water authority). Provides water concessions (Ponce, 2008).
Local Environmental Authority	REA Regional Office	Land-owner and administrator of a portion of the páramo ecosystem. It has the mandate to administer the REA.
	MAE Forestry Regional Office	Has the mandate to administer the forest areas at the local level.
National Environmental Authority	REA National Office	Provide direction for the REA Regional Office.
	MAE Forestry National Office	Provide direction for the MAE Forestry Regional Office.
Nationals Organizations	CAMAREN	Holds the secretariat of the National Water Forum.
NGOs	NGOs	Best allied or worse enemies; there is no indifference (Poats, 2008).

4.2.2 Case Study 2: The Experience of EcoCiencia Foundation with Proyecto Páramo Andino (PPA)

4.2.2.1 Background on the Working Site

This study takes the work led by *EcoCiencia Foundation* in Mojanda páramo ecosystem as case study 2. EcoCiencia is a Quito-based Ecuadorian environmental NGO which holds eighteen years of experience in the country. EcoCiencia has specialized in generating information for aspects relevant to conservation. Currently, EcoCiencia works in topics like: research (Applied Ecology and NRM), environmental education, governability, civil society participation, economic incentives for conservation, and recently on modeling (Manosalvas, 2008).

Mojanda Mountain is located southwards from El Angel watershed in between two provinces: Pichincha and Imbabura. Two counties (Otavalo and Pedro Moncayo) divide this area (Fig. 8). Mojanda is located on the headwaters of two basins: Mira River (on north) and Esmeraldas River (on south) both moving down by the western slopes of the Andes Mountains towards the Pacific Ocean.

In year 2004 a bi-county ordinance for the “*Protection and Preservation of Mojanda Area*” was launched by Otavalo and Pedro Moncayo counties. The ordinance determines the creation of a *protected area* of the land

located above 3,000 m.o.s.l. till the highest point (4,260 m.o.s.l.) covering a total surface of around 25,000 has.

Three ecosystems compose that protected area; one of them is the páramo, located in the highest lands above the 3,500 m.o.s.l. The mean annual temperature in this ecosystem is between 3 and 6° C. Typically, soils in the páramo (Idystrandept) are black deep soils with high permeability and water retention capacity (50-80%); whereas vegetation is dominated by gramineae and shrub remnants in the lower páramo. This ecosystem has been used for cattle-grazing and some cropping.

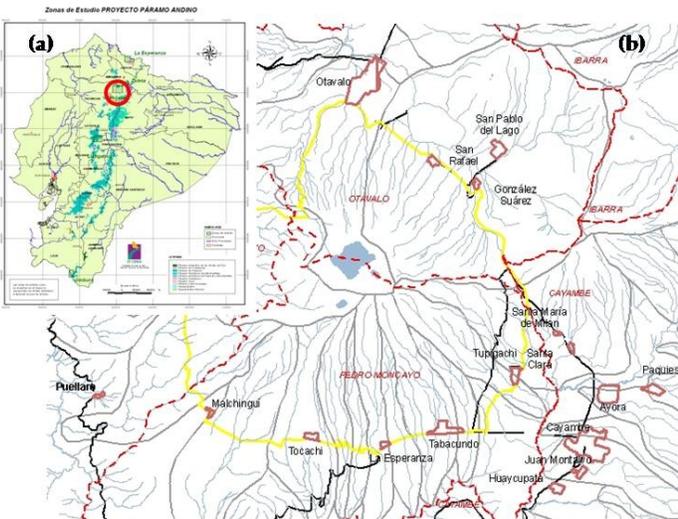


Fig. 8 Mojanda Páramo: (a) Location of Mojanda Páramo in Ecuador (red) and other páramo-ecosystems in the country (turquoise blue). (b) Yellow line shows the páramo ecosystem and its influence area (given by use); politic-administrative division is in red, watersheds in grey, and hydrology in sky-blue. Original scales have been modified. (Source: PPA, EcoCiencia)

Most of the native forest surrounding the páramo has been converted into crop-land (potato, broad bean, barley, quinoa, and oca) and pine-forests (*Pinus Radiata*). Land in this area belongs to communities and big land-owners. (FBU, and EcoCiencia, 2004:1-2)

The lacustrine system in Mojanda provides water for more than 90% of Pedro Moncayo County and three parishes of Otavalo County. In total, around 36,000 habitants are benefited by that water. Ethnically the population is more evenly distributed in Mojanda than in El Angel watershed. It is composed by three indigenous groups (Otavalos, Cayambis, and Cochasquis) and by mestizos.

Above the 3,000 m.o.s.l. there are 28 communities between the two counties with an approximate total population of 11,000 people, for which small-scale agriculture and cattle-raising are common productive activities. Bellow the 3,000 m.o.s.l. there are agro-industrial farms growing flowers since 1985, mostly in Pedro Moncayo County. They represent a big influence for the social dynamics in the region as well as for water demand. (FBU, and EcoCiencia, 2004:1-2)

4.2.2.2 Background on WRM and PPs in Case Study 2

The work EcoCiencia does is related to water through *ecosystem management*. The context in which PPA¹⁶ has been developed is considered as Case 2 for the purposes of this research. The project takes place in four pilot-sites in Ecuador, one of which has been used in this study: Mojanda páramo ecosystem. One of páramo ecosystem's *environmental services* offers the link between the PPA with WRM: *hydrological regulation*. The páramo ecosystem "is a zone of recharge and hydrological regime regulation" (Campaña, 2007); thus, "it plays an important function in regulating water provision: it captures water and regulates it along the year, regardless the dry or rainy seasons ... by *zoning* through the *participatory management plans* PMPs - which take place in community areas, the project seeks to preserve that function of the páramos" (Maldonado, 2008).

Through the development of PMPs (central activity of the project, currently in early stages of implementation), it is envisioned that "*participatory planning* will allow local populations to: identify areas which need to be preserved or need to recover their natural processes, and to identify other areas which hold optimum conditions to sustain economic activities" (Campaña, 2007). In addition, there is a set of other components that support the development of the PMPs. Those components are: training, research, education, and policy (Maldonado, 2008). In the case of the PPA, the working area is not defined by a bio-physical unit (as the watershed); rather, "various working-units have been considered which are composed by specific communities and its influence area in relation to the use of the ecosystem" (Maldonado, 2008).

There are other complimentary initiatives contemplated by the PPA to work on. For instance, "it is envisioned to find environmentally friendly *economic alternatives* to sustain local people's economy. Also, the PPA is trying to define an *ES scheme* in three of its four pilot sites, in agreement with the municipalities of nearby cities. At the national level, PPA supports initiatives to create policy instruments, e.g. for the conservation of páramo; in that respect, the project works with MAE and other organizations. At the regional level, the project is defining a strategy for recovering information; activity in which the Andean Nations Community (CAN) is involved" (Maldonado, 2008). The research component is also handled at the regional level. "Part of it involves the establishment of a WR monitoring system at the micro-watershed level"¹⁷ (Campaña, 2007).

The WRM problems in EcoCiencia's working sites according to interviewees are summarized in Appendix 5. Those problems are related to: inequitable distribution, unrealistic water concessions, ecosystem-ES threatening, pollution, and increasing demand. In addition, other problems mentioned during the interviews are: lack of

¹⁶ "The PPA [Andean Páramo Project] is a regional project that includes the 4 countries that hold páramo: Venezuela, Colombia, Ecuador, and Peru" (Maldonado, 2008). The "PPA seeks the *preservation of biodiversity* in the Northern and Central Andes Mountains. The aim is to promote the *ecosystem conservation* from an *integral perspective*. Although "*biodiversity*" is the key word, the project aims at *managing the ecosystem* with an *integral perspective* and with an *eco-systemic focus*" (Mena, 2008).

¹⁷ "The purpose is to characterize the conditions of water availability and its quality. It is envisioned that this information will be taken at the local level, and LGs should keep the monitoring system beyond the project timeframe" (Campaña, 2007).

scientific information, investment, knowledge in the general public about water dynamics, and Estate Policy; social inequity; and inadequate water valuation.

4.2.2.3 Stakeholders Involved in Case Study 2

“At the community level the way how stakeholders are identified is dependent on its organizational structure. At the beginning second grade organizations (SGOs) are contacted (if they exist in the area), and then moving down, the community leadership is reached, depending on the organizational level of the community. Community leaders are the first contact with the community. From the institutional structures of the Estate, LGs and MAE have to be involved” (Mena, 2008).

Tab. 3 summarizes who are, in general terms, the foreseen stakeholders to be involved in EcoCiencia’s work related to WRM in Mojanda.

Tab. 3: Stakeholders involved in EcoCiencia’s PPs in Mojanda (and other project-working sites)		
Category	Stakeholder	Role
Users	Communities	They give a direct use and have a direct relationship with the [páramo] ecosystem. They participate fully in the elaboration of the PMPs (generating information and agreements). They are the most important stakeholder (Maldonado, 2008).
	Irrigation Water Councils	In some cases they play a protagonist role, in others not much. The Irrigation Council in Mojanda is strong so it might be approached for the PMPs instead of working directly with the communities (Maldonado, 2008).
Local Governments	Parish Councils	They could facilitate channeling down some activities and resources (Campaña, 2007). All of them are involved. Consensuses have to be reached with them because of their ruling capacity (Maldonado, 2008). In order to guarantee an impact of participatory planning in the long run then participation of LGs is necessary. There is some implicit normative at the community level (use-agreements) but explicit norms (ordinances and regulations) are required, which are not feasible to apply if the project does not consider administrative stakeholders as LGs (Campaña, 2007).
	County Governments	
	Province Government	
National Water Authority	CNRH	In some cases CNRH is a fundamental stakeholder; in others not at all. It all depends on the local context (Maldonado, 2008).
Local Environmental Authority	MAE	MAE has an incidence as long as some project-sites are located nearby protected areas. It is necessary to establish clear agreements and a clear articulation between MAE’s MP and the PMP’s (Maldonado, 2008).
National Environmental Authority		
Nationals Organizations	Universities	Have some agreements with PPA for the “research” component. (Maldonado, 2008)
International Organizations	CAN (Andean Nations Community)	Part of the project board. CAN is also involved because one of the project-outcomes is to design a management and conservation strategy for the páramo [ecosystem] at the regional level (Maldonado, 2008).
NGOs	NGOs	Some of them have been [previously] present in the region for some period of time (Maldonado, 2008). Some of them are the project’s local partners (Robles, 2008). They can facilitate a close relationship between the project and LGs (Campaña, 2007).

5. Findings from the Analysis

5.1 Summary of Findings from the Comparative Analysis on “Leading NGOs” (Ground 1)

- Characterization of the relevance of PPs for WRM

Empowering people and increasing WRM feasibility. Three aspects seem to be common between the two case studies regarding the relevance of applying PPs for WRM. (1) *Empowering people*, which is expected to motivate local stakeholders to proactively participate in the implementation of WRM strategies. It is argued that local stakeholders could appropriate an action towards WRM more easily if that action was built together with them, instead of accepting solutions developed elsewhere. The previous includes creating *awareness* and *consciousness* about the value of WR as well as educating stakeholders and learning from them (see Campaña, 2007, Castillo, 2008, and Maldonado, 2008). (2) It is argued that applying PPs would increase chances to make *a WRM strategy feasible* as active participation of local stakeholders is what makes WRM strategies feasible. The results from the interviews show that this is based on two notions; first, through a PP *win-win solutions* might come along. And second, by participating in the WR problems characterization, local stakeholders could be convinced about the dimension of the problem, and the need to take action. This argument is based on the idea that if the reasoning behind a technical recommendation for WRM was clear for local stakeholders then implementation is more feasible (see Campaña 2007, Castillo, 2008, and Ponce, 2007). And (3) in the two cases the reasons for working through PPs are based on *lessons learned* from prior experiences. Either those PPs have shown to be effective for the application of WRM strategies or their absence has made it difficult to succeed on the application of measures towards effective WRM (see Maldonado, 2008, Neger, 2008, and Robles, 2008).

