



**D4.2.2-a Definitions and involvement of relevant stakeholders inc.
familiarization of parties**

**D4.2.2-b Involvement of relevant stakeholders inc. negotiation with all
parties on defining environmental progress**

Bringing Together Diverse Groups to Clean Up the Bogota River- The case of micro-tanneries in Villapinzón Colombia

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Audience This document is targeted at researchers, practitioners, policy makers, tannery communities, environmental authorities that can be part of the decision making scenarios.
Purpose The goal of this research was to contribute to the water management of Bogotá River. The research objective was to implement a systematic approach based on negotiation, conflict resolution and managed learning on the one hand and on cleaner production on the other, to deal effectively with the water problems faced by micro-tanneries impacting the Bogotá River. The approach was to contribute to knowledge, as well as successful change in terms of the concern of the micro-tanneries in Colombia. The case study, based on action research, dealt with social exclusion, mainly technical end-of-pipe focused institutions and was to contribute to internal strengthening of the micro-tanners by building strategic alliances at multiple levels and from multidisciplinary perspectives.
Background In Colombia, the environmental degradation is equivalent to more than 3.7% of Colombia's Gross Domestic Product (GDP). However, only 5% of the environmental authorities' budgets deals with pollution issues aside from investments in conventional wastewater treatment plants (Sánchez-Triana, 2007). Colombia has a vast majority of micro and small enterprises (MSEs) ¹ - employing 81% of the work force and representing 99.4% of the total number of businesses. These enterprises' owners have limited opportunities to scale-up in the social ladder and their industries impact the environment- some figures consider them responsible for 70% of the industrial pollution in developing countries- (DNP, 2007). Facing the environmental degradation caused by the smallest industries through innovative approaches is of the utmost importance. Since MSEs are seen as complex problems, there have been uncertainties on policy, scientific and methodological domains with regard to dealing with them. The use of regulatory, market and persuasive policies often bypasses the MSEs because of their specific characteristics and usually the only possibility left to deal with them is through legal actions from the adjudicatory ² system. Successful CP projects are not being broadly implemented (Cloquell-Ballester <i>et al.</i> , 2008; Montalvo and Kemp, 2008; Blackman <i>et al.</i> , 2007; Altham, 2007). The classical consulting approach has not focused on a deep understanding of each specific context and has not recognized their specific needs such as participation (Baas, 2007; Mitchell, 2006; Sánchez-Triana, 2006). Traditionally, the interests of micro-SMEs have been put aside relative to those of the larger industries because of their lack of negotiating power. The tannery industry has been highly polluting in the area of Villapinzón in Colombia for decades. Its discharges caused water quality parameters to exceed the limits for the Bogotá River, which because of unsustainable uses cannot meet for the year 2020, <i>i.e.</i> 7 mg/L for BOD and 10 mg/L for TSS. The discharges of chromium sulphate were five to nine times higher than what is allowed by the Decreto 1594 on industrial discharges.

¹ MSEs have micro enterprises (1-9 employees) and small enterprises (10-49) employees

² Referring to the judicial system

Potential Impact

Since the strategy on CP implementation, based on negotiation, conflict resolution and managed learning processes, worked at improving both the river water quality and the environmental status of the micro-tanneries going through a crisis, lessons can be learned for science and for social practice. The implementation of IWRM benefits from an extreme case of pollution prevention for the recovery of the river. Other MSEs in the context of Colombia benefitted from the Bogotá process because of their shared special characteristics. Moreover, it seems likely that also MSEs in other developing countries may profit from the lessons learned in this process.

This research in the area of Bogotá with small enterprises has implications for cities around the world who are tackling the issues of environmental pollution on water systems and for the sustainability of marginalized industries. This action research has proven the impact that can be realized when conflicts can be resolved for the benefit of all parties involved.

Recommendations

- This research proposes a paradigm shift in dealing with MSEs. Technical solutions are better worked out once the impending social challenges are faced and consensus has been built with all the stakeholders involved about resolving the challenges.
- The definition and involvement of parties implies more steps than just a stakeholders' analysis. It includes (a) building relationship between the negotiator and the stakeholders, (b) defining the best alternatives to a non-negotiation agreement, (c) determining the initial(s) definition(s) of the problem, (d) determining the nature of the relationships: short or long term basis, and (e) defining possible allies.
- This research process suggests that the re-integration of a community that has been breaking the rules for decades into Society should be a shared responsibility with the concerned institutions rather than just the responsibility of the community itself. The responsibility of the Authority on the tanners' conflict entailing social inclusion had been neglected for years.
- Through the systematic 6 steps approach, the owners of the MSEs became knowledgeable regarding their own problems and willing to change. The MSEs fully supported the process aiming at their own social inclusion.
- In water pollution problems dealing with marginalized groups, the development of conflict resolution policies in the formal institutions can be a useful feature to be integrated into Colombian policies.
- Building the strategy of an action research is a dynamic process that needs constant feed-back from the researcher and the target group. Since the approach is being permanently reflective, it could be reshaped constantly to address an ongoing process of change.
- Initially, CP fitted the needs and interests of the MSEs. CP implementation could be adapted to their budgets and did not threaten their identity as a small-sized industry. CP did not fit initially to the end-of-pipe approach from CAR. Only in a later stage, a mixture between CP and end-of-pipe became acceptable to the institution.
- Effectively integrating land issues that interfere with environmental issues proved to be a priority.
- Along with the interrelated land issues, the micro-SMEs access to credits were the most difficult tasks to work on.
- The researcher's role implied a demanding and complex task that needed commitment to the process on a long term basis. The role was set as a change agent that needed to be able to be versatile and independent.

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1. INTRODUCTION

1.1 Relevance of this deliverable

The six years research in the area of Bogotá with small enterprises has implications for cities around the world who are tackling the issues of environmental pollution on river systems and of sustainability of marginalized industries. This action research has proven the impact that can be realized when conflicts can be resolved for the benefit of all parties involved.

In Colombia, the environmental degradation is equivalent to more than 3.7% of Colombia's Gross Domestic Product (GDP) and only 5% of the environmental authorities' budgets deal with projects on pollution issues aside from conventional investments on wastewater treatment plants (Sánchez-Triana, 2007). Colombia also has a vast majority of micro and small enterprises (MSEs)¹ - employing 81% of the work force and representing 99.4% of the total number of businesses. These enterprises have limited opportunities to scale-up in the social ladder and impact the environment (DNP, 2007). Facing the environmental degradation caused by the smallest industries through innovative approaches is of the utmost importance.

1.2 Problem definition

This research deals with the smallest industries that have great difficulty implementing CP and that can cause water related conflicts (Cloquell-Ballester *et al.*, 2008; Montalvo and Kemp, 2008; Blackman *et al.*, 2007; Altham, 2007; Howgrave-Graham and Van Berkel, 2007; Le Van Khoa, 2006; Mitchell, 2006).

It can be acknowledged that water by itself tends to build asymmetrical² relationships, simply by the fact that it flows downhill and people downstream get affected by the upstream uses people give it (Van der Zaag, 2005). Stated this way, conflicts related to water seem inevitable.

In developing countries, the smallest industries either in close proximity or somehow linked through their business activities to water bodies, may be confronted with even more complex situations because of existing inequities and limited access to opportunities *i.e.* in education, financing, reliable information among others (UNIDO, 2005; Ocampo, 2002).

1.2.1 MSEs as complex problems

These businesses constitute complex problems as they are typified by (a) scientific uncertainties as the classical pollution abatement measures are not working, (b) conflicting interests since theirs do not usually match that of others, (c) urgency to formulate policy as MSEs are usually unreachable by the formal legal and economic system and hence socially excluded, (d) interdependency between actors since as

¹ MSEs have micro enterprises (1-9 employees) and small enterprises (10-49) employees

² Term broadly used by the economics and social sciences to imply uneven or unequal situations.

polluters they are affecting others, and (d) strong connection to other problems as there are usually land issues interlinked with environmental ones (Mason and Mitroff, 1981 in Van de Kerkhof, 2004).

The smallest industries, which are targeted in this research, are part of the micro and small sized enterprises (MSEs). MSEs group enterprises from the commercial (MSEs_c), service (MSEs_s) or industrial (MSEs_i) sectors. This research focuses on the MSEs_i that face more difficult challenges than the medium sized industries that generally already belong to the formal society in developing countries.

MSEs face the paradoxical situation of on the one hand, being (a) the main driving force behind economic and industrial opportunity for development and on the other hand, being (b) vulnerable and (c) problematic: (a) The main driving force because MSEs account for 50% of the national employment and represent around 90% of the number of enterprises (data including also medium sized enterprises) (UNIDO, 2005) which, by being small, may fit particular market niches and be flexible to changing market demands; (b) vulnerable since they have limited access to education, technological and financing opportunities, and hence their productivity is low (UNIDO, 2005). In fact, MSEs' financial contribution is not as high as their employment generation (37.7% of the GDP³ in Colombia is the contribution including the medium sized enterprises) - as an example of developing countries- (DNP, 2007); and (c) problematic as they cause substantial collective environmental impact and are not easily reachable by existing policies in developing countries – specific for the industrial sector- (Blackman, 2006; Frondel *et al.*, 2005).

MSEs in the developing countries belong to the informal sector of their economies (Tokman, 2007; UNIDO, 2005; ILO, 2002). The informal sector is associated with survival strategies in highly competitive markets, which limit transferability of entrepreneurship and management skills to formal modern industries (Fafchamps, 1994). As MSEs are barely making a living, they have no opportunity to make real profits and do not usually pay taxes. In this sector, workers are low-skilled and do not usually benefit from social security guarantees. Since the willingness or capacity of governments to solve informality is limited, the smallest firms lack even more opportunities from the financial, marketing or even legal formal frameworks (Tokman, 2007; Caro and pinto, 2007; Van Hoof, 2005; Frijns and Van Vliet, 1999).