Other insights about the relevance of PPs for WRM: Insights from the interviews in case-study 1 suggest that other important aspects which shape the relevance of PPs are: (1) *finding solutions from inside*; (2) facilitating the development of *systems-thinking solutions*; (3) creating potential *win-win solutions*; and (4) engaging stakeholders to *work together* towards *common aims* (See Castillo, 2008, Neger, 2008, Poats, 2008, and Ponce, 2007). Insights from the interviews in case-study 2 suggest three other important features of the relevance of PPs. (1) Understanding participation as a *basic management principle*; (2) empowering local stakeholders to *support long-term processes*, needed for WRM; and (3) *PPs lead to integrity* because local social, cultural, and economic aspects are incorporated, which sometimes might be considered not important by the proponent (see Campaña, 2007 and 2008Maldonado, 2008).

- Characterization of the relationship SD - PPs applied to WRM

Two ideas are similar for the two case-studies regarding the relationship SD with PPs and WRM. (1) There are problems with the *applicability of the concept of SD* as stated in the Brundtland Report (see Castillo, 2008, Maldonado, 2008, Mena, 2008, and Ríos, 2008). Particular attention has been given to the ambiguity in the definition of “basic needs”, which could have different meanings for different people (Maldonado, 2008). In addition, when that satisfaction of needs is attached to the provision of services by ecosystems then SD requires that those ecosystems are preserved because they are *providers of services*. That notion is not broadly understood, which in turn complicates the applicability of SD (Mena, 2008). And (2) *working on SD is linked with working on NR management*, particularly regarding the preservation of some ecosystem’s functions as providers of goods and services (see Campaña, 2007, Castillo, 2008, Mena, 2008, and Poats, 2008).

Another finding which is similar in the two case studies is the establishment of the relationship between WR and SD. There is a basic and simple relationship that water holds with SD for covering a “basic need” and as an input of economic activities. That is the case of areas that base its economy in agriculture. Water calls people’s attention to the link with “production” (Poats, 2008). Moreover, *water and SD* hold basic and simple relationships also in areas which do not have an economy based on agriculture. “WR are fundamental for productive and industrial processes; therefore to secure water in quality and quantity is very relevant. Water is a NR which calls the interest and perception of people for environmental quality” (Campaña, 2007).

In case-study 1 it was argued that the relevance of SD lies in the fact that “it represents a global milestone which has prompted to rethink the structures, concepts, and principles of development. Still, there is a need to define SD depending on the specific site conditions” (Poats, 2008). It has been suggested in the interviews to narrow down the concept considering the characteristics of the *specific problems* to be attended and combining it with *socio-economic* and *eco-systemic* visions (see Castillo, 2008, and Poats, 2008). The propositions to narrow down the concept in case-study 2 have been connected to the *environmental pillar of sustainability*. According to the interviewees in case-study 2 SD should be defined based on the “capacity of ecosystems to sustain their natural processes”¹⁸ (Campaña, 2007). “SD should aim at ensuring that human activities do not affect processes of hydrological regulation” (Robles, 2008), such as those generated in the páramo ecosystem.

- Lessons learned by the implementation of PPs for WRM

About the definition of PPs: In general terms, the definitions of a PP include the same elements in the two case-studies. From case-study 1 it could be concluded that *engaging stakeholders in projects execution and decision making* is a basic feature of PPs. The interviewees have also suggested that other elements of participation

¹⁸ “SD should take into account that many economic activities take a number of NR as raw material from some ecosystems. If it was also considered the *inequitable distribution of resources* then it is clear that there is higher pressure for NR exploitation, as means of *economic growth*. That makes people to exploit those resources surpassing the capacity of self-regeneration” (Campaña, 2007).

include: joint-work, dialogue, planning, working together, consensus, learning, and empowerment (see Castillo, 2008, Néger, 2008, Ríos, 2008, and Ponce, 2007). It has been argued that “the desired participation is the one in which decisions are made in a group, where there is feedback on the analysis of options, and a process which brings everyone to a better situation at the end. The learning process triggers empowerment. However, it is difficult to tell when people’s empowerment has been reached. Through the implementation of PPs *learning* leads to *awareness* and such *awareness* is expected to *change practices*” (see Poats, 2008).

From case study 2 it could be concluded that participation is determined by the capacity of local stakeholders to *take their own decisions* in relation to the *definition of a problem* and the *development of an initiative* (see Campaña, 2007, and Maldonado, 2008). Relevant points in that process are: *reflection*; *proactive attitude*; and the facilitating role of third parties which provide technical, financial, or logistic inputs (see Campaña, 2007, and Robles, 2008). “Caution is suggested so participation is not taken in a paternalist manner” (Mena, 2008).

Key factors for success or failure: There are many key aspects, which could determine success or failure when implementing a PP. There are three similar aspects pointed out in the two case studies. (1) The *relevance of trust* in the execution of PPs, not only between *proponent* and *receptor* but also trust on the *definition of the problem* and the *measures* to counteract it (see Campaña, 2007, Castillo, 2008, Maldonado, 2008, Neger, 2008, and Ríos, 2008). (2) The *relevance of the methodology* used for applying the PP (see below). And (3) the need of *reflection* as part of the process to break down *people’s inertia*. *Reflection* is relevant in this respect because, often, it is necessary to facilitate for local stakeholders to acknowledge the existence of a problem and the causes and effects in which they are involved (see Robles, 2008). This is also connected to the *severity of the problem* being addressed. The *severity of the problem* not only facilitates reflection about the causes and consequences of the problem, it can also motivate people to take action (see Neger, 2008, Ponce, 2008 and Ríos, 2008).

About the methodology: Insights about the *methodology* used for the application of PPs include various points. In case study 1 it has been mentioned the need to carefully define “when” to start a PP. Conflicts related to *land tenure*, amount of *antagonistic stakeholders*, and *weak organizational structures* need caution. Also the use of local knowledge has been mentioned as a positive factor (see Castillo, Neger, 2008). For case study 2 methodological considerations include: *identifying stakeholders*; acquiring a proper knowledge about the *organizational dynamics*; *systematizing the contribution of stakeholders*; working with a *team sensible enough and trained* to carry out PPs; being able to *balance interests* among stakeholders; finding *balance* between *participation* and a *desired outcome*; developing *communication tools* sufficiently flexible, but at the same time efficient to recover relevant and comparable information; and *engaging local partner-organizations* (see Campaña, 2007, Maldonado, 2008, and Mena, 2008). In relation to methodology, also the need to carefully

consider *cultural differences* was mentioned in the interviews. For instance, “when working with indigenous communities it is difficult to know how much [*proponents*] are really acquiring relevant information and getting the desired impact” (Mena, 2008).

Relevant aspects to consider: Other identified relevant aspects which should be considered in the implementation of PPs are: (1) how dependent is the PP on one single person or one single organization. If it was very dependent then the absence of any of them could determine the process to fail (see, Neger, 2008, and Ríos, 2008). (2) Dealing with *false leaders*; including people who might be looking for political recognition or conflictive persons who are usually looking for confrontation and thus, distract people’s attention on the important points. This situation can modify the working dynamics or can make a participatory activity to fail (see Castillo, 2008, Poats, 2008, and Ponce, 2008).

About the challenges: There are some embedded challenges in the application of PPs simply because consensus has to be reached and conflicts around water could bring forward very polarized positions among stakeholders. In relation to this point, a number of other difficulties for running a PP have been mentioned by interviewees (see Appendix 6). Among those challenges, one that is critical is reaching agreements and compromises to work with LGs. They are key stakeholders which offer some opportunities for the maintenance of PPs. But each of them can have a different position respect to a water problem. Or simply, they could consider that working in WRM is not a priority (see Castillo, 2008, Ponce, 2008, and Ríos, 2008).

Another challenge identified by the interviewees in the two case-studies is the durability of the PP. This is particularly the case in which the PP has been implemented in the context of a specific project. In that case, when the project has reached an end then it is most likely that the PP will also end (see Castillo, 2008, Mena, 2008, and Poats, 2008). It has been also argued that *PPs do not facilitate implementing WRM-strategies automatically* first because PPs require more time and effort, but also because, if consensus were not reached then the PP might end up with an irrational outcome undermining the original WRM aim. Also, PPs could leave important aspects for WRM out of the agenda. In the same way, *PPs do not trigger better WRM practices automatically*. Changes in practices take time. Ensuring better WRM practices is a non-proved expectation attained to PPs. However it is expected that in absence of PPs simply there is not even a chance to shift bad practices regarding WRM (see Campaña, 2007, Maldonado, 2008, Poats, 2008, Ponce, 2008, and Robles, 2008).

5.2 Summary of Findings from the Comparative Analysis on “Stakeholders” (Ground 2)

Interviews in ground 2 are based on a slightly different questionnaire (see section 3.4) focusing on two of the research’s questions of this research: (1) relationship between SD and PPs applied to WRM strategies; and (2) lessons learned.

- Characterization of the relationship SD - PPs applied to WRM

The traditional technocratic view of SD: Interviewees from LGs (including municipalities, MAE and MAGAP regional offices) presented in general terms a rather traditional technocratic view regarding WRM and SD. Regarding WRM and NRM municipal work has focused on: the *sewage systems*, *solid waste management* and *NR management* (see Salas, and Cabascango, 2008). In three of the five municipalities involved in the two case studies, the environment is a topic managed by units handling other activities not necessarily related to the environment or WRM (see Cabascango, 2008, Garrido, 2008, and Márquez, 2008). Regarding SD and the solution of WRM problems the view of these LGs can be summarized in three points: (1) building infrastructure (e.g. irrigation channels, storage tanks, and reservoirs); (2) technical assistance (e.g. training about irrigation techniques), technological transfer (e.g. sprinkle irrigation systems, high productive seeds, genetic enhancement), and government assistance programs oriented towards strengthening productive systems; and (3) regulating polluting activities in the short term but promoting clean technologies use in the long term (see, Márquez, 2008, Mora, 2008, and Enríquez, 2008).

Instrumental motivations around SD: It is also possible to find *instrumental motivations* to preserve the environment and WR. For instance, it was suggested by some of the interviewees to *put a monetary value on water* as a measure to induce people to take care of it, under the understanding that if people recognized the relevance of water as an input for production then they will be more conscious about the need to take care of it (Márquez, 2008). Also, by *creating micro-entrepreneurships* some activities relevant for WRM have started to take place. The example of San Rafael Parish in Mojanda area shows that micro-entrepreneurships has been created for the administration of the potable water provisioning system, and for the administration of the households' sewage treatment plant (see Sánchez, 2008). In the same way, under the motivation to develop *tourism activities*¹⁹ it has been argued that local people have found the need to preserve the environment focusing in the *natural beauty* of the landscape (Sánchez, 2008). In this sense, a problem which has been mentioned besides environmental degradation for the case of Mojanda is *cultural degradation*²⁰ as a threat for the environment (Sánchez, 2008) and possibly for PPs as well (see section 6).

WRM, SD and Agriculture: An important difference in attention to WRM and SD between the two case studies is the main economic activity of the population. In El Angel watershed (case 1) agriculture is the economic activity in which the economy of the family is based upon, whereas in Mojanda (case 2) agriculture is not that important. This situation implies different needs regarding irrigation. In El Angel watershed “potatoes have

¹⁹ Tourism activities have been considered a priority within the context of a Local Development Plan where other priorities are: education, health and high self-esteem (Sánchez, 2008).

²⁰ Cultural degradation is understood as a loss in the traditional way of living, particularly attained to indigenous communities.

been the most important agricultural product in terms of profitability, but it has been recently replaced by milk production” (Mora, 2008). In Mojanda, “traditionally agriculture has been also an important activity, and it is still relevant for food security at the household level” (Sánchez, 2008). But, after the establishment of some agro-industrial farms producing flowers, most of the economically active population is either currently employed at those farms, or providing services (food, transportation, etc.) for the same farms. Therefore, the economy of the families is now based on selling labor²¹ (Cabascango, 2008). In addition, people in some areas in Mojanda have an ancestral tradition of craft-making (rush mats, crafts and recently some pieces of furniture) from an aquatic plant²², and they have been also well known as merchants (see Sánchez, 2008).

- Lessons learned by the implementation of PPs for WRM

Positive aspects brought by the implementation of PPs: In El Angel watershed *education* has been identified as a positive outcome of the PPs. In this case, education is referred not only to learn about *water dynamics* and NRM (Ordoñez, 2008) but also learning to *share responsibilities* (Borja, 2008) and *changing attitudes* towards a WRM problem and the environment (Ordoñez, 2008). In addition to that, it has been acknowledge that *CMPs* have become an important *tool to link* a WRM problem with the vision of a solution, and at the same time, to involve local stakeholders for taking action towards that solution. It was argued that *CMPs* have acted in two ways; first they have linked the external view of a solution about WRM problems (brought to the region by the proponent [RR]) with the local reality of the community. And second, they also have linked the work of the environmental authority with the reality of the local communities which before had an antagonistic attitude towards the environmental authority (see Ordoñez, 2008, and Molina, 2008). Another important aspect of the PPs was the establishment of the so called “*agreement tables*”, which is a negotiation space created to deal with WRM issues at a broader scale (at the watershed level) comparing with the *CMPs*. Something interesting about those tables is that “all stakeholders were invited and all of them had *equal rights and conditions to participate*” (Loyo, 2008). For case study 2 (Mojanda), none of the interviewees evaluated outcomes from the PPs because it is too early as to have outcomes from the PPs being implemented by EcoCiencia’s PPA.

Relevant aspects to consider: Four aspects were common for the two case studies. (1) It is relevant to have *good organizational structures* for facilitating the implementation of PPs. It is easier to work with groups which are associated and have a good organizational structure (see Mora, 2008, and Sánchez 2008). This facilitates authorities and PPs’ proponents to work with them as well as to optimize resources; this helps auditing too (Mora, 2008). Also in attention to the cultural differences when working with indigenous communities (as in the

²¹ Due to the relatively close distance to the capital city, selling labor also includes other activities in Quito City (constructions for instance) besides the activities related to the flower plantations.

²² This aquatic plant, named totora is a bulrush *Schoenoplectus californicus* (Dumont, et al., 1998:410)

case of Mojanda), using the *pre-established organizational structures* could be the best strategy to reach community members by contacting and working with the leadership first (see Sánchez, 2008). (2) It has been also argued that indigenous people have strong organizational structures. Indigenous people presumably have an ancient communitarian organization embedded in their culture. Besides the smallest organizational unit at the community level, indigenous people have federations gathering various SGOs (see Cabascango, 2008, Salas, 2008, and Rios, 2008). (3) It is relevant to *identify key stakeholders to start working with*. It has been argued that working with schools first has been fundamental to approach farmers later on. In this sense, it has also been recognized that children & women are key stakeholder (see García, 2008). In other cases, particularly when working with indigenous communities, using local leaders to break down cultural barriers is critical (see Cabascango, 2008). Moreover, it was argued that it is relevant to identify leaders who have been part of prior environmental awareness processes to start working with (Sánchez, 2008). (4) Policy and Estate programs are relevant for attending WRM problems. In the same way, there is a potential for *policy-making* at the LGs level. That could facilitate continuity to the work initiated by the PPs provoked by a third party like a NGO.

About the challenges: From the reflection about the difficulties some challenges have been identified. Common threats are: *individualism*; *people's inertia*; and *paternalism*. (1) *Individualism* has been referred as a social problem in El Angel watershed. Stakeholders look after they self-interest only, which compromises the possibilities to reach agreements in the context of a PP (see Borja, 2008, García, 2008, Loyo, 2008 and Ordoñez, 2008). Individualism seems to be common all over El Angel watershed, whereas in Mojanda is presumably more frequent in urban areas than in rural areas (see Cevallos, 2008). (2) *People's inertia* can also be described as a very *weak proactive attitude* in people, which takes place not only at the common citizen level but also at the level of governmental bodies (see Borja, 2008, Mora, 2008, Molina, 2008, and Márquez, 2008). (3) The previous could be related with the notion that *local stakeholders might be used to paternalistic patterns*. At least two aspects of those patterns have been identified. One refers to the fact that local stakeholders are used to wait for assistance programs in which they are benefitted but do not have to pay anything back (see Molina, 2008, and Ordoñez, 2008). The other makes reference to the traditional manner in which the Estate has “assisted” local communities, for instance by building irrigation infrastructure with Estate funds, but local stakeholders have not been asked to contribute in any manner (see Molina, 2008, Mora, 2008, and Ordoñez, 2008) with the development of such projects - situation which has changed lately. Those factors might have contributed to get a passive attitude in local people who do not have much capacity to promote their own projects.

Finally, there is another difficulty which deserves attention. By implementing PPs it was argued that it is necessary to look for outcomes beyond education (Ordoñez, 2008). There is a need to provide *productive alternatives* to local people. This applies particularly to those cases where local people might be threatening the

stability of an ecosystem relevant for hydrological regulation (as páramo) by changing the natural vegetation cover into crop fields (see Ordoñez, 2008, Molina, 2008, and Márquez, 2008). But it also applies for people who have abandoned agriculture presumably because of lack of water for irrigation (see Cabascango, 2008).

5.3 Summary of Findings from the Analysis on the View of “National Actors” (Ground 3)

The characterization of WRM problems according to the vision of interviewees in ground 3 is not different from what has been mentioned by interviewees in grounds 1 and 2. However, other problems not mentioned earlier or those presented with a different focus are summarized in Appendix 8.

- Characterization of the relevance of PPs for WRM

Increasing WRM feasibility: It has been argued that the implementation of PPs offers better conditions for the effective *applicability of a WRM solution*. Only solutions and proposals which have been defined in consensus through a PP are those which have possibilities for success. After formalization of problems and solutions for WRM, by all stakeholders as a group, then it is easier for them to work in the same direction (Eguiguren, 2008). It has been also argued that PPs help to ensure *stakeholders’ engagement* along the execution of actions. PPs provide local stakeholders the possibility to influence WRM. For that purpose, the PP should ensure that all stakeholders are well informed and capable to take decisions. It should also ensure that the *relative power* of each of stakeholder is *balanced*. (See Manosalvas, 2008 and Falconí, 2008)

Mobilizing Civil Society: In essence, *PPs have the potential to mobilize civil society* towards a better WRM. In this case, it has been suggested that it is important to acknowledge a gradient in the implementation of PPs. “First, a PP is informative, later it should balance power forces, thus ensuring equal conditions to negotiate, and then it prompts sharing responsibility over the management of WR” (Manosalvas, 2008). Based on the previous argument, and assuming that there is correlation between implementing WRM solutions and policy-making then it was further argued that *PPs could stimulate legislation compliance*. This idea is based on the notion that “if stakeholders had participated in the entire process of discussion, debate, awareness building (where stakeholders know their role in the normative framework as well as in management schemes) then there are better conditions for complying legislation and following agreements” (Arroyo, 2008).

The integrative role of PPs: PPs also play an integrative role. At one hand, it has been argued that PPs are expected to link *research* with *action* towards the solutions of WRM problems. “PPs envision *aligning accepted solutions with scientific knowledge* in an environment where scientific research has lost reputation on local stakeholders because it has not been very effective at solving specific problems, regardless the considerable amount of research done” (De Bièvre, 2007). On the other hand, it has been argued that PPs have been designed to *integrate various visions* from different stakeholders for WRM solutions, not only at the level of public

policy-making (see Arroyo, 2008), but also as an strategy to find meeting points among those views (see Arends, 2008), which is a necessary condition for the implementation of PPs (see Arends, 2008, Arroyo, 2008, Manosalvas, 2008, and Onofa, 2008). Besides those integrative effects, other important contributions resulting of the inclusion of non-traditional stakeholders for WRM through PPs include introducing the idea of “looking at stakeholders at the watershed scale” (De Bièvre, 2007).

Strengthening local skills: Finally, regardless how effective PPs have been for WRM, there are other contributions of such processes. Some of those contributions are the side effects of participation. Participation is not the ultimate tool, but it brings together education and strengthening local skills; and that allow better decision making possibilities for the use, access and benefits of WR (Manosalvas, 2008).

- Characterization of the relationship SD - PPs applied to WRM

Narrowing down SD's concept: In the interviews several suggestions to *narrow down the concept of SD* for the conditions of Ecuador were brought forward. These included taking into account cultural diversity, and balancing the relationship between protecting the environment and enhancing quality of life. According to the interviews, *cultural diversity* refers not only to ethnical differences but also the broad range in diversity of opinions, views, etc. among Ecuadorian people (see Manosalvas, 2008). Whereas, the challenge to find the *balance between protecting the environment and enhancing quality of life* lies on the urgency to provide environmentally friendly productive alternatives for the poor. The previous particularly applies for those populations who base their economy on extractive activities or who threaten ecosystems stability because of the economic activity they develop (see Arends, 2008).

WRM and SD in Ecuador: It was argued that the problems around WR are already affecting the development of the country. The interviewees suggested that one of the drivers which originate problems is *social inequity*. For instance, social inequity has determined also inequity in decision-making around the distribution of water, where some are favored and others are not (see Manosalvas, 2008). Another reason that was brought forward is that in Ecuador at all levels WR have been taken for granted which, in turn, has resulted in negligence of its value (see Manosalvas, 2008). It was argued that water is a strategic resource not only because of covering a fundamental human need but also because it is a relevant input for agricultural systems. Those systems are fundamental for the economy of many families in rural areas, and also for food security in general (see Arends, 2008, and Arroyo, 2008).

Unfortunately, water problems in Ecuador today (like scarcity levels and inequity in distribution) are already causing problems and worsening poverty levels, production capacity, and food security. Those problems are also “*compromising the capacity to reach the MDGs*, particularly in regards to overcoming chronic poverty,

women equity, decreasing child and maternal mortality, and ... environmental sustainability” (Falconí, 2008). In addition, it was argued that “sustainability has not been considered in [national policy-making and] planning for WRM because ecological considerations have not been foreseen, e.g. in attention to the páramo ecosystem. Even though the institutionalism around water is a problem conspiring against sustainable WRM, other sectors (like energetic), which define policy affect water sustainability as well” (see Falconí, 2008).

- Lessons learned by the implementation of PPs for WRM

Positive aspects brought by the implementation of PPs: One of the positive lessons learned from PPs, which was mentioned by the interviewees in ground 3, is that participation contributes to *make the applicability of a WRM solution feasible*. From the donor perspective *participation is a requisite* for a project to be funded (see Eguiguren, 2008, and Manosalvas, 2008). From the executor perspective, the reasoning about why participation makes the application of a solution feasible has been done following the same arguments given by interviewees in grounds 1 and 2 (appropriation, local stakeholders engagement, etc.).

Relevant aspects to consider: Among the relevant aspects determining better possibilities for a successful implementation of PPs, *good organizational structures* among local stakeholders have been identified as a key. That notion is based on the fact that when there are such organizational structures it is possible to use the pre-established hierarchical structures to reach local stakeholders (see Manosalvas, 2008). That makes methodologically easier to start the PP. Other ways there is some work required to be done before initiating the PPs, which in turn demands more time and resources. In addition to the previous, *good leadership* was pointed out in the interviews as key for the successful implementation of a PP. Good leadership means “being able to set up rules and managing the mechanics of the participatory spaces, so then dialogue takes place instead of confrontation and intolerance” (Manosalvas, 2008).