MSEs are a heterogeneous group, which is also more difficult to monitor. As they lack housekeeping systems, only little and dispersed quantitative data is available regarding their environmental impact (Frijns and Van Vliet, 1999). Some authors consider that the smallest industries in developing countries could be collectively responsible for 70% of the local and global industrial pollution (Soni, 2006; Le Van Khoa, 2006) or that their impact on the environment is already substantial due to the fact that they are usually situated within close proximity to residential areas (Frijns and Van Vliet, 1999). Industrial MSEs (MSEs_i) are not the major pollutants in their own industrial sector given their small percentage of outputs but they are high polluters in terms of the unit of output due to inefficiency, and obsolete processes

³ Gross Domestic Product

(Montalvo and Kemp, 2008; Blackman *et al.*, 2007; Van Berkel, 2007; Blackman, 2000; Frijns and Van Vliet, 1999). By learning how to work on networks, joint strategies and collective actions, which can reduce the abatement pollution costs, these industries can acquire sustainability and improve their environmental status.

In Colombia, industrial MSEs that derive their livelihood through a subsistence economy may have some additional disadvantages:

(a) since the industries may be able to evade policies and taxes, their productive activities can be considered “illegal” by governmental agencies and banned from receiving support (Caro and Pinto, 2007), (b) the relationships between environmental agencies and micro-firms have been historically characterized by a feeling of mistrust and conflict in the water domain because their pollution abatement measures have not been successful at meeting legal standards (Caro and Pinto, 2007; Van Hoof, 2005), and (c) the environmental problems of the tanneries have been worsened by people’s rejection of their activity specifically due to solid waste dumping in open spaces that generate foul smells.

When these MSEs belong to a critical industrial activity in environmental terms -like leather tanning, electroplating, metal working and rubber –among others- (Le Van Khoa, 2006)-, their social exclusion tends to be reinforced. Pollution further accentuates the stigma they carry as poor. The environmental regulations, as they are considered today, raise their costs and threaten their viability (Frijns and Van Vliet, 1999). By being considered “illegal” businesses and lacking a proper environmental status, they have no negotiating power and their situation is bound to get worse (Caro and Pinto, 2007).

1.2.2 Classical approaches to the MSEs⁴ environmental impacts

As complex problems, there have been (1) policy and (2) scientific uncertainties with regard to dealing with them. These concerns inspired this research and are considered relevant in relation to the MSEs’ ability to implement CP in developing countries:

- (1) The use of regulatory, market and persuasive policies often bypasses the MSEs because of their specific characteristics and usually the only possibility left to deal with them is through legal actions from the adjudicatory⁵ system (Blackman *et al.*, 2007; Delli Priscoli, 2003). As a result, each day more lawsuits are filed against the polluters but also against the environmental authorities for non-action in cleaning-up the rivers. Such approaches can result in expensive end-of-pipe solutions, relocation without solving the polluting practices, and even shutdowns with social implications and deep conflicts (such as in Delhi and Agra in India, and Bogotá and Villapinzón in Colombia) (Soni, 2006; Van Hoof, 2005).

⁴ In this document for simplification purposes, MSEs will refer to micro and small sized industries unless noted otherwise.

⁵ Referring to the judicial system

- (2) In the last decade, cleaner production implementation programmes have been thought to provide opportunities for MSEs to clean up their processes and to improve their economic base. Practice shows in contrast, that this statement does not reflect the reality yet: Even though the relevant issues that stimulate or avoid CP adoption have been extensively reported and vary in importance from country to country, successful CP projects are not being broadly implemented in their own contexts and their particular processes do not contribute yet to the knowledge base with respect to cleaner production (Cloquell-Ballester *et al.*, 2008; Montalvo and Kemp, 2008; Blackman *et al.*, 2007; Altham, 2007; Howgrave-Graham and Van Berkel, 2007; Le Van Khoa, 2006; Mitchell, 2006).

Besides the policy and scientific uncertainties there has also been methodological uncertainty. The mainstream approach based on quantitative approaches that correlate data but not context can omit crucial aspects in terms of the complexity involved with MSEs (Del-Río-González, 2009; Howgrave-Graham and Van Berkel, 2007). The classical consulting approach has not focused on a deep understanding of each specific context and has not recognized their specific needs such as participation (Baas, 2007; Mitchell, 2006; Sánchez-Triana, 2006; Baskerville, 1997).

1.3 Question, Hypothesis & Objective

1.3.1 Question

The question that arises here is whether and how would a strategy, based on an action research work for MSEs that seem to have no chance of solving their water problems through the formal institutions.

1.3.2 Hypothesis

A highly participative approach that meets sustainability and the interests of the MSEs may be designed and implemented in order to deal effectively with the water problems faced by MSEs in the context of developing countries.

1.3.3 Objective

To implement a systematic approach based on negotiation, conflict resolution and managed learning on the one hand and on cleaner production on the other, to deal effectively with the water problems faced by MSEs in the context of developing countries.

Along with this objective,

1. The potential role of Cleaner Production as a major tool for bringing the conflicting parties to the negotiation table is targeted.
2. The role of the researcher as change agent is identified.
3. The role of the formal authorities and institutions with respect to public participation and to environmental conflicts related to informality is investigated.

2. BACKGROUND

2.1 Key concept

2.1.1 Sustainability

Sustainability has become one of the main development goals agreed to at the United Nations Millennium Summit in September 2000. *Sustainable Development aims to meet the present needs of people without compromising the ability of future generations to meet their own needs* (World Commission on Environment and Development 1987). It implies fighting against poverty and aiming at a well being that is limited by the access to technology and the environment's capacity to absorb changes.

Integrating the principles of sustainability into country policies and programmes has resulted in two sets of challenges ever since: (a) To focus on reinforcing the environmental concerns for prevention, and (b) on integrating those concerns in the planning and implementation of development. Integrating the environmental concerns implies cross-sectoral planning and such a challenge requires improving stakeholder participation (Thabrew *et al.*, 2009). This research concentrates on both challenges.

2.2 Theories

The theories of Negotiation, Conflict Resolution and Managed Learning seem to be able to fill the gaps needed to handle MSEs as they imply a reliable process that is planned, problem solving and systematic and that, at the same time being highly participative, it assures respect for the MSEs' interests.

2.2.1 Negotiation

Negotiation takes place every time someone requires the cooperation of others to meet someone's goals (Thompson, 2009). Negotiation occurs when the parties find that this fact brings more benefits than not negotiating and that they believe they can work towards a mutual convenience zone (Tandem, 2010).

A negotiator's ability to exert influence depends upon a combined total of a variety of factors. These include: 1. Knowing and determining the people and the interests involved, 2. Having a good working relationship, and 3. Having a good alternative to a negotiated settlement or BATNA (Fisher *et al.*, 1991).

Basically, for big groups like MSEs, the first factor can be obtained through stakeholder participation and analysis; the second and the third are not necessarily assured unless there is a systematic approach aiming at win-win situations, at decision-making, and at establishing long term commitments. Leading that approach entails constant facilitation.

The integrative negotiation theory states that bringing negotiation based on interests and not on positions will open the possibilities towards creative outcomes that generate better results for all stakeholders involved (Raiffa *et al.*, 2002; Fisher *et al.*,

1991). When a negotiation has multiple issues to be settled and/or when more than two stakeholders are involved, the negotiation can be called a multilateral or complex one (Thompson, 2009; Tandem, 2010⁶).

Dealing with MSEs –defined earlier on as complex problems- could then be considered as complex negotiations. As already mentioned, water-related processes being so prone to conflicts of interests should belong also to this kind of complex negotiations. Complex negotiations must be successful in integrating valuable data and designing solutions. For water-related conflicts and in general for environmental conflicts, there is a need to integrate topics, basically in terms of decision-making (Van der Zaag, 2005).

A systematic approach in negotiations is needed in order to reach goals. It is based on the following steps (Saner, 2000; Tandem, 2005):

1. Preparation, 2. Trust building, 3. Sharing information, 4. Redefinition of the problem, 5. Creation of options, 6. Agreements and 7. Implementation.

Stated this way, negotiations rely more on following systematically a process and on learning how to become good negotiators than on what was classically the “sixth sense to negotiations” or intuition that some people seemed to have as part of their personalities. Many authors focus today on the importance of the first steps shown above (1-4) in order to lead to successful negotiations. They state that it is very common to find that failed negotiations are due to a lack of a good preparation step (Thompson, 2009).

2.2.2 Conflict Resolution

When conflicts arise, there are interests, values, perceptions or even preferences opposed to each other. Today it is fairly known what is needed in order to bring the right parties to the negotiation table. It takes above all, the preparation of a conflict assessment by a neutral party, a facilitator or a mediator (Susskind and Field, 1996; Ury *et al.*, 1993; Bacow and Wheeler, 1987).

Conflicts can be resolved classically in the legal system, through shared vision development, fact finding, mediation, conciliation, arbitration and litigation. When focusing on big groups as the selected targets, conflict resolution should work at building common grounds with those groups as well as at respecting the individuals (Holman and Devane, 1999; Holman *et al.*, 2007).

Conflict resolution methodologies based on integrative negotiation for big groups, such as Appreciative Inquiry (AI), Open Space Technology (OST), and Dialogue, engage people from all levels of a system and increase their capacity to achieve what is more important for them, individually and collectively (Holman, 2004). They all work making circles and use “talking sticks”, meaning respect towards others’ opinions.

⁶ Besides the literature on negotiation, this program from the Faculty of Business Administration from the Universidad de Los Andes is also based in the negotiation practice on case studies such as the Free Trade Agreement in Colombia 2005. EXXON-MOBIL negotiation 2006 and HP Billington 2007 were also studied.

AI is a process focusing on starting the analysis on any possible and positive aspect and on aspirations for the future. It is used to create a positive revolution. OST is a process enabling high levels of group interaction and productivity, providing a basis for enhanced organizational function over time. Dialogue is used to open communication channels, building trust and fostering cultures of collaboration (Holman and Devane., 1999) (Table 1).