Contributions of PPs to WRM: There are two other aspects in regards to the potential contributions of PPs for WRM. (1) The *connectivity between human activities and the environment* has been lost in people in general. It was argued that people can see such connectivity as long as there is a specific problem affecting them, around which they gather (see De Bièvre, 2007, and Manosalvas, 2008). PPs contribute to improve WRM by helping to re-establish that connectivity in people’s perception. (2) The *severity of the problem* is an important driver motivating people to take action. It was acknowledged that it is remarkable to see how people gather around a problem when feeling a crisis. Water is a very sensitive topic and offers a potential in this case because of its relevance (see Arends, 2008, Eguiguren, 2008, and Manosalvas, 2008). It was mentioned that PPs might facilitate the course of action towards the solutions for those *crises*.

About the methodology: From the methodological point of view, there is a number of relevant factors brought forward. It was argued to be crucial to start the process with a *clear definition of a problem*, and based on that problem, scale of work and stakeholders are defined. This could go against integrality because not all stakeholders in the watershed are included, but, it was recognized that if a central problem had not been defined, then it is not possible to work efficiently and efforts can be diluted by trying to attend all problems. It was also argued that the *definition of the problem* should be done in consensus with local stakeholders. All stakeholders involved with the problem should be part of the PP (De Bièvre, 2007). “A different phase of the process should articulate the work being done at different scales. Some of those actions might overlap spontaneously, but for others, it could be necessary to find the mechanisms for articulating them” (De Bièvre, 2007).

There are other three relevant aspects mentioned by the interviewees in relation to methodology. (1) *Solutions cannot be extrapolated*; solutions are not necessarily good for all places and the manner how PPs are implemented cannot be extrapolated from one place to another. (2) *Multidisciplinary teams need to have strong individualities*; a multidisciplinary team will work fine as long as each member is strong in her/his topic. The same applies for local stakeholders; they should be clear about what they “want”. In addition, good facilitation provides possibilities for success (see De Viebre, 2008). (3) It is *relevant to acquire an adequate dialogue among different types of knowledge*. “Scientific knowledge has not been capable to adequately transfer its results for the solution of problems. Consequently, certain sectors have qualified that knowledge as useless. In this sense, there is the danger of taking *perceptions* as *realities* in the contexts of PPs”. (See De Bièvre, 2007)

It was also argued that it is crucial to evaluate if it is *worth or efficient to use a PP* in certain area. Two factors are particularly important to take into account: (1) Exploring if there was any *experience about manipulative processes* in the past, and (2) analyzing if there was any *common interest* among stakeholders. In the first case, stakeholders could have experienced PPs in which they have received any economic compensation to either participate or to make an opinion (see Manosalvas, 2008). In that case, the real willingness of stakeholders to solve a WRM problem through a PP could be compromised. Consequently, the previous could determine a failed PP. In the second case, a common interest among stakeholders is one of the most important factors which could make that stakeholders sit together to find solutions to their WRM problems (see Arends, 2008, Manosalvas 2007, and Onofa, 2008). If there was no such interest then it might better not even to start a PP.

About the challenges: Four challenges were brought forward as determinants for the implementation of PPs. (1) *Individualism*. This is a direct threat towards defining a *common interest*, which is a challenge if self-interest is not left aside (see Arroyo, 2008 and Manosalvas, 2008). (2) *Scientific knowledge gap* e.g. in Hydrology. From the technical point of view “the gap of knowledge about the hydrological processes in mountain ecosystems is an obstacle because there is no certainty about selecting measures” (De Viebre, 2007). (3) The

environment is not a priority for some stakeholders. Even though water has the potential to mobilize people, it results very difficult to talk about NR particularly in poor communities which do not even have their basic needs covered (see Eguiguren, 2008 and Manosalvas, 2008). This is a challenge as long as for addressing WRM problems it is required to work on other topics related to NR. To keep the motivation of stakeholders up in such circumstances is difficult. (4) *PPs are time consuming.* This is particularly related to the fact that PPs require consensuses among very different opinions and views. Reaching such consensuses takes time which is a challenge because that is directly translated into more resources, energy, and difficulties to keep people's motivation up (see, Arends, 2008, Arroyo, 2008, Eguiguren, 2008, and Manosalvas, 2008).

6. Discussion

This section and the following (conclusions) seek to answer the research questions defined for this study. The information has been organized so it attends each research question. Section 6 presents the results of integrating all the information gathered for this study and some reflections about what has been learned in the course of the study. Section 7 presents a summary which is expected to answer in short to the research questions. As stated in the objectives of this study, it has been expected to generate ideas based on the analysis of *community and participatory* empirical examples, so that, those ideas help understanding how WRM and sustainable WRM could be benefited. It was also expected to analyze what can be done at the community level (or any other level) where effective management can take place beyond /or in addition to other traditional institutional governance structures and to identify challenges and opportunities these type of participatory WRM initiatives have.

6.1 Characterization of the Relevance of PPs for WRM

Based on the results from the analysis of primary data the relevance of PPs applied for the implementation of WRM strategies can be portrayed in three different ways.

(1) ***Participation, an instrumental tool.*** Participation is an *instrumental tool* for an *effective application of a WRM solution*. The instrumental motivation to apply a PP comes from the assumption that *engaging local stakeholders* from the definition of the problems all the way to the application, monitoring, and evaluation of the solution, increases the chances for that solution to reach the aims for what it was designed. Some conditions are necessary so the previous can happen. Rising *awareness* is fundamental as well as promoting *reflection* processes. *Reflection* is expected to motivate people to be proactive and to take action.

But, how come that *engaging local stakeholders* who have *reflected* about the problems and the solutions in relation to WRM is an instrumental tool for the success application of WRM strategies? From the interviews it seems that the assumption is that local stakeholders have to take action towards better WRM because they might

be involved with the causes of WRM problems. If that is the case then the above mentioned process is valid because better WRM practices include changing practices on local stakeholders. In this sense, the traditional top-down approaches have shown to be not effective for that purpose, whereas bottom-up approaches have demonstrated to offer better possibilities for the successful implementation of WRM strategies.

Unfortunately, it has not been proved by the interviews that PPs really ensure a shift from “bad” WRM practices to something better; it is just suggested to be so. Therefore, it cannot be concluded that PPs lead towards a better WRM as an instrument for changing practices in people. As said earlier, they can only offer more possibilities to succeed in that respect. However, the “side effects” of participation might contribute towards a better WRM practice. This last point provides the connection to the second way of looking at the relevance of PPs.

(2) ***PPs as drivers of social mobilization.*** *PPs have the potential to mobilize society towards better WRM practice.* As long as PPs ensure (besides education, and reflection) the *balancing of power forces, equal conditions to negotiate*, and installing *co-responsibility sense* then civil society mobilization might come along. In this case, the assumption is that the solution of WRM problems is not only in engaging local stakeholders in the design and implementation of WRM strategies, so then those stakeholders change practices. It also implies that the causes of the WRM problems are a reflection of social dynamics in which some local stakeholders have no voice and power in decision making. The relevance of PPs in this sense lies on *promoting more informed and democratic decision-making* processes around WR. The extent to which PPs have accomplished such mobilization in the studied cases, or in society as a whole, is difficult to tell, because it depends on how far the above mentioned conditions have been accomplished; it is a question of degree. Nevertheless, the results from this research show that the application of PPs certainly provides opportunities to move in that direction.

In this respect, it is worth noting that a positive contribution of PPs is that it creates a platform to democratize decision making. From the secondary data for characterizing the local settings in the case-study areas as well as from the interviews it came clear that there is a lack of access to decision making. Furthermore, among the different propositions to characterize *poverty*, one of them uses non-material deprivations, including aspects like: “lack of participation in decision-making and powerlessness” (Alastair, et al., 2007:16). Some of those poverty features have been mentioned as being reflected in WRM in the interviews. In this sense, PPs offer the opportunity to counteract the lack of participation in decision making and powerlessness. But again, that depends on the extent to which the PP can ensure equal conditions for decision making. In this respect, critical factors brought forward in the interviews are *balancing power forces* for decision making and promoting a *common vision* among stakeholders respect of the management of WR. Attained to this point about democratizing decision making some critiques on participation have been made by scholars (see section 2.3).

(3) **Participation, an integrative tool.** Finally, another way to look at the relevance of PP from the analysis of the interviews is by acknowledging the *integrative role* they play for the implementation of WRM strategies. This includes not only integrating the *visions* and *interests* that various stakeholders have respect to WR. It also includes integrating *research* with *action*. Integrating *visions* and *interests* is not an easy task, particularly considering that the use of WR could motivate sharp polarized positions among stakeholders. It has been suggested that unless the PP finds a *common interest* among those stakeholders and unless *self-interest* is put aside then integrating visions and interest would be rather very difficult to accomplish. On the other hand, integrating *research* and *action* seems more feasible. In this case, engaging stakeholders in the research process for characterizing the WR problems is fundamental according to interviewees. If local stakeholders can see the dimension of the problem and understand the logic of the WRM measures then they could be more motivated to take action. It is important to note that the previous applies for situations in which the WR problems are not that severe as for motivating stakeholders to take action towards the solution of a problem which is not really visible for them. Thus, the “research process”, which could be handled by a third party, might facilitate for local stakeholders a comprehensive understanding of the dynamics by which WR are available to them, as well as the dynamics by which the same resource might become unavailable. It has been argued that understanding water dynamics as a system could facilitate local stakeholders to see themselves as part of such system and also to acknowledge the need to create alliances and agreements in order to reach consensus and win-win solutions.

Reconciling Participation with “citizen participation” for WRM: According to the previous description of the relevance of PPs applied for the application of WRM strategies, it can be concluded that those PPs fit better with this view of “citizen participation” (see section 2.3). This is based on the notion that PPs applied for WRM has been promoting spaces in which local stakeholders could influence decision making regarding the access to a resource which has strong impact on their development. However, it is important to bear in mind that, regardless the mobilizing power of WR, some actions expected to enhance WRM are related to the management of ecosystems and other environmental considerations which are not viewed as important for many local stakeholders (particularly those with uncovered basic needs). Therefore, PPs for WRM could be taken as instrumental means to reach an end (better WRM practices), because those environmental considerations have to be positioned on decision making spaces. Finally, some questions remain open. Who should be leading the execution of PP? Is it the LGs? Is it the NGOs? Is it some governance body with jurisdiction over a unit more accurate for WRM e.g. the watershed? Is it the local stakeholders themselves? How feasible is to balance power forces for decision making around WR?

6.2 Aligning Sustainable Development, Water Resource Management, and Participation

Social Sustainability: Within the theoretical considerations of this research (section 2) it has been mentioned that *social sustainability* includes *equitable sharing* of the benefits and burdens of resource use. This study has shown that in the two case study sites there is not such equitable sharing of benefits and burdens of WR use. Instead, the lack of access to decision making around WR has determined inequitable distribution of the resource. In the same way, the general tendency has been to use, not only WR but NR in general, in an “immediate” manner to satisfy “immediate” needs. In turn, that has triggered a lack of preoccupation about the burdens of WR use. In this sense, by promoting co-responsibility, PPs have installed consciousness about the existence of a “burden” for resource use among water users. However, it is not clear to what extent the installation of such “preoccupation” about sharing the burden of water use is sufficient enough as to ensure a sustainable WRM practice. Equitable sharing of the benefits of WR use is difficult to accomplish. Sharing those benefits could be reflected on the willingness to share burdens. If the share of benefits was inequitable then there is no reason to believe that it is feasible to have willingness to share burdens. By ensuring equality of conditions to negotiate in decision making processes, PPs could promote equitable sharing of benefits and burdens. However, as a result of this study it became clear that self-interest is the major threat in this respect, arguably more common in non-indigenous populations.