	Appreciative Inquiry AI	Open Space OST	Dialogue
Purpose/Outcomes	To enable full-voice appreciative participation that taps the organization's positive change	To enable high levels of group interaction and productivity, providing a basis for enhanced organizational function over time	To build capacity to think together, creating shared meaning To open communication channels, building trust and shared leadership
Process	Discovery Dream Design Destiny	One law Two principles	Based on the power of collective thinking
Types of Participants	Internal & External stakeholders Creators who hold images	Anybody who cares about the issue under consideration Diversity is a plus	Cross functions and cross management levels
Number of participants	20-2000 involved in interviews, large scale meetings	5-1000 No limit by using computer connected, multiple site, simultaneous events	5-100 people in circles
When to use	To create a positive revolution Enhance strategic cooperation overcoming conflict	When time is pressing	To open communication channels and build trust based on deep inquiry
Creators	David Cooperrider, Suresh Srivastva 1987	Harrison Owen 1985	David Bohm 1985

Table 1. A comparative analysis of three methodologies of Conflict Resolution (After Holman 2004)

2.2.3 Managed Learning (Action research by Schein (1996))

Social scientific practices like Managed Learning (embedded into action research) (see 3. material & methods) (Schein, 1996) or “postnormal science” (Ravetz, 1999) develop understanding parallel with the change process taking place.

Social scientific practices, of which the driving forces are a high degree stakeholder participation and action, are becoming more and more attractive in order to face the complexity of contemporary environmental problems (Van de Kerkhof, 2004). They recognize that since the environmental field is in constant evolution, and is only partially predictable, the research methods must therefore allow an effective approach that takes into account a constant process of change (Gummesson, 2007:228). For change to last the approach necessarily needs researcher and stakeholders' involvement at all levels: visioning, planning, decision-making, policy-making, and implementation (Godard and Laurans, 2004).

A research that is action-oriented focuses on solving problems while enquiring about them. By focusing on results and effectiveness, it is also problem-driven (Flyvberg, 2004).

Action research (Managed Learning) was originally conceived by Lewin (1946), as a research methodology that states that there is no better way to learn about a social system than changing it (Lewin, 1946; Schein, 1996).

For Lewin (1946), “*everything you do with a system is an intervention*” (Schein, 1996:13) and the researcher needs to develop criteria that balances the risk from that intervention designing a first low key inquiry step thought to assess the risk. For these authors, the posture of the researcher must be one of engagement towards a *managed learning process* and his/her task is defined as a change agent.

In this process, the researcher plays the role of a change agent that contrary to the classical consultant, (a) engages in the process and differentiates when he needs to be a helper, a facilitator or a mediator, (b) recognizes the importance and uniqueness of the context in every case, (c) facilitates an open learning process based on the special characteristics and culture of a given community, on trial and error instead of preset models and on mutual learning, and (d) is mainly motivated towards empowering vulnerable communities to solve their own problems (Lewin, 1946; Schein, 1996)- not to be confused with paternalistic approaches-.

One can wonder why it would not be more objective and suitable to simply limit the roles of the researcher to that of facilitator or mediator. The change agent's role was defined by Lewin (1946) as crucial because action research was originally conceived to act in the context of underprivileged groups that need to be lead through a change process, to improve their negotiating power, and to learn how to solve their own problems in order to enhance the outcomes of a specific situation (Gummesson, 2007).

By doing so, the traditional approach to environmental complex challenges, which usually limits itself to setting suggestions and recommendations, could be improved (Gummesson, 2007; Flyvberg, 2004; Schein, 1996; Lewin, 1946).

2.2.4 Cleaner Production

Cleaner Production (CP), within the context of sustainable water management, is considered an integral preventive strategy to improve the environmental, productive, socioeconomic and institutional situation of micro and small tanneries.

Cleaner Production CP is defined as: *“the continuous application of an integrated preventive environmental strategy to processes, products, and services to increase overall efficiency and reduce risks to humans and to the environment”* (UNEP, 1999). CP modifies the management of resources, does housekeeping, substitutes materials, and uses new technologies on a given industry (Montalvo and Kemp, 2008; Frondel *et al.*, 2005). CP cannot be copied from anywhere else as each particular situation is context specific; it calls for simultaneous changes in individual behaviour and is open to new concepts and innovations (Van Berkel, 2007).

Cleaner production (CP) works in conjunction with the principles of sustainability. At the Rio Declaration, CP was set on pollution prevention and reduction. CP has been helping ever since on the transition (a) “from waste management policies and approaches to waste prevention or industrial innovation policies of waste minimization” (Baas, 2007: 1205), and (b) from working *at* and *for* the industry towards an integrated and social-oriented approach of working *with* all the stakeholders that have interests in CP in order to build commitment towards prevention (Thabrew *et al.*, 2009; Van Berkel, 2007; Montalvo, 2003).

The literature reveals that there is a growing concern regarding how to more effectively support the implementation of CP among the smallest scale industries in developing countries -something that was underestimated in the past (Baas, 2007; Van Berkel, 2007; Siaminwe *et al.*, 2005).

There is a need for understanding the complex relationships between small-scale firms and environmental institutions, to identify how different mechanisms foster change, to understand how learning processes take place, and how the choice of technology is being undertaken in the field of CP (Montalvo and Kemp, 2008; Montalvo, 2003).

Authors like Altham (2007), Baas (2007), Van Berkel (2007), Mitchell (2006), Oosterveer *et al.* (2006), Frijns and Bas van Vliet (1999) recommend focusing on context-specific strategies for CP implementation on MSEs aiming to build appropriate tools for behavioural changes and to pilot and evaluate the impacts. The assessments on CP should no longer be limited to technical approaches. Instead, the social and psychological dimensions of organizational change are now being taken into account in the design and delivery of CP programmes (Baas, 2007; Van Berkel, 2007).

The above focus privileges a deep understanding and acting within complex social processes through a context-specific research. The case study methodology based on action research seems to fit the challenge of working and learning with respect to MSEs implementing CP.

2.3 Principles

Besides the principles on sustainability already mentioned, this research is guided by the following principles stemming from participation (1), conflict resolution (2), negotiation (3), and managed learning (action research) (4) and (5).

- (1) People support initiatives that they help create (Holman, 2004) or said differently, participation increases commitment (Dick, 1999);
- (2) When focusing on big groups as the selected targets, conflict resolution should work at building common grounds within those groups as well as at respecting individual autonomy (Holman, 2004; Holman and Devane, 1999);
- (3) Bringing negotiation based on interests and not on positions will open up possibilities towards creative outcomes that generate better results for all stakeholders involved (Raiffa *et al.*, 2002; Fisher *et al.*, 1991).
- (4) There is no better way to know a system than trying to change it (Lewin, 1946).
- (5) The learning process has better results when it works through trial and error (Schein, 1996).

2.4 Colombia

2.4.1 The water situation

Regarding water availability, Colombia has one of the highest availability of water resources in the world. Some figures even consider Colombia the fourth water producer in the world (UNDP, 2007). The renewable water resources per capita, per year were in the year 2000, 50.600 m³ and in 2005, 47 470 m³ (WWAP, 2003). According to national data the available water is 30.000 m³ per capita per year, four times the world average (Rodríguez, 2009).

However, these resources are not uniformly distributed due to geographic, climatic, demographic and socio-economic factors. Regional and seasonal flow variations and environmental vulnerability differ considerably among river basins.

According to the Institute of Hydrology, Meteorology and Environmental Studies (Instituto de Hidrología, Meteorología y Estudios Ambientales, IDEAM) (2004), water demand in 2003 was 7435 million cubic meters. Of this amount, 54.5 % was for agriculture, 28.8% for household use, 12.7% for industry, 3.1% for livestock, and 0.9 % for the services sector. The usage efficiency is rather low. IDEAM (2004) estimates that if water resources are not properly managed, by 2015, 66% of the municipalities will have a great risk of water shortages on a dry year; and by 2025, more than 31 million inhabitants could suffer water shortages in the Andes and the Caribbean regions of the country, which have the highest population. Many of those water shortages are already occurring today because the big rivers are not used to supply drinking water facilities due to pollution, corruption or economic reasons (Guhl *et al.*, 2007).

Colombia has a wide array of laws related to water. A proposal for a unified water law was presented in 2007 to the Senate but was not accepted. In year 2010, a

policy on integrated water management was built by the Ministry and represents an opportunity to improve the integrality and cross-sectoral planning on water issues.

The latter complements the efforts made also by the Embassy of The Netherlands to support public participation since 2009. In fact since that year, at the national level, the National Comptroller's office has been forcing the regional authorities to focus on enabling participatory approaches.

One of the main water problems in Colombia is related to pollution and safe drinking water and sanitation. It is estimated that the annual cost of the damage caused by insufficient water, sanitation and hygiene is 1% of the GDP. 1450 to 1820 children die every year from diarrheal illness related to this.

Based on the above information it becomes evident that the water problem in Colombia has more to do with management aspects than on natural availability and/or climatic reasons.

The use of polluting technologies in the manufacturing industry such as those traditionally used in tanneries, electroplating, metal smelting, palm oil extraction, promote the waste of prime material and high production of residual waste in uncontrolled conditions. In 2002, the Ministry reported that in 66% of the cities they had studied, no industries treated wastewater as mandated by decree 1594 of 1984 and only 3.1% the industries treated their wastewater 100% (Sánchez-Triana *et al.*, 2007).

An important contributor to this is the prevalence of high-cost, high technology conventional treatment plants and the limited use of low technology, low cost solutions -only 5% of the environmental authorities' budgets deal with projects on pollution issues aside from the conventional investments on wastewater treatment plants-. Clean production agreements have not succeeded in improving the environmental situation. On the one hand, CP agreements and CP guides do not offer a wide range of technological and financial alternatives that suit the smallest industries which constitute the biggest number (99.4 % of the industrial units are micro and small sized). On the other hand, the regional environmental authorities have accomplished little progress in developing environmental indicators, and CP programmes are usually vague in terms of evaluating results (Sánchez-Triana *et al.*, 2007).