Economic Sustainability: According to section 2 of this study, sustainable *economic development* means economic growth, employment and better living standards for all. The relationship between WR and SD seems to be evident for stakeholders in general in relation to this particular point of sustainability (economic growth and better living standards). WR has been broadly understood as critical for sustainability not only as a resource to cover a basic need but also as an input of economic activities. Regardless the orientation of PPs (whether it is for the development of a region or for the conservation of ecosystems), *poverty* determines the bottom line respect of the economic pillar of sustainability. Thus, the urgency to *provide economic alternatives* for local people as a measure to counteract poverty and also, as a measure to reduce the pressure over the stability of ecosystems which offer critical services for the stability of WR, becomes evident. Therefore, PPs could be a catalyst for the implementation of measures to move in that direction.

Environmental Sustainability: Finally, the *environmental component* of sustainability requires that NR and energy are not utilized faster than the Earth can replenish them, and that waste and pollution are not produced faster than the earth can accommodate them (see section 2). The orientation of the PPs being implemented in case study 2 could fit with the first requirement of environmental sustainability. Though, the concept could be expanded. Besides the already included notion of *utilizing NR not faster than the Earth can replenish them*, the concept should also include the need of *preserving the mechanisms by which those resources are replenished*. In

case study 2 the conservation of the ecological functions of the páramo ecosystem has been the focus of attention (and also a very important part of case study 1). Those functions are critical to “replenish” WR and to facilitate its access. Of particular interest are the hydrophilic capabilities of páramo soil to retain water, given the relative high organic matter content (due to low decomposition rates because of low temperatures). Páramo soil together with its natural vegetation have the capacity to collect water from condensed fog, rainfall, and glaciers - in some cases, and then distribute it towards the lower lands (see Mena, 2008, see also Buytaert et al., 2006, Buytaert et al., 2007, and Poulenard et al., 2001). In order to ensure that this function remains, soil and vegetation of the páramo ecosystem have to be preserved in its natural conditions. Thus, the ability to use a NR like water is directly dependent on the preservation of páramo ecosystems and its functions in the two case studies.

Narrowing down the concept of SD: The previous point supports the notion that it is reasonable to narrow down the concept of sustainability attending to specific *problems*, or *resources*. Agenda 21 (see section 2) on its definition of SD regarding WR clearly states the need to ensure that water supplies are maintained while preserving the hydrological, biological, and chemical functions of ecosystems. That has become clear regarding WRM in the two cases studied in this research. In addition, Agenda 21 has called also attention to the need of adapting human activities within the capacity limits of nature. This is clearly a point that is very difficult to address in cases like the ones studied in this research. Adapting human activities to the capacity of nature becomes strongly connected to economic sustainability; in particular regarding the need to provide economic alternatives for those populations basing their economy in activities which threaten the stability of ecosystems.

Full public participation? Agenda 21 has also pointed out the need to include local populations in WRM in two ways. One is related to the link WR and rural development, and the other is through the concept of IWRM. In the first case it has been simply stated that *local communities must participate* in all phases of WRM, whereas in the second case it has been stated that IWRM strategies should be defined based on a *full public participation* approach for WRM policy-making and decision making. It has been demonstrated that “participating in all phases” and “full public participation for policy-making” are very difficult to accomplish because of a number of barriers (see sections 6.1 and 6.3), notably lack of access to decision-making processes, inequitable power forces, reaching consensuses among antagonistic interests, and lack of knowledge.

What can be expected from participation towards SD?: A skeptical view about PPs has called attention over a number of facts in relation to sustainability. “First, in order to contribute towards sustainability, certain level of *consciousness* should be in place. It should be achieved from reflecting on the fact that *current needs* cannot surpass the *future availability* of those resources. There are doubts about to what extent PPs can offer a guarantee about ensuring the establishment of such *consciousness*. Communities, as well as any other stakeholder, would look after their self-interest. Moreover, the *satisfaction of immediate needs* [as those of the

poor] *is not necessarily overcome by participation*. In addition to that, *adequate information* should be available for all stakeholders participating in a PP. Also *equitable power* should be accomplished for negotiations and decision making in the participatory space” (see Falconí, 2008). If those conditions are not fulfilled by the PP, or any other process, there is little room to move towards sustainability.

6.3 Contextualizing Lessons Learned

Drivers to bring about the change: Both, the literature used in section 2 as well as the findings of this research coincide on various points in regards to what is expected from PPs. They include: empowering local people by giving local stakeholders a role in the solutions to their own problems, democratizing decision making, balancing power forces, strengthening local skills, and balancing different interests. All the previous points are expected to trigger mechanisms able to solve WR problems. However, two findings could challenge that assumption. First, it has repeatedly been mentioned that *feeling a crisis* or the *severity of the problem* could be the most important drivers making people to take action. In that case, the previous considerations are valid indeed, but it is important to note that the real motivation to proactively participate in the process towards the solution of a problem could be the severity of the problem. And secondly, it has also been repeatedly argued, particularly from ground 2, the urgency to *provide economic alternatives* for local people as a way of solving some of the WRM problems. Again, it could be argued that economic incentives are another driver which can motivate people to be proactive. In any of those two cases PPs are still a valid mechanism to organize and synchronize efforts among stakeholders. This means that PPs are not the ultimate tool for the solution of problems, but they contribute by facilitating some mechanism by which those solutions could be applied.

Bringing back the general problem being studied on this research: the *unsustainable use* of NR for the *satisfaction of human needs*, the example of WRM has been able to demonstrate that the initial set of sustainability challenges (lack of infrastructure, socio-economic issues, lack of understanding on the water cycle, and short-term vision for the WR use) apply to the cases being studied in this research. What has not been demonstrated consistently is to what extent PPs offer a clear possibility to deal with those issues. It has not been consistently demonstrated because it seems like PPs could successfully address those issues in some cases but not in others. Therefore, it seems like it is more fruitful to look at the factors which determine success or failure in the application of PPs.

Important factors to consider for an adequate application of PPs: Two aspects which emerge from the case studies are (1) the importance of *strong organizational structures* and (2) *provoking reflection*. The first point, which is also mentioned on the literature (see Alastair, et al., 2007:239) could be taken as an instrumental factor which has a direct effect on methodologically facilitating the application of a PP. The cases in which a PP is being applied in a site where strong organizational structures are common among the local population can move

faster towards the aim of the PP. The cases in which such organizational structures are weak (or do not exist at all) slow down the PP. Furthermore, the lack of such organizational structures can determine a definite failure on accomplishing the objectives of the PP, simply because if local stakeholder did not have a culture of “meetings” then there is no reason to believe that a PP could motivate them to sit together and make agreements about WR use. These two factors are relevant because they are connected to another notion which has been consistently mentioned as key: *finding common interests* in order to acquire a *common vision*. The last point is also fundamental for moving towards sustainability in general. It has been suggested that *indigenous people* holds stronger organizational structures than *mestizos*. However, this point remains open, because on the other hand, it has been mentioned that there is deterioration of the culture and traditions among indigenous people. It remains open if that implies also a loss in their presumably good organizational structures which would undermine the possibility to facilitate the implementation of PPs. Respect to the *mestizo* group it has been mentioned that individualism and self-interest are a trend. This is an obstacle not only for strengthening organizational structures but more importantly to acquire a *common vision*.

About the methodology: Another point which deserves attention is the methodology used for the application of PPs. Two aspects which do not fit, at first glance, with the notions brought by the theoretical considerations (section 2) are: the use of the *analysis unit*, and the *stakeholders* who should participate on the PP. Regarding the analysis unit, even though the literature review done for this research does not specify any particular unit to work, it suggests to take a holistic approach at the level of the *watershed*. In practice however, it has been suggested that it is more efficient if the work was organized attending to *specific problems* regardless integrality issues at the watershed level. Nevertheless, it has been also suggested to bear in mind the watershed as a broader unit, so in further steps those local initiatives attending local problems could connect each other in a fashion so integrality at the watershed level could be accomplished. In the same way, it has been argued in the literature that “all”/“a broad set” of stakeholders in the watershed should be part of the PP. Indeed, from the theoretical point of view, the previous seems appropriate in order to acquire connectivity and integrality along the entire watershed. In practice however, it has been argued that the definition of stakeholders who should participate is dependent on the specific problem being addressed. Nevertheless, it seems reasonable to suggest that, at some point, a space where the interests and visions of stakeholder in the entire watershed, or at least sub-watershed or micro-watershed are integrated should be promoted.

About the challenges: The literature suggests two challenges for the application of PPs which have been evident in the two cases studied. (1) The *cooperation of bureaucracy* is essential, especially the support of powerful advocates from the upper levels. “All too often people in poorer countries see their governments and bureaucratic representatives as distant, disinterested and corrupt” (Alastair, et al., 2007:239). But, besides those

problems in the relationship between governmental authorities and common citizens, another critical point in relation with governability is *to accomplish integrality in policy-making* at the watershed level. Governmental structures at the local level (as LGs) have the capacity to develop policy which could embrace the good initiatives brought by PPs for WRM. But, the problem comes when there is more than one LG within the watershed and they have different views respect of WRM. An alternative approach suggests creating governance bodies with jurisdiction at the watershed level. But, it should be considered if such alternative is not going to complicate even more the already difficult environment to align policy making in a geographical unit in which there are already various policy-making entities involved. (2) Another difficulty mentioned in the literature is “*lethargy, exhaustion or disillusionment* which also affects attitudes and energies for participation” (Alastair, et al., 2007:239). This difficulty could take place for various reasons. One, which has been evident in this research, is the embedded difficulties of PPs due to the necessity of reaching consensus, especially when negotiating diverse [and often opposite] interests as suggested by Munk et al. (1999). Another reason is the time it usually takes to get outcomes from the PPs. In this respect, it has been suggested in this study that a great deal of responsibility to keep people motivated is on the PP’s leadership. It has been further argued that PPs could experience momentums in which there is a *charismatic leader* (a person or an organization) in whom the entire stability of a PP rests. In the absence of such a leader the entire PP could felt down. This point also brings an open question: who should bring the PP about? Is it an external actor as an NGO? Is it the LG? Is it civil society?

The relevance of the watershed as a work-unit. In regards of the working unit which should be used either for WRM, the application of PPs, and assessing sustainability, particular attention deserves the *watershed* because its connection with water. There is general consensus about using the watershed as the geographical unit for applying WRM strategies in the literature as well as in the case studies. In mountainous areas it might be easier for people to locate themselves respect to watersheds than for people in flat areas. The watershed provides the opportunity for people to understand how water dynamics work. By looking at “where water comes from” and “where it goes” people can start looking at the water dynamics as a system. They can also identify the elements which affect water quality or quantity on that system. However, thinking on assessing sustainability, the watershed should be considered as one layer of information in which some biophysical dynamics could be included. But there are also other layers of information required for assessing sustainability. For instance, the social aspect is a different layer of information because social dynamics regularly do not follow the logic of watersheds. Social complexity goes beyond the watershed. The watershed is a natural unit related to water. Social and other environmental aspects (like biodiversity) cannot be integrated within that unit. Also, the *watershed does not integrate all visions about the territory*, as those related to historic and cultural contexts.

The relevance of the ecosystem as a work unit: Finally, it has been argued that some ecosystems could hold a direct relation with water availability. It could be appropriated then thinking also on using the eco-systemic approach (as suggested in section 2). In this sense, WRM, PPs and to some extent sustainability assessments could be carried out in attention to ecosystems as analysis units. Nevertheless, it has been stated that both: the *watershed* and *eco-systemic approaches are equally relevant*. What is important for WRM is acknowledging that the hydrological processes of regulation are different depending on ecosystems. There are various different zones of hydrologic response within the same watershed (De Bièvre, 2007) which to a great extent depend on certain characteristics of ecosystems.