At the Bogotá's river valley, being home to almost 20% of Colombia's total population and representing 26% of the GDP (DNP, 2004), a clear case of uneven access to water is identified. While the big industrial sector does not consider water availability, price or quality to be limiting factors in its development and investment plans, small rural water users face scarcity every year during the dry months. At the same time, it is estimated that 70% of small users do not hold water permits and there is no information on their water consumption. It can be said that in Colombia, finding long term solutions to the problems of small water users has not been a priority for local, regional or national authorities. Obtaining water permits or concessions is a cumbersome and expensive process for small and local users and public participation in water allocation policy for them is nonexistent (Sánchez-Triana *et al.*, 2007).

2.4.2 Institutional context for the MSEs in Colombia

MSEs fall under the regulatory surveillance of the Ministry of Commerce, Industry and Tourism under a subdivision. As the industry in general causes substantial environmental impact, a joint committee was created between the Ministry of the Environment and the Ministry of Commerce in order to face the problem. This committee does not meet periodically and there are no real positive outcomes stemming from its activities (personal communication, 2009).

The main entities responsible for water resources management in Colombia are regional authorities, including departments, municipalities, Autonomous Regional Corporations (ARCs), and Urban Environmental Authorities (UEAs) that can formulate regulations that are more restrictive than those required under national law.

These entities are supposed to invest in water and sanitation on behalf of the public interest, but not in the private sector- to which MSEs belong to-. Legally, these authorities must focus on command-and-control activities and the tasks related to CP are considered complementary on the part of the authorities and voluntary from the industries' side (Sánchez-Triana, 2007; MAVDT, 1997). In order to deal with this especial situation, the authorities have taken diverse strategies towards CP: Some have created alliances with the Swiss sponsored CP institute in Colombia (CPML), creating CP bodies in their organisations that are financially supported by governmental, private and foreign initiatives; others have just relied on private initiatives such as private consulting CP companies.

Under the environmental law 99 of 1993, a comprehensive environmental system was created: the *SINA, Sistema Nacional Ambiental (National Environmental System)* where the Ministry decrees the main directives. Some obstacles are: (1) Coordination on policies' implementation is lacking among a wide array of institutions at the local, regional and national levels and cross-sectoral planning is still controversial (Sánchez-Triana *et al.*, 2007; Guhl *et al.*, 2007). (2) Even though IWM is being promoted by the new water policy, it is far from being implemented (MAVDT, 2010). (3) Monitoring is far from being effective as only administrative indicators are used and there is an absence of environmental indicators. Even though Decree 1200 of 2004 established the framework for environmental indicators, environmental authorities do not have strong incentives to create effective indicators as these can be turned against them by the control authorities classifying them as failures in terms of compliance with the action plans (Sánchez-Triana *et al.*, 2007).

2.4.3 Tanneries in Colombia

A SWOT analysis is presented at the micro and macro levels:

Micro-level	Strengths	Weaknesses
Kind of industry 77% micro-	Can fit specific niches Can be flexible Strong family ties & values	Variable leather quality Obsolete technology Low level of education

sized	Low employment costs Employment to low-skilled labourers	Limited access to credits Lack of monitoring Seen as “illegal” Lack of environmental status Lack of negotiating power Employees without social security guarantees
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Table 2. A SWOT analysis at micro-level

Macro-level	Opportunities	Threats
National level	Colombia, 10 th in terms of size of cattle livestock: Potential as leather producer (ANDI, 2004)	Lack of integral policies supporting MSEs End-of pipe focus Punitive measures dominate
Global level China’s competition on cheap leather (MAVDT, 2006) Rapid changing fashion trends Growing environmental concern	To innovate for higher quality, to eliminate intermediate dealers, to reduce costs (DNP, 2007) To adapt more easily by being small 30% growth per year on eco-leather products (Diaz and Ochoa, 2005) To join CP programmes aiming also at increasing competitiveness	Prices must be kept lower in order not to lose market To keep up with technological demands and sound training Stricter policy barriers

Table 3. A SWOT analysis at macro-level

2.5 MSEs adopting CP

Taken from the SWOT analysis above, MSEs should be empowered through holistic approaches in order to lessen their weaknesses and to take advantage of the opportunities that their national and global contexts can offer.

MSEs need powerful internal and external supporters to trigger action (Hillary, 1997). By learning how to work on networks, joint strategies can help them acquire environmental status. CP programmes that are strongly supported at all levels of government and that privilege studying the wide array of possibilities of CP - including collective actions- can fit the MSEs.

Howgrave-Graham and Van Berkel (2007) consider that estimating the level of CP implementation is a challenge by itself due to their lack of monitoring and record keeping. Although verification with quantitative and economic performance is desirable, it is impractical with these firms. Semi-qualitative approaches can be more useful in estimating their CP uptake. Tracking trends over time is most desirable and can give a better understanding of CP implementation in MSEs instead of the classical assessments that provide only a snapshot of CP implementation (Howgrave-Graham and Van Berkel, 2007).

2.5.1 A right approach to MSEs

Pushing heavy polluting MSEs towards sustainability demands a deep understanding of the complex forces involved at the local, regional and national levels, as well as of the economic, social and environmental dimensions. The problem gets especially challenging in countries like Colombia where illegality, mistrust, social exclusion and lack of communication are prevalent in the context of MSEs.

2.6 Villapinzón

2.6.1 Choice of case study

The study site of this research is the tannery community of Villapinzón in Colombia.

Among the 8 main tannery communities in Colombia, it was chosen because: 1) the common belief regarding this case was that the micro-tanners had squandered all the opportunities that had been offered to them and that the tanners had no will to change and clean up their industries. Their situation looked like a lost case and society had excluded them. Some academicians even considered that it was useless to focus research on them because these micro-tanners were like the dinosaurs: bound to disappear (personal communication 2006); 2) micro and small tanneries represented more than 80% of their industrial communities in terms of the total numbers; and 3) its environmental impact was challenging the sustainability of the capital city of Colombia in terms of the impact caused to the Bogotá River (CONPES, 3320).

The case of the micro-tanneries impacting the Bogota River looked like an extreme case in the sense that it could disclose more data because it seemed to mobilize more actors and more essential systems in the scenario of the recovery of the Bogotá River (Flyvbjerg, 2004). The Bogotá River's recovery was a national sensitive matter. The tanneries in the upper basin were facing the maximum legal and penal actions because their raw discharges into the river were considered illegal and they seemed to have lost the opportunities to solve their problems through the formal channels.

Developing a case study based on action research at these micro-tanneries was ideal because of the urgency that existed to act because of a crisis situation, to understand the conflict, and to deal with complexity and maybe innovate.

If a strategy on CP implementation based on negotiation, conflict resolution and managed learning processes could work at improving both the river water quality and the environmental status of the micro-tanneries going through a crisis, lessons could be learned for science and for social practice. The implementation of IWRM would benefit from an extreme case of pollution prevention for the recovery of the river by the “polluters’ black sheep”. Other MSEs in the context of Colombia could benefit from the process worked out because of their shared special characteristics, and maybe even MSEs in the context of other developing countries could also profit from the process.

Developing such a strategy would entail placing the researcher within the community of micro-tanneries in order to be able to dig into the deeper causes of their problems and their consequences than to just describe symptoms and the frequency of appearance of the problems (Oosterveer *et al.*, 2006).

2.6.2 The case study

At a distance of only 6 km from the source of the Bogotá river, which is used for the water supply of Bogotá and for crop irrigation lies a community of 150 micro-tanners with a native indigenous background. The community as a whole has only an elementary level of education; lives on a subsistence economy and uses an obsolete technology. The industries have existed for decades, spread over an area 7 km along the river and south of the village of Villapinzón. 51 of these tanneries are within 30m of the river bank, an area that since 1977 has been considered, “for preservation and protection use only” (INDERENA, Decreto 1449, 1977).

Natural tanning agents were used until 1984 when the Regional Authority (not yet Environmental), taught the use of synthetic tanning agents and afterwards was absent for more than 10 years (CAR, 1994). Today, tanning entails two basic processes that impact upon the environment: the classical de-hairing with sodium sulfate and the tanning process itself using chromium sulfate.

The effluents of these industries are discharged into the Bogotá River with disastrous consequences for river water quality. According to Regional Authority (CAR) ruling 043 of 2006, these values exceed water quality parameter limits of the Bogotá River, for the year 2020, *i.e.* 7 mg/L for BOD and 10 mg/L for TSS.

For over 20 years, the Regional Environmental Authority has tried to solve the environmental problems of the community of Villapinzón without effective results. Different measures, especially the ones from the adjudicatory⁷ system to improve the environmental situation had been enforced by the authority but without success. 67 potential solution proposals remained by 2004 on the shelves (CAR, 1998). Since the agency has always had a focus on end-of-pipe solutions without a CP branch, only one of the presented proposals was directed towards the prevention of the polluting flow (Cleaner Production). Interrelated land issues had placed the

⁷ Referring to the judicial system

tanners virtually at fighting with the authority as the industrial area had not been formally recognized and the tanners from the riverbank were considered invaders without property rights (El Tiempo 2004c). This has not benefited the economic livelihood of the tanneries, whose owners all have been sued by the authority, banned from credits and face fines that they are unable to pay. As a result, all micro-tanners are literally joining the growing group of Colombian residents living below the poverty line of 52% as the national average (El Tiempo, 2004a).

Their association did not have support from the community and their leader was a lawyer that stimulated fights and disputes without a problem solving orientation. Lawyers, chemical products salesmen and end-of-pipe technologies salesmen had made a living out of the conflict.

Realizing that no environmental rehabilitation project was being implemented, in February 2005 the Regional Environmental Authority (CAR) closed 58 tanneries (El Tiempo, 2005a). Among them, 51 tanneries are located on the river bank and have permanent closures. 8 tanneries could be reopened provided they present sound technical solutions on their PMA (Environmental Planning) (CAR, 2004).

The regional authority had previously asked for a consensus regarding the closures, which the ministry, the political and control authorities at the national and local levels had agreed upon. The micro-tanners had squandered all the opportunities that had been offered to them.