7. Conclusions

The relevance of PPs: PPs are relevant for a more effective application of WRM strategies. However, the relationship is not automatic. The application of PPs for the implementation of WRM strategies does not ensure that those WRM strategies will be effective. It only offers more possibilities to be effective. However, PPs include a number of activities which contribute towards a better WRM practice, notably education, awareness rising through reflection, and local stakeholders skills strengthening. Major expectations from PPs include democratizing decision-making, creating a common vision for the management of WR, and installing the sense of co-responsibility among stakeholders. Balancing power forces for decision making, eradicating self-interest, and counteracting weak proactive attitude might be the most significant obstacles.

The contributions towards sustainable WRM: In order to make PPs to contribute towards sustainable WRM the previous major obstacles should be overcome. From the social perspective, sustainable WRM includes equitable shares of benefits and burdens from the use of WR. In order to accomplish equitable sharing of the resource it is expected that also equitable decision-making around WR should take place. Unless power forces are balanced for such decision making, and unless self-interest does not guide decision-making then equitable sharing of benefits and burdens is not possible. From the economic point of view, growth, employment and better living standards should be accomplished. Poverty determines an attitude for seeking the immediate satisfaction of needs. If a population had few possibilities to grow economically (and thus enhance living conditions), and if those possibilities are related to overexploiting a resource or developing an activity by which relevant ecosystems are threatened then economic growth might be undermining environmental sustainability. If PPs were capable of installing a sense of co-responsibility among stakeholders about the use of WR and maintaining the system by which WR are available then economic sustainability might find possibilities to be achieved by the provision of economic alternatives for people who threaten the environmental sustainability.

Lessons learned: Among the lessons learned, one that is relevant for inequitable societies is that PPs offer a great opportunity to reduce the gap in the range of those inequalities. Without PPs those people lacking access to decision making would remain in that situation. Lack of access to decision making has been the common trend for many local stakeholders. On the other hand, giving local stakeholders the possibility to influence decision making offers new challenges for them. Making a decision leads to taking responsibility as well; and some stakeholders seem not to be prepared for that yet. It is expected that consciousness about the importance of WR as a finite resource (not because it will get exhausted but unavailable) as well as the need to take care about the system by which NR are available for human use will motivate people to proactively take action and start assuming those new roles. PPs offer the opportunity to facilitate those changes as well as to integrate various visions from stakeholders to reach better water governability.

The best opportunity that PPs have for becoming an approach which facilitates the transition towards sustainable WRM is the relevance of WR in itself. Water has the potential to get people's attention because of the relevance of the resource. Because of the same reason water can also create sharp antagonistic stakeholders. A clear and transparent flow of information by who facilitates participation is relevant in that respect. The major challenge is to overcome individualism in stakeholders. It has been suggested that recognizing a common interest among stakeholders is relevant on that respect because that will provide room for them to sit together and negotiate. Without that common interest even the best methodological approaches could fail to make the PP to become an adequate strategy to move towards sustainable WRM.

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Sánchez, Freddy, (2008), *President*, San Rafael Parish Council, Personal Interview, January 22nd 2008, San Rafael, Ecuador

Appendix 1: Full List of Interviewees

Name	Position	Organization	Case Study
Ground 1: Leading NGOs			
Tatiana Castillo	Office Administrator (Mira) / Project Manager	Randi Randi	Case-Study 1 (The Experience of Randi Randi in El Angel River Watershed)
Susan V. Poats	Executive Director spoats@interactive.net.ec		
María Isabel Ríos	Communitarian Conservation Project Technician		
Aldemar Néger	Technician		
Patricio Ponce	Worked in community outreach in MANRECUR project (Former RR)	Ibarra Municipality	
Jorge Campaña	PPA Coordinator for Ecuador	Ecociencia	Case-Study 2 (The Experience of EcoCiencia Foundation with Proyecto Páramo Andino)
Gabriela Maldonado	Technical Assistant / Project Manager		
Rossana Manosalvas	Executive Director rmanosalvas@ecociencia.org		
Patricio Mena V.	Information Consultant		
Marco Robles	Participatory Management Plans Responsible		
Ground 2: Stakeholders			
Juan Márquez	Community Development Responsible	El Angel Municipality	Case-Study 1 (The Experience of Randi Randi in El Angel River Watershed)
Carlos Molina	Regional Responsible for El Angel Reserve	El Angel Ecological Reserve (REA) / MAE	
Luis Ordoñez	La Libertad Community Reserve Community Ranger		
Euler Fuentalá	23 de Julio Association Reserve Community Ranger		
Wilson Enríquez	Environmental Quality Responsible for Carchi Province		
César Mora	El Angel Agricultural Center Director (Participated at Carchi Consortium as part of Bolivar Municipality)	Bolívar Municipality	
Arnulfo Borja	Water User	Mascarilla Community	
Marco Borja	Community Economic Development (Participated at Carchi Consortium as part of Mira Municipality)	Mira Municipality	
Johnny Garrido	Environmental Unit Coordinator		
Miriam García	Water User (Responsible of the San Isidro Water Council at MANRECUR time)	San Isidro Water Council	
José Rivadeneira	Executive Director Responsible for PPA Project at the Local Level in Mojanda	Brethen Unida Foundation	Case-Study 2
Ilario Morocho	President / Water User	La Esperanza Water	(The Experience of

		Council	EcoCiencia Foundation with Proyecto Páramo Andino)
Segundo Mecías Cevallos	President / Water User	González Suárez Water Council	
Marcelo Salas	Environmental Unit Director	Otavalo Municipality	
Patricio Cabascango	Environmental Unit Director	Pedro Moncayo Municipality	
Freddy Sánchez	President / Water User	San Rafael Parish Council	
Pedro Loyo	Expert (WA Director at MANRECUR project Time)	Water Agency Regional Office for Imbabura and Carchi Provinces (WA)	(Case-Study 1 and 2)
Ground 3: Relevant Actors on WRM at the National Level			
Aline Arroyo	Hydrological Resources Forum Responsible	System for Training on Renewable Natural Resources Management Consortium (CAMAREN)	CAMAREN
Bert De Bièvre	PPA Coordinator (Regional Level – Andean Countries)	Consortium for Sustainable Development of the Andean Eco-region (CONDESAN)	PPA
Francisco Arends	Communications Responsible	Programme to support the Decentralized Management of Natural Resources in the Three-Northern Provinces of Ecuador (PRODERENA)	PRODERENA
Ángel Onofa	El Angel Reserve Coordinator	Environment Ministry of Ecuador	MAE
Cecilia Falconí	UNDP Officer for SD in Ecuador	UNDP Ecuador	UNDP
María A. Eguiguren	Programme Asistant	UN-PPD Ecuador (Small Grants Programme)	UN-GEF-PPD

Appendix 2: Questionnaire A

FORM A

SUSTAINABLE DEVELOPMENT & WRM

- [Introductory questions] What is your role in the organization you work for? / What your organization does?
- How is your organization involved with work related to WRM?

-
- If sustainable development is understood as an approach for the management of resources that aims to “meet the needs of current generations without compromising the ability of future generations to meet their own needs”, then what is your opinion about that concept?
 - How do you understand SD if you are not satisfied with the previous definition? (If the concept should have to be redefined, how would you define SD?)
 - Do you see a relationship between WR and SD? If yes how does it look like?

-
- What is the role of [your organization] regarding SD in area/region/Ecuador?
 - Does [your organization] try to implement the concept SD in the projects it develops?

-
- Are there any specific problems concerning WRM in the area/s/region/s you are working in? If yes, what are the most urgent problems to be solved?
 - Are those problems affecting the SD/development of the area/region you are working on? If yes, how?
 - What is your explanation on the causes of those problems in the area/region you are working on?
 - What do you propose as solutions for those problems?

PARTICIPATORY PROCESSES & WRM

- What is your understanding of “a participatory process”?
- How important do you think the application of PP is in the execution of strategies for NR management? Why?
- Does it apply to WRM as well? Is WRM any different on that respect than the management of other NR?

-
- What specific activities/projects [your organization] executes in regards to WRM?
 - What are the problems [your organization] is seeking to find solutions for?

-
- Why has [your organization] not considered or implemented PP in the WRM projects it executes?
 - Why has [your organization] decided/is seeking to implement PP in the WRM projects it executes?
 - Who are the stakeholders in the PP your organization is involved with? What are their roles?
 - What is the role of [your organization] in the PP?
 - Are there up-stream – down-stream issues? Do PP help to solve those type of issues? How?

-
- In your opinion, how WRM is related to SD in Ecuador and in the project [your organization] is executing/has executed?
 - What do you think is the relevance of participation in the design, implementation, systematization, and evaluation/monitoring of the project [your organization] is executing/has executed?
 - Do you think participation is ensuring/has ensured better WRM practices in [your project's] areas?
 - Do you think incorporating participatory approaches in the project [your organization] is executing/has executed can contribute to sustainability?

-
- ◇ What is the geographical unit being used for the analysis?
 - In your opinion, can you tell if WRM strategies could be benefited if the geographical unit used for their design and implementation is the watershed?
 - Do you think that working at the watershed level could help people to understand better the interconnectivity between human activities and nature? Have you/your project experienced that?
 - Do you think the previous understanding could contribute to the management of NR? Has it contributed in some way to the WRM project you/[your organization] is working on?
 - Do you think that the watershed, considered as a work-unit, can be used to assess sustainability? (Yes/No) Explain

◇ PARTICIPATORY PROCESSES LESSONS LEARNED FOR SUSTAINABILITY

- What are the most important challenges of implementing PP for WRM?
- State advantages of using PPs for WRM
- State disadvantages of using PPs for WRM
- Does PP favor or impede the execution of the WRM projects [your organization] is implementing? How?
- What do you think are the factors which determine success or failure in the implementation of PP for WRM projects?
- Do those factors apply for most cases? Under what circumstances do you consider it adequate to initiate PP for WRM projects? Under what circumstances do you consider it less adequate to initiate PP for WRM projects?

OTHER ALTERNATIVES

Is there any other approach that you can suggest to execute WRM projects, other than PP, or in addition to it? Explain

Appendix 3: Questionnaire B

FORM B

SUSTAINABLE DEVELOPMENT & WRM

- [Introductory questions] Please, state your name and the organization you represent
- Do you know the project [MANRECUR-RR / PPA]? How and what do you know about it?

-
- What are the environmental problems in the [place you live]?
 - Do you have access to water? Describe
 - What do you/people [in this place] use the water for? Explain
 - Can you tell me what the economy of the people in [the place you live] is based on?
 - Do you know what SD is? Do you like that concept? Why?
 - How is the level of organization on your community/[in this place]? How do you, as a group, relate to other communities?

-
- Do you have any problem with the provision of water? What is the problem?
 - Is that problem affecting your economy/the economy of people in some way?
 - Have those problems affected in some way other members of the community or other communities?
 - Who is responsible for the solution of that/those problem/s?

-
- Are your problems related to water caused by people located up-stream? How do they affect you?
 - Do you think other people downstream is experiencing problems because of what people upstream as well as you are doing?
 - How would you solve those problems?

PARTICIPATORY PROCESSES & WRM / LESSONS LEARNED FOR SUSTAINABILITY

-
- Are you involved with the [MANRECUR-RR / PPA] project? How? Why not?
 - For how long have you been involved on the project? And for how long do you think you will be involved on it?
 - Is the project [MANRECUR-RR / PPA] helping you to solve the problem related to water? How?

-
- What is your overall assessment about what the project is doing? Explain
 - Would you like to change the process [of the project] in some way? How? Why?
 - Is there any other way to solve the problems [related to WRM]?
 - Can you contribute to the solution of that problem? How?

Appendix 4: Water Resource Management Problems in El Angel Watershed

Appendix 4: WRM problems in El Angel River Watershed	
Code/Category	Description
DIRECT	
Distribution	<ul style="list-style-type: none"> Studies on <i>water user census</i> show that approximately 60% of the water flow in one irrigation channel is given in concession to one person. (Ríos, 2008) There is an <i>inequitable distribution</i> of WR at the moment. (Néger, 2008) The WA has given concessions to few people. Around 10 people hold 70% of the water concessions. (Ponce, 2008)
Unrealistic water concessions	<ul style="list-style-type: none"> Currently water flows are not the same as those measured when water concession were given. (Castillo, 2008) Water flows being distributed [given in concession] by the Estate are not real. Measurements have been done in "winter" [rainy season]; if those measurements were done on summer [dry period] there would be no enough water flow even to cover the already given concessions. (Néger, 2008) 230 l/s has been given in concession in Yascón irrigation channel [eastern watershed]. During a period of 6 years (1999-2005) of water flow measurements, it was established that the actual average water flow was 149.48 l/s. Same thing happens in the lower area of Yascón where the actual water flow after 40 km of channeling is 22.32 l/s vs. 50 l/s given in concession. In the Tinajillas area [mid-watershed] there were 56 l/s vs. 139 l/s given in concessions. (Ponce, 2008)
Recent need for irrigation	<ul style="list-style-type: none"> When water concessions were given people on the upper watershed did not see the need for irrigation since rainfall was "good enough". (Castillo, 2008) In San Isidro [upper watershed] 30 to 40 years ago the problem was not water scarcity rather strong winter periods [rainy season], but now there is a need for irrigation. (Ponce, 2008) According to local people 40 years ago there was no need for irrigation in La Libertad [community] and in this area [upper watershed], rainfall was pretty regular. Whereas, in Mira surroundings and in the lower valley [mid to low watershed] there has been always the need for irrigation. Now days they [people in the upper watershed] need irrigation because rainfall is irregular. (Néger, 2008)
Water use without concession (upper-lower watershed conflict)	<ul style="list-style-type: none"> When summer [dry season] comes [people] here [upper watershed] take water [from the irrigation channels] without concessions and leave no water for people located downstream. (Néger, 2008) On the upper section of the Yascón channel (approximately 25% of the channel) 13 people were found taking water from the channel without concession. Some using water pumps others just by building provisional uptakes from the channel. (Ponce, 2008)
Administrative units conflict	<ul style="list-style-type: none"> Counties hold different realities. Mira County [mid-low watershed] consumes water which is produced in Espejo County [upper watershed]; Espejo County produces water but does not have concessions; Espejo County robs water. (Ponce, 2008)
Ecosystem-ES threatening	<ul style="list-style-type: none"> The REA protects around 15,715 has of páramo ecosystem out from approximately 45,000 has of ecosystem. When REA was created to be administered by MAE, there was no consultation to local people who were forced to move their activities out of the REA, but still displacing those activities to other páramo areas, thus threatening the stability of the ecosystem which produces [regulates] water (This includes: transforming the landscape from páramo's native vegetation to farming areas, grazing, and burning native vegetation out) (Ponce, 2008) The expansion of the agricultural frontier is determining the reduction of páramo [ecosystem] and thus a reduction on WR. (Castillo, 2008)
Pollution	<ul style="list-style-type: none"> The upper watershed produces primarily potatoes [solanum tuberosum] which, as a good solanaceae, require a lot of pesticides and agrochemicals. All residues are through away on the irrigation channels. (Castillo, 2008) [Besides] pesticides there is also pollution due to soil erosion. (Néger, 2008)
Poor irrigation infrastructure	<ul style="list-style-type: none"> Irrigation channels are too long (20-40 km), do not have cement coating, and are not covered, so there are losses due to filtration and evaporation. (Ponce, 2008) From the upper watershed around 20 channels originate; then they flow downstream in parallel with El Angel River, sometimes only few meters apart from each other. (Ponce, 2008)
INDIRECT	
Access to decision making	<ul style="list-style-type: none"> Local people should have access to decision making and thus make their good ideas useful. (Ríos, 2008)
Leadership	<ul style="list-style-type: none"> There is no strong leader in the region who can push forward (Ríos, 2008)
Political will	<ul style="list-style-type: none"> There is no political will for WRM. (Ríos, 2008)
Individualism	<ul style="list-style-type: none"> There is a great deal of individualism and lack of organizational capabilities. (Ríos, 2008) People who have more [water concessions] are not interested in protecting [managing] the WR and

	those who have less, often are not in the possibility to do it. (Ponce, 2008)
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Appendix 5: Water Resource Management Problems in Mojanda

Appendix 5: WRM problems in Mojanda and other EcoCiencias' Project-sites	
Code/Category	Description
DIRECT	
Distribution	<ul style="list-style-type: none"> There is a very inequitable distribution of the resource at the national level. It is originated by strong political factors and different interests (including economic) which influence the Estate's control on that distribution (Maldonado, 2008) In Mojanda some communities have water concessions; others have not gotten the concessions. The problem is exactly there; concessions have been given to the flower-plantations or to other users instead. (Maldonado, 2008)
Unrealistic water concessions	<ul style="list-style-type: none"> Water concessions have been given by measuring minimum and maximum water flows and thus determining the hydrological offer of certain area. In many cases CNRH can give in concession overestimated water flows. Determining a water flow mean (From min. and max. measurements) and then based on that discounting 10% as "ecological flow" represents a situation of use beyond the real capacity of the hydrological systems. Pressure and conflicts are based on an over-offer of concessions which, in most cases, responds to legitimate water demands of people. (Campaña, 2007) Within the Water Law there is a prioritization. First priority is human consumption, then irrigation and finally industry use. But there is inaccuracy respect of the definition of the water flows, according to what has been observed in each pilot site. (Campaña, 2007)
Administrative units conflict	<ul style="list-style-type: none"> There is high pressure to use water from the lakes in Mojanda as supply for irrigation and potable water from both sides: Pedro Moncayo and Otavalo counties. (Campaña, 2007)
Ecosystem-ES threatening	<ul style="list-style-type: none"> It is required to reduce pressure over the exploitation of the páramos due to human activities in the 4 sites. In Mojanda the problem is a lot deeper than in the other 3 sites. Because of cattle rising people burn out páramos vegetation so when it sprouts cattle gets food. That in turn affects not only quantity but quality of water coming from those páramos. (Robles, 2008)
Pollution	<ul style="list-style-type: none"> Water quality is another problem. In Ecuador no one is doing anything about that. There is no policy on that respect neither at the local level nor at the national level. (Maldonado, 2008)
Increasing demand	<ul style="list-style-type: none"> In Pedro Moncayo communities have been using the hydrological system for rudimentary irrigation networks. Now days those systems are suffering great pressure due to higher demands brought by agro-industrial farms who are receiving water concessions from CHRH and WA. Because their capacity and technology they are putting pressure to obtain higher water flows. (Campaña, 2007)
Community conflict	<ul style="list-style-type: none"> Higher demands in Pedro Moncayo (due to agro-industrial activity mainly) is determining conflicts among communities because there is higher pressure on water volume demanded. WRs in this area can trigger a situation in which organization levels are enhanced or destroyed. (Campaña, 2007)
INDIRECT	
Lack of information (scientific hard-data)	<ul style="list-style-type: none"> The main problem is the lack of information about what is really available in terms of WR. There is a need of a inventory of uses and management practices. (Maldonado, 2008) It is necessary to strengthen the scientific part. Regardless remarkable progresses it is still not known yet how much water produces one páramo hectare in a time unit. There is also few "hard-data" regarding how much the considered dangerous activities affect the availability of water. Hard-data is required to approach decision-makers. (Mena, 2008)
Lack of investment	<ul style="list-style-type: none"> This affects particularly the lack of information. There is lack of investment in economic as well as in human resources. There is no interest from the Estate. (Maldonado, 2008)
Lack of knowledge (general public)	<ul style="list-style-type: none"> Considering cultural and social aspects it is necessary to fight against the lack of knowledge from the general public regarding the current problems. It is fundamental to create awareness, to build capabilities for analyzing what is the problem and how to face it, how to contribute to the solution. (Mena, 2008)
Social inequity	<ul style="list-style-type: none"> There is tremendous social inequity in the country. People living in páramos surroundings are absolutely marginalized. Mostly those are indigenous communities to whom land nearby páramos were given after the Agrarian Reforms, also reflecting a deep structural problem in Ecuador (Inequitable distribution of land and wealth). Those marginalized people burn páramo out and raise cattle nearby páramos, because they have been forced to move their productive activities over there. Regardless the projects, progresses and so on, they are still among the poorest and most marginalized people in the country, living near the ecosystem thanks to which there is electric energy to satisfy luxuries in cities. (Mena, 2008)

Lack of Estate policy	<ul style="list-style-type: none"> If there was no Estate policy for páramo preservation (or fragile ecosystems) then not much will happen. At local levels there are successful examples of community-based management plans and WRM. Participation has been fundamental at that level. But Estate policy should make the isolated successful examples solid and transform them into national/local policy. (Mena, 2008)
No water valuation	<ul style="list-style-type: none"> Valuation of WR is not yet clear. In Ecuador people pay for the infrastructure aggregated value of the service; but the water itself is free of charge. Payment for water should be translated into taking care of the water catchments. (Mena, 2008)
Vicious circle	<ul style="list-style-type: none"> In one side the agricultural frontier is increased as a strategy to sustain the agricultural productive systems, or to enhance the local economy, but on the other side increasing the agricultural frontier reduces the capacity of the soils to retain water. This in turn determines that water potentially useful for irrigation would not be enough to cover the demand (as expanding the agricultural frontier put pressure over the water recharge zones – as the páramo). This is a vicious circle: more land for agriculture but less water for irrigation. (Campaña, 2007)

Appendix 6: Additional Findings from Comparative Analysis in Ground 1

Appendix 6: Findings from comparative analysis in Ground 1 (not included in the body text)	
Category	Description
Characterizing the importance of PPs for WRM	
Insights from case study 1	
Finding solutions from inside	Insights from case-study 1 suggest that other important aspects which shape the relevance of PPs are: (1) <i>finding solutions from inside</i> ; (2) facilitating the development of <i>systems-thinking solutions</i> ; (3) creating potential <i>win-win solutions</i> ; and (4) engaging stakeholders to <i>work together towards common aims</i> (See Castillo, 2008, Neger, 2008, Poats, 2008, and Ponce, 2007).
Insights from case study 2	
<i>basic management principle</i>	(1) Understanding participation as a <i>basic management principle</i> ; as for the cases where WRM is related to the stability of an ecosystem which is located within lands privately owned (Campaña, 2007). In such cases land owners are managing an ecosystem located in a piece of land which belongs to them.
<i>supporting long-term processes</i>	(2) Empowering local stakeholders to <i>support long-term processes</i> , needed for WRM. Through a PP, local stakeholders are expected to acquire negotiation and management capabilities, which imply acquiring an ability to channel down resources from different institutions for the implementation of their own WRM strategies (Campaña, 2007).
<i>PPs lead to integrality</i>	(3) <i>PPs lead to integrality</i> because local social, cultural, and economic aspects are incorporated, which sometimes might be considered not important by the proponent. If various stakeholders were included then WRM initiatives can have a wider vision and a strategy which is integral (Maldonado, 2008).
Characterizing the relationship SD - PPs applied to WRM	
Insights from case study 1	
<i>systems- thinking</i>	(1) It is relevant using PPs to promote <i>systems- thinking</i> in stakeholders
<i>create alliances</i>	(2) It is necessary to <i>create alliances</i> in order to move towards SD
<i>individualism and selfishness</i>	(3) <i>Individualism</i> and <i>selfishness</i> represent a challenge in relation to the previous point (about the previous three points see Castillo, 2008, Neger, 2008, Poats, 2008, and Ríos, 2008)
<i>Linking development and sustainability</i>	(4) Water becomes a resource which articulates very well " <i>to produce</i> " and " <i>to survive</i> ", thus, water helps to link the concepts of <i>development</i> and <i>sustainability</i> (Poats, 2008)
<i>CMPs facilitate systems- thinking</i>	(5) The implementation of CMPs provokes a way of reasoning in which people visualize that NR are all connected to each other (Ríos, 2008)
Insights from case study 2	
<i>ecosystem preservation</i>	(1) It is necessary to work on <i>ecosystem preservation</i> to make water provision sustainable. Through management of the páramo <i>ecosystem</i> it is envisioned to <i>preserve</i> its hydrological regulation function, thus <i>making water provision sustainable</i> (Campaña, 2007).
<i>páramo ecosystem as services provider</i>	(2) The <i>páramo ecosystem</i> is relevant for SD as <i>services provider</i> . <i>Páramo</i> is related to SD because it is an <i>ecosystem</i> where natural processes are being generated. Those processes are relevant for hydrological systems and for the production of other type of resources used for certain populations (Campaña, 2007).