Several meetings took place between the local actors such as micro-tanners, the big tannery, the mayor of Villapinzón, the regional environmental authority CAR and the leader of the micro and small tanners, but no solution had been worked out so far. The meetings always ended up with fights and disputes because aside from the cited conflicts, CAR had not defined in January 2005 if the river bank could be considered to extend beyond 30m.

2.6.3 First interventions

The researcher's interventions started with the judge that was in charge of the court order ruling the Bogotá River's recovery. After six months of follow-up of the dynamics of the court order, the researcher made herself visible and asked to have an informal meeting with the judge. She was surprised to find the judge interested in getting to know her as she had seen her taking notes during the court proceedings. The researcher started to talk to her about the importance of pollution prevention, and in December 2003, she found herself organizing a video conference between UNESCO-IHE in Delft, and the main actors involved on the recovery of the Bogotá River. A week later, Professor Huub Gijzen from UNESCO-IHE gave the judge a personal lecture on CP at her office (annex 2 on the minutes of the videoconference).

After a local visit to Villapinzón, the tanners asked the researcher to help them resolve their conflict. The fact that she had asked them during in-depth interviews about their interests had caught their attention. Helping the tanners on the river bank to present their property documents to the *Procurador*, which had

thought they were invaders of the river bank, helped to build a trusting relationship between the tanners and the researcher.

At the end of 2003, at a meeting on IWRM, the researcher was introduced to the person responsible for implementing CP at the tanneries in the west of Colombia at Valle del Cauca. She was leading a participative approach for CP implementation that was just starting and offered her support for the micro-tanneries of Villapinzón.

In August 2004, the Bogota River court order ruled, aside from other issues pertaining to the recovery of the river, on CP and pollution prevention implementation by the micro-tanneries. They ought to not just implement CP, but they ought also to be supported by the environmental authority CAR, something that had been neglected for years. The judge had taken into consideration the specific characteristics and context of the micro-tanneries that the researcher had presented to her on a document that was used as support at the court proceedings (see annex 3). The magistrate designated the researcher, to her surprise, as a supervisor of the court order once it was enforced (Court Order, 2004).

3. MATERIALS & METHODS

3.1 Introduction

The approach to the conflict is systematic as it follows steps and the logic from the negotiation practice, while being critically reflective within cyclic processes as exemplified by action research (Figure 2).

The methodology is based on a case study based on action research that develops a deep understanding but goes further into acting and solving impending problems.

3.2 A proposed framework for the action research

3.2.1 Theory and Methods: An integrated approach

First, case study research was inspired by the Burawoy's extended case method (1998) in the sense that it is based on the inter-subjectivity of the researcher and the subject of study and on the relevance of context-oriented work. The criteria and structure of the case study research were taken from Yin (1994).

Action research, *defined as a scientific practice having theory and methods*, (Lewin, 1946; Schein, 1996) was undertaken on the extreme case of Villapinzón. It dealt with the "how" question that is explanatory as it needs to be traced over time, rather than showing frequencies (Yin, 1994: 6). The study was carried out in a period of 6 years from a theoretical and methodological framework based on 6 cyclic steps and derived from methods and techniques from Integrative Negotiation (Fisher *et al.*

1991; Lax and Sebenius, 1991), Conflict Resolution (Holman, 2004) and Managed Learning methods (Lewin, 1946; Schein, 1996). The approach was actor-oriented and focused technically on CP implementation. All methods are characterized to the highest degree in terms of the level of participation (see figure 1.). This approach has been called High Degree Systematic Approach (HDSA).

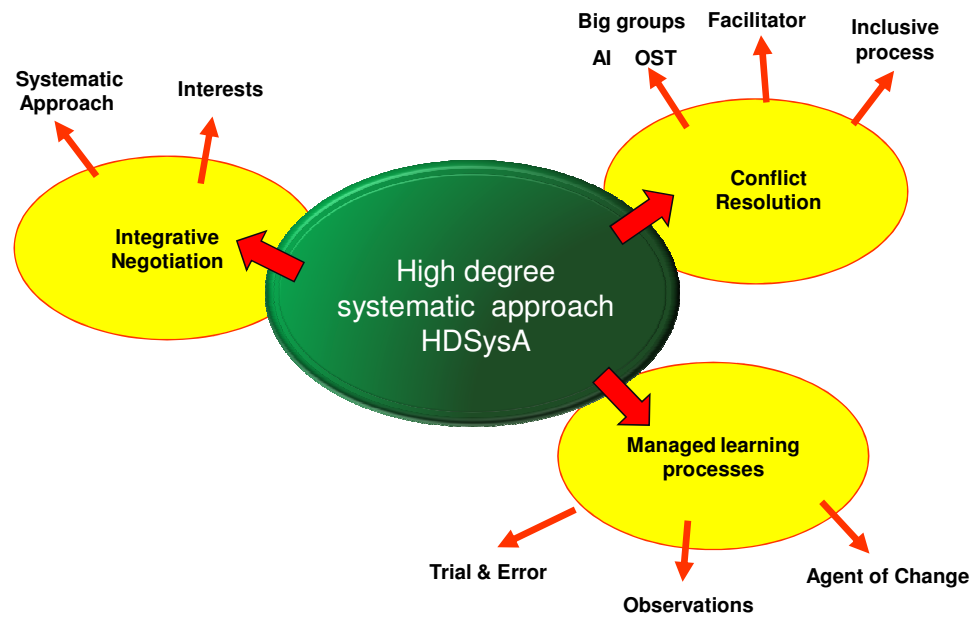


Figure 1. Theoretical and Methodological Framework:
Key elements of the High Degree Systematic Approach

3.3 Research design

3.3.1 Purpose

The purpose of choosing this approach is to allow a contribution to knowledge, as well as successful change in terms of the concern of the micro-tanneries in Colombia. The case study based on action research needed to deal with social exclusion and a mainly technical end-of-pipe focus through internal strengthening and by building strategic alliances at multiple levels and from multidisciplinary perspectives.

3.3.2 Data collection and data analysis

Cyclic

The study was carried out in a period of 6 years from a theoretical and methodological framework based on 6 cyclic steps. Each cyclic step is critically reflective and has being designed as having five elements: observe, plan, act, observe, and reflect. (Kemmis and McTaggart (1988) have described four: plan, act, observe and reflect. The reflection at the end of each cycle fits into the observations of the next cycle. Data collection and data analysis are developed in parallel through cyclic processes. The researcher observes and plans before acting and reflects on the findings and the methods after acting.

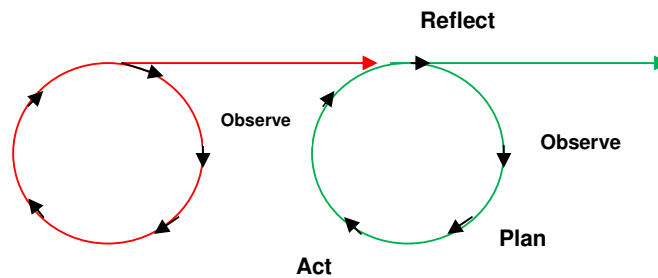


Figure 2. Cycles of action research

Multilevel linkages

This study was designed to be conducted at the national, regional and local levels in order to bring to focus the conflict involved at the different levels, raise consciousness and bring new perspectives to all stakeholders. The local interventions built internal strengthening and strategic alliances.

Archival research was compared with people's perceptions and actions and with the researcher's observations and interventions.

Level	Observations & Interventions
National	<p>National tannery committees at Ministry- twice a year- 2004-2007</p> <p>Two Presidential Councils- President Uribe- 2004-2005</p> <p>Four meetings with the Office of the Presidency (2004-2005)</p> <p>Meetings with the Public Prosecutor (2004-2009)</p> <p>Meetings with the National Comptroller (2009)</p> <p>7 Denunciations and publications in Main newspapers (2004-2010)</p>
Regional	<p>Meetings with the regional authority CAR (2004-2010)</p> <p>Follow-up Court Order ruling on the Bogotá river recovery (2003-2005)</p> <p>Joint work with Governorship of the province surrounding Bogotá (2004-2010)</p>

	Visits to the tannery community of Cerrito that was implementing successfully CP
Local	Meetings in the municipality of Villapinzón/ mayor and local actors like the big tanner and the small tanners (2004-2006) OSTs to handle time pressing issues among all stakeholders (2004-2010) Follow-up committees (2004-2010)

Table 4. Multilevel observations & interventions

Multiple data collection techniques and a multidisciplinary approach

Archival research was initially done consulting official documents and newspapers on the tanneries' conflict. *Direct observation* and *in-depth interviews* were also carried out, and visits to Cerrito and San Benito tanneries in Colombia helped to inspire the action research itself.

From Integrative Negotiation, the research focused its actions on the *interests* of the stakeholders, on the importance of trying to aim at *win-win situations*, and on the fact that the strategy needed to be systematically *structured*.

From Conflict Resolution it dealt with *big groups* through methodologies such as *Open Space Technology* (OST) (Owen, 1985) and *Appreciative Inquiry* (AI) (Cooperrider 2000), with the fact that solving a conflict entailed a third party called a *facilitator*, and with strategies to conduct *inclusive processes*.

From Managed Learning processes- a kind of action research (Schein, 1996) the facilitator was called *change agent*, learning was done mainly through *trial and error*, and a *first step of low key inquiry* was targeted in order to avoid non-valid interpretations of the initial diagnosis of the situation (see figure 1.).

The quantitative and qualitative methods implied developing the selection criteria for choosing 6 tanneries that were going to be used as pilot industries before scaling-up CP; establishing through the SWITCH-Universidad Nacional (EU) project, the material and energy balances and the economic analysis on NPV⁸ (Net Present Value) of the 6 tanneries involved in the project; determining after a literature review, the best CP options for the specific characteristics of the tanneries, and of the Bogotá River in the upper basin; analysing the policy on discharge limits set by the regional environmental authority CAR; developing a CP monitoring system considering conflict resolution indicators as well as technical, economic and social indicators; and constituting an evaluation process within the actors themselves.

The researcher's role as change agent

As this study was facing conflict of interests with marginalized communities, the researcher's roles were designed to switch from observer, mediator, helper, facilitator or negotiator depending on the *momentum* of the designed strategy that

⁸ NPV: Method used in evaluating investment whereby net present value of cash outflows (cost investment) and cash inflows (returns) are calculated using a given discount rate. A positive NPV usually means that the investment can be accepted. www.google.com March 18 2009.

was built initially with the tanners (Table 10). The researcher was also responsible for facilitating communication channels between the national, regional and local levels.

3.4 Research process

3.4.1 6 Step Process

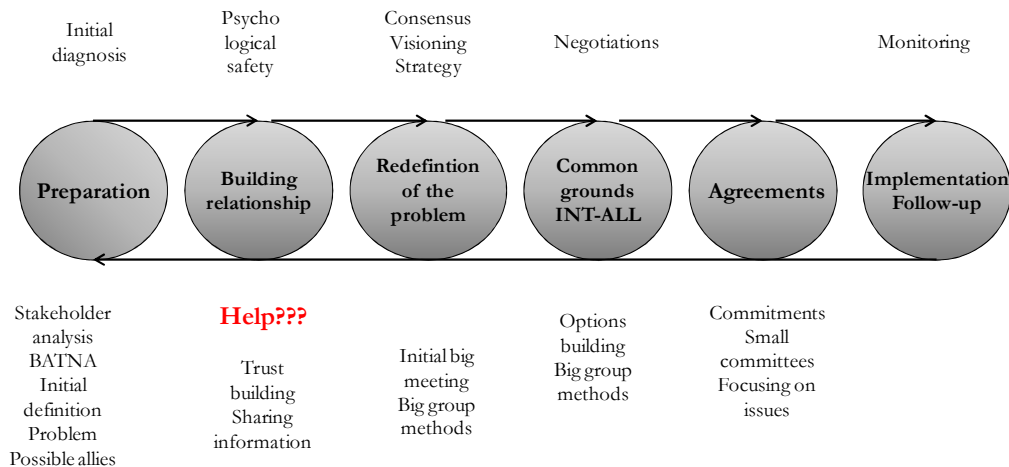


Figure 3. Systematic Social Inclusion Process

It is commonly believed that negotiating implies defining a strategy, to sit at a table in order to discuss each others' proposals and to reach agreements. Practice and theory working together proved that the latter was not enough. Three essential and initial phases leading to a "negotiation" were taken into consideration in order to identify interests and stakeholders, motivate, build trust and reach some consensus over the nature of the conflict being dealt with.

The remaining classical negotiation steps are then taken in order to reach agreements and the necessary implementation phase. An explanation of the 6 steps proposal for big groups going through a change process is explained below.

In this process, each cyclic step's reflections can be taken to feed the next step's observations. The results will be presented for each step whereas:

#	STEP	AIMING AT
1	Preparation	Initial diagnosis (identifying interests, possible allies, BATNAs, nature of relationships, minimum intervention)
2	Building relationship	Trust- Psychological safety-Sharing information
3	Redefinition of the problem	Consensus- Internal Visioning- Initial building strategy
4	Common grounds	Empowering communities for better win-win

	INTERNALLY then AMONG ALL	situations- Building realistic and accurate options- Feed-back to the strategy
5	Agreements	Establishing commitments
6	Implementation Follow-up	Developing solutions by acting- Monitoring processes- Constant feed back to a dynamic process

Table 5. Purposes of 6 steps process

4. RESULTS

4.1 Results on Theory and Methods

As working with polluting MSEs impacting rivers constituted complex and impending problems, this research proposed an innovative approach that could develop understanding and change.

Based on a long-term case study of six years based on action research, this paper provides a detailed fabric of information about how different issues in the functioning of MSEs are inter-linked. This research allowed, (a) to acquire a deep understanding of the multiple forces operating at MSEs implementing CP, (b) to get acquainted with the chain of events during that period of time, and (c) to engage and to act together with the stakeholders at solving their complex problems and conflicts.

The approach to the situation of the MSEs is systematic as it follows steps and the logic from the negotiation practice while being critically reflective within cyclic processes according to action research. It is based on an integrated approach inspired by the negotiation, conflict and managed learning scientific practices. The scientific practices offered theory and methods that complemented each other on the design of the research. The design was successful at allowing the research to focus on the internal strengthening of MSEs, and at building strategic alliances supporting the action research's approach at multiple levels, from multidisciplinary perspectives, and through multiple data collection techniques. The research responded to a strategy built together with the target group.

Since priority was giving in the first steps towards understanding the conflict, evaluating alternatives to solve it and to build trust and consensus, the technical part of the research (CP implementation) did not start before the tanners themselves realized that CP could really be fitted to serve their interests and needs. The social acceptance and will to fight for CP was the precondition needed to start the quantitative research on the CP options.

4.2 Results of the 6 step process

4.2.1 Preparation

This step includes (a) 12 in-depth-interviews with representative stakeholders and observations on the real and actual social interactions targeting the understanding of the games of power, discovering the long-term relationships and unveiling the different problem definitions perceived by the actors in order to understand the complexity involved; (b) a stakeholder analysis with identification of as many actors as possible and their different interests and priorities in order to establish the possible strategic alliances in the process; (c) data collection on as much related information on related cases and public documents to unveil the history of the conflict; (d) the BATNAs; and (e) a small tanner's profile.

As stated by the change theory and the nature of action research, this step should be a very low key inquiry-oriented diagnostic intervention at first instance, designed to have a minimal impact on the processes inquired about.

(a) Observations and 12 in-depth interviews

ACTIVITIES	RESULTS
Initial observations of group dynamics (4 regional and local meetings)	<ul style="list-style-type: none"> • 98% of tanneries are micro & small industries • The big tanner is a negative leader • Non appreciative attitude towards the conflict • Meetings are non-solving oriented but claim oriented • Aggressiveness
<p>12 in-depth interviews:</p> <p>Former Director CAR A1 Director CAR (2004) A2 Responsible CP A3 Public Prosecutor A4 Mayor M Big Tanner BT</p> <p>Small tanners' Leader SL</p> <p>Small tanner S1 Small tanner S2 Small tanner S3 Small tanner S4 Small tanner S5</p>	<ul style="list-style-type: none"> • 3 Initial perceived definitions of the problem <p>Control authorities (A1-4), Mayor (M) and Big Tanner (BT):</p> <p>The small tanners have consistently rejected the options offered to them</p> <p>Small tanners' leader (SL):</p> <p>The small tanners need the money to build their end-of-pipe treatment plant</p> <p>Small tanners (S1-5):</p> <p>The authorities do not listen to us. We want to solve the environmental problem while keeping our identity.</p>

Table 6 The situation in 2004 and the definition(s) of the problem

From the latter table, it is drawn that the perceived definitions and causes of the conflict were multiple in May 2004. **Three different definitions expressed three different ways of looking at the problem.**

The lack of consensus regarding the original definition of the problem at the **preparation step** suggested that the different stakeholders had limited access to the relevant information

(b) Valued Interests, priorities of stakeholders

Initially, 11 kinds of stakeholders were identified (year 2003- April 2004) and asked through semi-quantitative surveys to value from 10 to 100 the issues that represented their interests. This information was drawn from the initial in-depth interviews (12), from the observations at the initial 4 meetings and from informal conversations with the actors. Table 3 shows the main interests ranging above a value of 70.

<i>STAKEHOLDERS</i>	<i>INTERESTS</i>	<i>VALUES</i>
La CAR main office	To build efficiency image	100
	To clean the river at short term	80
	To abide judicial orders	100
La CAR Regional Office	To support the Mayor	90
Public Prosecutor	To build efficiency Image	100
	To reinforce Command & Control	80
Big Tanner	To get environmental status	100
	To invest in end-of-pipe plant	90
Small tanners	To maintain an identity	80
Not from the River Bank	To be heard	100
	To clean their image	80
	To clean the river	80
River Bank	To have their legal property rights	100
Mayor	To build efficiency image	80

	To support the big tanner's interest	90
	To stimulate new coming tanners	100
Council Villapinzón	To support the Mayor	90
Governor	To support the Court Order	70
	To support sustainable development	90
Ministry	To get a consensus on the national tanners' politics	100
	To reach sustainable development	70
Court order Bogotá River	To recognize the tanners' legal rights	80
	To stimulate CP	100

Table 7. Stakeholders/Interests/Priorities

- The results showed that the control authorities (CAR and The Public Prosecutor) considered building an **efficiency image**, a priority together with **short term implementations and command and control approaches (values 100-80)**.
- The results also showed that the local and powerful stakeholders such as the mayor, the council and the big tanner privileged **end-of-pipe solutions** and also **efficiency image (values 100-90)**.
- The small tanners showed the will to change and solve their environmental conflict provided they were **heard** and were able **to keep their identity as Small Enterprises (values 100-80)**.
- Stakeholders such as the Ministry, the Magistrate from the court Order on the Bogotá River and the Governor of the Province were interested in reaching **sustainable development** and **CP implementation (values 100-70)**.

The analysis regarding the main stakeholders' interests suggested that:

- The conflicting situation was bound to get worse since the control entities were aiming at just quick and drastic measures to solve the environmental problem.
- All the stakeholders showed an interest in finding a solution to the industrial pollution.
- The tanners needed to make other stakeholders listen to them. They needed empowerment.
- The tanners were not a homogenous group but they all were interested in maintaining their identities as MSEs.
- The Ministry, the Magistrate and the Governor could potentially become allies of the small tanners, even as indirect stakeholders.

(a) Data collection in order to unveil the history of the conflict (see 2.7.2)

(b) The BATNAs

- The Best Alternative to a Non-negotiation Agreement (BATNA) was very bad for the small tanners: Definitive shut down of the tanneries.
- There was also a bad BATNA for the region and for the authority itself: By shutting down the industries, poverty and illegal business would flourish since people did not have any other choice than developing underground activities.