<i>keep the balance between human development and NR</i>	(3) It is important to <i>keep the balance</i> in the relationship between <i>human development and NR</i> . If there was a process of land and water quality deterioration then there is also a process of decreasing quality of life (Robles, 2008) which provides a link between <i>human development and NR</i> (Robles, 2008).
Lessons learned by the implementation of PPs for WRM	
Insights from case study 1	
<i>Acquiring a communitarian strategic vision</i>	By the implementation of PPs a <i>communitarian strategic vision</i> could be acquired, for instance by changing attitudes from <i>confrontation</i> to <i>negotiation</i> (see Neger, 2008, and Ponce, 2007).
<i>Common challenges</i>	Challenges identified in case study 1 for the implementation of PPs include: <i>time, trans-disciplinary thinking, mistrust, unwillingness to take responsibility, lack of compromise, and weak organizational levels</i> (see, Neger, 2008, Poats, 2008, Ponce, 2008, and Ríos, 2008).
Insights from case study 2	
<i>Common challenges</i>	Challenges identified in case study 2 for the implementation of PPs include: <i>misunderstandings, mistrust, polarization, division, antagonism, unwillingness to take decisions, discontinuity, and weak organization</i> (see, Campaña, 2007, Maldonado, 2008, and Mena, 2008).
<i>Other challenges</i>	Participation for WRM needs multi-disciplinary teams; sometimes <i>breaking down disciplines into trans-disciplinary thinking</i> is challenging (Mena, 2008). In addition, there is always the doubt of the legitimacy of a PP, especially when working with marginalized groups in an inequitable society. Regardless how well implemented and good intentioned is a PP, there is always room to reflect if those processes are real <i>participation or "forced inclusion"</i> (Mena, 2008). In any case, what is certain is that those processes are <i>time consuming</i> (Maldonado, 2008).

Appendix 7: Additional Findings from Comparative Analysis in Ground 2

Appendix 7: Findings from comparative analysis in Ground 2 (not included in the body text)	
Category	Description
Lessons learned by the implementation of PPs for WRM	
Insights from case study 1	
<i>new stakeholders might start new processes</i>	Identified challenges related to the implementation of PPs in El Angel watershed include the presence of <i>new stakeholders</i> (see Arends, 2008, Borja, 2008, Garrido, 2008, and Márquez, 2008) who have recently started working in the area in topics related to WRM (like PRODERENA project). Such presence has called attention respect to the development of <i>new processes</i> . It is not clear to what extent prior work done in the area has been taken into account by the new stakeholders to build up over what has been already done instead of starting a process all over again.
<i>Participation being handled by a LG</i>	In El Angel watershed there is an example of a Municipality following up the work done by the PPs at the community level through the CMPs. They have been broadened to <i>Parish Development Plans</i> , and in turn, the sum of those plans constitutes the <i>County Development Plan</i> . The definition of those plans has been done with participatory approaches (see Garrido, 2008). The previous is a tendency in some municipalities in Ecuador, which have been taking decisions based on the so called “ <i>citizen participation</i> ” processes.
<i>problem at seeking integrality at the watershed level beyond politic-administrative units</i>	Another identified issue relevant for WRM is the <i>problem at seeking integrality at the watershed level</i> , where important stakeholders like municipalities could work in different directions regarding the solution of WRM problems (see Garrido, 2008). Related to this point is the <i>problem at seeking integrality in areas beyond politic-administrative units</i> . One municipality cannot take any action in an area outside its jurisdiction regardless integrality considerations (see Garrido, 2008). This is also an issue raised by LGs in Mojanda (see Cabascango, 2008).
Insights from case study 2	
<i>The need to broaden the set of stakeholders</i>	(1) <i>Broadening the set of stakeholders</i> refers to the case in which the PP has been proposed to take place in specific communities located in the surroundings of an ecosystem which has hydrological functions. In this case, the argument is that people at cities (usually located in valleys downstream those communities) should also be part of the PP. The PP in this case should prompt to ensure sharing responsibilities for WRM at the user level; recognizing the different roles that upstream and downstream users play along the entire system (see Sánchez, 2008).
<i>The role of proactive LGs</i>	(2) Some WRM problems can be solved by a <i>proactive LG</i> . There are examples of Water Councils and Parish Councils which on their own initiatives (or under the influence of a third Party) have solved some WRM problems. In all cases PPs have been used with different strategies (see Cevallos, 2008, Morocho, 2008, and Sánchez, 2008). The cases in which a LG has not contemplated using PPs from the beginning have created conflicts, as in the case of the bi-cantonal ordinance to protect Mojanda páramo launched by Otavalo and Pedro Moncayo municipalities (see Cabascango, 2008, and Salas, 2008).
<i>Cultural barriers</i>	Other issues in Mojanda include <i>cultural barriers</i> when working with indigenous communities, which could determine considerable differences in the way how PPs should be conducted. For instance, it could be relevant to manage workshops in the indigenous’ language (see Loyo, 2008, and Mena, 2008), or working strongly with the leaders in order to reach the community (Cabascango, 2008).
<i>Mistrust</i>	<i>Mistrust</i> has been also mentioned regarding the PPA in Mojanda. Part of it refers to previous experiences in which <i>false leaders</i> have manipulated people, and which in turn determines resistance of people to work on something new (see Cevallos, 2008). But also <i>mistrust</i> has been motivated by the origin of the funding for the PPA (GEF in this case), based on the idea that institutions like the World Bank have caused many problems for local communities, argument which holds a strong political view (see Morocho, 2008).
<i>Resistance to accept regulations</i>	It has been also mentioned that local communities might present <i>resistance to accept regulations</i> . This is particularly the case brought up by the bi-cantonal ordinance to protect the páramo ecosystem in Mojanda (see Cabascango, 2008, and Sánchez, 2008). But it also refers to the fact that in suburban areas people are not used to pay for water consumption. When an initiative to regulate potable water-use is in place then many conflicts appear (see Cevallos, 2008, and García, 2008).
<i>Poverty</i>	Finally, another issue which could be related to worsening WRM problems and affecting PPs is <i>poverty</i> . The case of the agro-industrial flower plantations have been mentioned in this case. Even under recognition of the pollution levels that such activity cause to water streams (and also under the recognition of potential health problems for workers caused by the contact with agrochemicals used in those plantations) the situation of poverty makes of this industry an accepted activity (see Loyo, 2008) not only for society but also for authorities.

Appendix 8: WRM Problems identified by Actors at the National Level

Appendix 8: WRM problems identified by stakeholders at the national level (Excluding those already mentioned in Appendixes 4 and 5)	
Category	Description
DIRECT	
There is no “felt need” at the national level	<ul style="list-style-type: none"> The need to manage WR has not been identified yet. Therefore, there is no implementation of WM at the national level (Manosalvas, 2008). That could be part of the reason to explain why there is <i>no control system</i> over the <i>regulatory and normative body</i>. <i>Water quality</i> is one of the problems that is most affected because of that. (Arroyo, 2008) It is important reformulating the institutional structure. Giving power to a water <i>regulatory entity</i>, as for obligating stakeholders and users, to manage water under sustainability criteria. Processes like decentralization should be done with some fixture in which it is mandatory to enhance water quality, reducing waste, and managing sources appropriately. (Falconí, 2008) The institutional re-structure is oriented towards managing water by watersheds through <i>Watershed Councils</i>, hoping that the Watershed Council could be an entity where different interest could be reflected and where there could be an interest in preserving and managing WR. Still, there is the need to <i>clarify roles</i> at the legislative body about the big amount of institutions allocated for management [<i>reformulating institutional structure</i>]. (Falconí, 2008)
Problems related to “offer” and “demand” at the same time	<ul style="list-style-type: none"> Solutions to WRM problems in Ecuador have to consider working on the two sides: offer and demand. From the <i>demand side</i>, there is very <i>low irrigation efficiency</i> at all levels. There is a lot of wasting in irrigation with very few exemptions. The same thing happens at the household level. Cities like Quito receive three times more water quotas per day than what it is considered enough as to satisfy needs without any sacrifice. In addition to that, <i>water wasting at the use phase</i> at home makes the required water consumption quotas a lot bigger than they should be. The distribution networks have high leeching percentages as well. From the offer side there are knowledge gaps about how that offer functions which makes to take <i>wrong decisions</i>. There is no adequate understanding about how the <i>hydrological processes</i> that provide a <i>regulated water provision</i> work. In Quito, decision makers look at glaciers when they should be looking at páramo. Glaciers have not represented more than 10% of the water supply for Quito. When it comes to offer people look at a <i>regulated offer</i>, and that is normally gotten by pumping water from aquifers and storing it in reservoirs then a <i>constant water flow</i> is gotten. <i>High-mountain ecosystems</i> have a good capacity for <i>regulation</i> in areas where the provision of aquifers is minimum. (De Bièvre, 2007)
The threat of climate change	<ul style="list-style-type: none"> In the long term climate change will determine ecological changes, which in turn are going to affect water availability. None of those changes have been quantified in scenaRíos. Though possible outcomes are: longer dry periods in southern coasts and central Andes; more severe and frequent extreme climatic events in other regions; and droughts and salinisation of aquifers in the coastal zone due to rise of the ocean level. (Falconí, 2008)
INDIRECT	
Forgetting the physical system in advocacy	<ul style="list-style-type: none"> At the national level, propositions for changes from civil society (represented in the water forum for instance) towards better WRM have included only one paragraph where the need for protecting the ecosystems which provide water was mentioned (Manosalvas, 2008). In Ecuador it is evident that for WRM sustainability is not taken into account for national policy-making. The [<i>stakeholder “ecosystem” or “ecological flow” is not considered</i>]; rather WR are taken as a “right to be awarded” and there is no vision to allocate WR. (Falconí, 2008)
The need to transfer and update information	<ul style="list-style-type: none"> There is a need to have standardized information sources. An standardization of what is being measured and how do you do that, establishing indicators. WR inventories should be uniform, they should use validated information. Those have to be efforts at the national level, for instance strengthening INAMHI. Also strengthening the information transfer between who generates it and who uses it, through transparent mechanisms, which should have no cost, and which should be provided in useful formats. Generating information was designated to INAMHI and those regional development corporations, which came as a product of turning down the Ecuadorian Institute of Hydrological Resources (INERHI). Some of the management of big watersheds was given to some of those regional development corporations. In practice, you have various information networks working in the same geographic area, because also the province councils, municipal governments, and those regional development corporations are interested in getting their information. INAMHI has its own information; rarely there is maintenance of these information networks. I have the impression that there is no regular information transfer. CNRH should hold its information about water concessions. That information is not continuously updated, and they

	have a gap for knowing how much water is given in concessions and information of the real water flow available to be given in concession. There are no continuous measurements as for doing a rational allocation of the resource. [<i>Information is dispersed in this network of various institutions</i>]. It would be important to synthesize that information in specific indicators which could be useful for stakeholders, users, municipalities for taking decisions. (Falconí, 2008)
Water problems linked to land problems	<ul style="list-style-type: none">• Small farmstead is a tremendous threat for developing agriculture as for self-sustenance for the family. Providing water for irrigation will not solve that problem. (Arroyo, 2008)