The above statements suggested that leading both communities and CAR through negotiations was the best choice for the community and the authority. They both needed to recognize that their relationship was not of independency but instead of dependency and of a long term nature.

(c) A small tanner's profile

- A small tanner's profile was done with 60 tanneries in November 2004. (50% coverage)

90% with low educational level and a humble personality

90% of them are afraid of CAR

60% of them live on subsistence economy

100% of them have a family oriented industry

80% of them considered the tanning chemical products salesmen to be their teachers

95% of them are working below their installed capacity

100% want to solve their environmental problem but distrust CAR

90% of the tanners that have invested in individual end-of-pipe solutions, turned to have over invested and over dimensioned their technical solutions.

Table 8. A tanner's profile

4.2.2 Building relationship

This step includes (a) building trust by providing help to urgent needs, (b) sharing information, (c) trial and error approaches by the target community.

(a) The Change Agent aims at opening communication channels in order to build **trust** and long term relationships. By using the Dialogue methodology, the tanners **asked for help** and the researcher became an empowerment agent at the beginning. First direct access with the Public Prosecutor and the Ministry was worked on. Direct communication was established for the very first time between the authorities and the small tanners and (b) **sharing information** took place also for the first time. They started to be heard. The property legal papers were handed out

to the Public Prosecutor. CAR sets meetings with the Small tanners. (c) The target group is actively seeking the solutions to their problems and is undertaking **trial and error approaches**. The Change Agent becomes a source of containment and support or their “psychological safety” (Schein, 1996).

The approach was based on appreciative inquiry (AI).

- The tanners showed an interest in learning about CP. They chose the El Cerrito case as a legitimate example to follow. They visit El Cerrito. A first alliance is established.
- A new leader is chosen. The visible tanner that lived through the experience with the researcher was chosen to be their leader.
- The authority distrusts the participative process and the researcher in charge of it.

4.2.3 Redefinition of the problem

At this stage, new possibilities for the solution of the conflict had arisen. (a) By using the Dialogue methodology, individual meetings and a first initial big meeting, a **consensus** is being built over a new and an only definition of the problem. (b) Initial ideas are given to set a **strategy** to solve the problem.

(a) After having three definitions, all stakeholders agreed upon the following:

The past options to solve the problem in Villapinzón did not take into account the small tanners' interests.

(b) A SWOT analysis on the industry on 2.5.3 highlighted the importance to empower the tanners through holistic approaches and to take advantage of the opportunities at national and global contexts. The water situation in Colombia suggested the importance towards working on IWRM (Integrated Water Resources Management) and on prevention oriented tools as Colombia was already in 2004 realizing a quick environmental degradation with the Global Water Report (Esty, 2004).

A Strategy was then built with the target group after indentifying the barriers and needs and the essential issues to work on, and the possible allies.

The chosen strategy in the whole process of the tanneries would entail five basic issues shown in table 10. The progress is also presented up to the year 2010.

Issues 4 and 5 are in bold format since they constitute the efforts from the SWITCH project and Universidad Nacional and Colciencias and Universidad Nacional respectively.

#	ISSUES	AIMING AT	ACTIONS TO BE TAKEN	PROGRESS
1	United tanners willing to change	Empowering tanners in order to give them negotiating power and improve the	Tanners are aware and wanting to change	Reached since 2005 but needs to be constantly worked out. New publications on newspaper and TV.

		<p>outcomes of a negotiation</p> <p>Social inclusion</p>	<p>Motivating allies</p> <p>Motivate Media</p> <p>Better Public Image</p> <p>Following 6 STEPS process</p> <p>OST AI applied</p> <p>Broadcasting on the media</p> <p>Reliable technical information and support</p>	<p>Participation at two presidential councils in 2004-2005.</p> <p>The micro-tanner association becomes stronger. A positive and new leader is responsible for the association. Consensus on the tanners' problems among all the direct stakeholders. Cleaner production is chosen as the technical path among tanners.</p>
2	Process of Legalization	<p>Social and economic inclusion:</p> <p>Financial support becomes a possibility</p>	<p>Motivate the environmental authority CAR, control authorities (Public Prosecutor and National Comptroller) and the judge (magistrate) in charge of the court order on the Bogotá river to support the social inclusion of the tanners.</p> <p>Motivating a prestigious lawyers' firm to present a judicial action claiming the tanners' rights as socially excluded people</p> <p>Motivating the local judge to switch penal fines for environmental recovery work</p>	<p>From a universe of 150, 86 have been legalized in 2005 from a demand from CAR to start negotiations.</p> <p>The magistrate rules CP should be implemented in the area. Support from the Chamber of Commerce to finance such a process thanks to the senator and requests from CAR.</p> <p>Pressure on CAR from the Presidency afterwards, thanks to the senator.</p> <p>A judicial action that asks for the recognition of their rights as socially excluded people reaches de Highest Court and rules that the tanners had lost their legal opportunities</p> <p>The local judge gives the possibility to present a project on environmental recovery work switching fines- February 2010 (First time in Colombia).</p>
3	Inter-related issues	Reaching sustainable solutions by integrating land and environmental issues	Motivating Ministry and regional environmental authorities to participate at	Control authorities and political stakeholders as the President of the Senate in Colombia are supervising the process in order to solve the land conflicts. The Office of the Governorship influences

			<p>OST, AI and Dialogue technologies and discuss such issues.</p> <p>Following 6 steps process</p> <p>Denunciations on newspapers</p>	<p>CAR's directive board to work by integration. The mayor gives priority to the land issues of the tanners. The properties on the river bank will be bought by the Governor.</p> <p>The river bank policy is set in 2009.</p> <p>The industrial use is set in Dec 2010</p>
4	CP PROJECT SWITCH	<p>Environmental sustainability and social inclusion through education and technology:</p> <p>Reaching a technical solution for SMEs in accordance with the requirements from the law, that supports prevention, and recognizes the interests of the tanners.</p> <p>International and national support</p> <ul style="list-style-type: none"> • Technical support • Political Support • Financial support 	<p>Motivating academia, and environmental authorities to support the technological change chosen by the tanners. Following a 6 steps process</p>	<p>SWITCH-UNAL started in 2006</p> <p>Colciencias co-finances 2007</p> <p>The Authority CAR itself co-finances with training in CP relying on academia.</p> <p>The tanners are trained in CP and environmental matters-Innovations on dehairing processes from tanners themselves</p> <p>Since 2004-2009 12 legalized Tanners had reduced 71% on Chromium, 72% on Sulfur, 48% on BOD₅, and 75% on TSS on the liquid discharges to the river and saved 70% on water use</p>
5	Business Development program	<p>Social inclusion through economic opportunities</p>	<p>Searching new markets</p> <p>Growth prospects</p> <p>Competitiveness through associative strategies on the leather chain</p> <p>International and national support</p> <ul style="list-style-type: none"> • Technical support • Political Support • Financial support 	<p>Colciencias-UNAL also concentrates the efforts on the competitive issues.</p> <p>The Technical Leather Body gives training on better quality products.</p> <p>The tanners are trained on business matters.</p> <p>Access to credits from the ministry of commerce is being worked out.</p>

Table 10. Original strategy and progress up to year 2010

4.2.4 Common grounds first internally and second among all

This step aims at building common grounds first among the target group and second among all stakeholders. Strategic meetings were organized for both targets. A thorough search on the people and the organizations to invite to the meetings based on OSTs and Als methodologies was carried out. All stakeholders invited were high decision makers in order to enable, the day of the event, to establish commitments and serious input. Those methodologies involved between 80 to 100 people, assuring that all the interests would be represented (Tandem, 2010). The work was done on “future search scenarios” (starting from consensus over the future and going backwards to the present where the difficulties are found) with all the stakeholders.

Motivating people to assist to the events implied making personal contacts in the first instance and writing and sending strategic invitations (See Annex 1.). As a result of the first OST in May 2004, a member of the Chamber of Deputies (a senator afterwards) brought the debate to the Presidency of Colombia when the conflict was at its worst (see details on OSTs in annex 2). The CAR representatives made clear that they would work with the tanners provided they go first through a legalizing process entailing water and discharge permits.

4.2.5 Agreements, Implementation and Follow-up

These two last steps had been worked together with support from SWITCH-UNAL, Colciencias and CAR. CAR recognizes on public documents that they learned to work with MSEs. These steps are explained on the deliverables (4.2.3, 4.2.4. and 4.2.5) and the progress on the strategy (table 10). They have lasted 4 years.

The project's time line

#	Steps	Dates
1	Preparation	March 2003-April 2004
2	Building Relationship	April 2004- May 2004
3	Redefinition of the problem	May 2004- June 2004
4	Common grounds internally & all	June 2004- June 2005
5	Agreements	June 2005- December 2006
6	Implementation & Follow-up	December 2006- January 2010

Table 11. Time line

Summarizing the results from the 6 step process:

Step 1 - preparation - identified the interests at stake and **three** main problem definitions. In fact at the beginning, the authorities considered that the cause of the problem was that the tanners had rejected any solution offered to them. The tanners' leader at that time considered that the problem was that the tanners did not have the money to implement the end-of-pipe solution. The tanners said that

the authorities never listened to them and that they wanted to clean the river while maintaining their identity. Their leader, chemical salesmen, and local lawyers had made a living out of the conflict without offering real solutions. The lawyers had manipulated them until the point that they could not present legal defences because the legal terms had expired.

By the end of step 3 -redefinition of the problem-, one problem definition allowed to build some consensus: **The past solutions never took into account the small tanners' interests.** The authority recognized that their relationship with the tanners is interdependent and on a long term basis.

The first 3 steps were followed in small groups and lasted 3 months. A new leader was chosen and the association became strong; CP was identified as their technical option, the magistrate responsible for the court order on the Bogotá River (see introduction) supported it. The property rights of the tanners from the river bank were respected. Individuals were eager to participate on a CP program.

The process from step 4 to 6 needed feed-back and needed to be brought to big groups (big groups methodologies like Open Space technologies (OSTs) and Appreciative Inquiries (AIs) constantly in order to build common grounds. As a result of the first OST, the senator that had participated decided to support the conflict resolution process and opened channels with the Office of the Presidency, the President itself and the Chamber of Commerce in order to support a legalizing process demanded by CAR. CAR stated that it needed to get proof of the tanners' will to change before considering evaluating a CP project for the tanners. At the same time as a solution was negotiated with the Authority, the negative actors like the initial tanners' leader and the large tanner slowly started to get excluded from the process by losing power among their former supporters. The mayor had no other option than putting himself away. Reaching step 5 (agreements) took 2.5 years while the first steps were reached in three months. Five AI and OST methodologies were implemented.

At the end congruent with the strategy being set:

Allies: The CP branch from El Cerrito got involved in the process as an ally. Powerful stakeholders such as the Office of the Presidency, the magistrate, the senator, the Governor, Academia and the Ministry of the Environment became strategic allies.

Will to change: 66 tanners financed 15% of their environmental legalization process by presenting the legal document stating the technological solution to the discharge pollution problems known as PMA, (CAR, 2004) asking for discharge permits and organizing themselves in 7 collective water associations. Tanners have been investing on CP and innovating. The tanners from the association (grouping 100 tanners) bought a land for solid waste valuation (year 2010). **Since 2004-2009 12 legalized tanners had reduced 71% on**

Chromium, 72% on Sulfur, 48% on BOD₅, and 75% on TSS on the liquid discharges to the river and saved 70% on water use.

Relationship with the authority: The reopening of the tanneries (except the ones on the river bank that would sell their lands to the Governor) was accepted by the Regional Environmental Authority based on recycling sodium sulphate and chromium sulphate. The authority created a CP branch. The authority is working on a policy proposal for industrial discharges based on loads and not just on concentrations. The authority finally accepted CP as the technical option with difficulty because (a) they thought CP was designed for clean industries becoming cleaner and not for dirty industries, and (b) they had no control upon CP processes.

Academia: At the stage of implementation (6), the SWITCH-UNAL project represented the opportunity for the implementation of CP in six pilot industries. The authority has joined SWITCH financing 6 more industries as pilot industries. There are now 12 pilot industries that are motivated and innovating on better dehairing processes based on improving control operations.

Fighting barriers to exclusion: A judicial action, facilitated by this research with prestigious lawyers, asked for the recognition of the tanners' rights as socially excluded people. This action reached de Highest Court, which ruled that the tanners had lost their legal opportunities to claim for their rights (year 2007).

For the first time in Colombian history, the judicial system is considering compensatory work on environmental matters instead of the fines the tanners cannot pay, based on an initiative from the tanners and supported by all the authorities. The latter is an example of participative policy-making (year 2010).

Their industrial area is in the process of being legally recognized (year 2010).

In the political arena, in the elections of October 2007, the tanners supported a candidate for mayor that won the elections.

In the water policy domain the micro-tanners' association is participating actively at the monthly national tannery committee that discusses the policies and strategies of this industrial sector at the Ministry of the Environment.

As a result of the whole process, the tanners got empowered and counted with allies on every issue stated on the original strategy. The strategy aimed at strengthening the tanners' association, legalizing the tanners and helping them to sort out the legal barriers, solving the inter-related land issues, implementing the appropriate CP options, and implementing a business plan for competitiveness.

4.3 Results regarding the CP's and the change agent's roles in the related conflict and the role of institutions towards participation and informality,

CP role

CP was seen by the tanners as a key to solve their problems because it would not force them to lose their identity as small industries. The authority CAR was reluctant initially to allow the tanners to engage on CP implementation because CP seemed only like a practice based on good intentions the authority had no control over. CAR did not have at that time (2004) implemented CP programs and CP was seen even by the director as “a practice meant for industries that were already clean and wanted to become cleaner” (personal communication, 2005).

Change agent's role

The researcher's role was inspired by the change agent from Schein's (1996) theory of managed learning.

Since the researcher started without a formal position of power, her strength originated from the support given by the tanners. The researcher's role was seen initially with suspicion by the authorities (personal communication, 2006). It was not until reaching step 4 on building common grounds among all the stakeholders that diverse strategies from the authorities that were meant to block the process based on action research on the tanneries, cooled down. Once step 4 was successfully reached, the change agent became almost like a “natural” actor that the formal stakeholders had to give recognition to because of the results.

Based on Managed Learning, the researcher's intervention was substantial at the initial steps when the empowerment was starting, but diminished at the last phases as the community started to become its own master.

Participation and informality

Even though Colombia's environmental law of 1993 has considered stakeholder participation as an essential issue to be taking care of at all levels, the regional authority CAR was using participation only in 2004 to inform communities about decisions already made. The authority had traditionally used top-down approaches.

In 2004, as the CAR authority got confronted with an innovative participative process in Villapinzón with the tanneries, mistrust and incredulity were found from its side (personal communication, 2004). Once CAR realized that the tanners were starting to show their will to change, the authority started to recognize the importance of assuming a collaborative process with the tanners and of breaking with a conflicting past (official news from CAR, 2008).

By the end of this research (2010), the authority is making participative councils in order to get ideas and proposals from the different communities. Follow-up from the side of the communities to their inputs is not implemented though. Participative policy making is absent. Informal industries with specific characteristics are not being addressed through specific policies.

5. DISCUSSION

5.1 On theory and methods

Engaging in a long-term case study based on action research had strengths and draw-backs. Some strengths were presented in the chapter on results. The problems are related to:

- Difficulties in finding financing on a long-term basis
- Investing a greater time in preparing and working on consensus
- Organizing and making multidisciplinary teams work efficiently
- Building commitment towards the action research process from official stakeholders, which do not usually stay in their posts for long periods
- Needing constant feed-back and reflection

The critique of existing methods more frequently used by researchers like- statistical analysis, quick questionnaires, shallow interviews, and short term quick research- which correlate data but not context, states that these can omit crucial aspects in terms of the complexity involved with MSEs.

Qualitative methods like a case study aiming at understanding of the social processes involved in technological changes, offer long-term advantages:

- (d) Since qualitative methods can work either top-down or bottom-up, they can descend to the level of the local actors and identify details of the environmental technologies, internal and external elements of an industry, and the social and economic relationships that are relevant to explain the technological change that cannot be captured by aggregate quantitative analysis (Del-Río-González, 2009).
- (e) For social problems, qualitative approaches privilege understanding. However, generalisations cannot be expected unless these are considered in light of other scientific facts (Baskerville, 1997).

This research intended to do justice to the complexity of the problematic of MSEs impacting water bodies. By recognizing the complexity and interdependency of factors, this research proposed an innovative approach that might come across as haphazard rather than methodical in terms of a conventional vision because it reflects the politics, the institutional demands, the everyday struggles, the chaos and the confusion inherent to MSEs impacting water bodies in the context of Colombia.

This is the reason why the design of the research responded to the needs of the situation in every step and not just to a standardized pre-established framework. This research responded to the how questions instead of to the frequency of the appearance of problems.

As stated by Van Berkel (2007), this research focused on an integral approach to CP where the technical component as important as it is, is put into the specific context in order to adapt it to it, to stimulate the appropriate behavioural change and to build commitment toward CP implementation.

5.2 On the 6 step process

As stated by the theory of Managed Learning (Schein, 1996), the initial preparation step, designed as a low key inquiry process provided important information on the diagnosis of the conflict: Besides information on the interests, potential allies, BATNAS, nature of relationships (taken from the theory of Negotiation), and the initial definition of the problem, it showed a vulnerable system eager to be helped.

- The tanners asked for help once they felt the researcher seemed to have a comprehensive approach to their problem and was asking them for their own definition of the problem.
- Announcements of drastic measures from the authority CAR in the past had made the tanners go many times through similar processes of anxiety, and negative agents (lawyers, chemical products salesmen and individual sewage system plants salesmen) had taken advantage and had even made a living out of these negative cycles.

The lack of consensus regarding the original definition of the problem at the preparation step suggests that the different stakeholders had limited access to the relevant information. It was only after a successful initiative to listen to each other's opinions had been implemented that the stakeholders started to recognize each others' points of view.

As for the steps where big groups methodologies were used (steps 3, 4, and 6), the OSTs applied showed long lasting commitments. In none of these five cases, negative actors could exert influence as had been observed before the whole process started. Positive results were even found without being able to make OSTs last two classical days (Holman, 2004). In Villapinzón, they could only last 5-6 hours for practical reasons. Besides, the topics could not be discussed in small groups because everybody wanted to be involved in all the issues.

Using "future search scenarios" at the OSTs (Holman, 2004) helped in building, even on a complex problem like the one in Villapinzón, some consensus right at the beginning.

In terms of the 6 steps process, the approach was congruent with the Conflict Resolution Theory that aims at building common grounds on those groups as well as respecting the individuals. The 6 steps approach proposed 3 steps working individually or in small groups and 3 in basically big groups. The inspiring idea is that individual and collective interests are equally important towards solving a water conflict and that $3+3=6$. This six steps approach could be used as a policy tool.

Barriers to CP implementation

As it was anticipated from the stakeholders' analysis on interests at the initial step, the closures could not be avoided since the authorities CAR and The Public Prosecutor were seeking to build a public image based on efficiency.

The technical solutions and agreements on the CP implementation at a big scale have been delayed because of the interdependent and essential land problems (property rights on the river bank) and the technical uncertainties setting the extension of the river bank. The tanners facing uncertainties related to the land properties and the right to develop industrial activities in the area could not implement CP until clear rules could be elaborated. The tanners not having land problems were the only ones allowed to invest on technical solutions that would be accepted by the authority.

A project supported by the IAB (Inter American Bank) to do industrial planning could not be carried out since the whole area had not been legalized in terms of the industrial use by the municipality and CAR. This legalization process defining the industrial use in the area would not be finished before December 2010.

The land issues showed a more complex nature involving the municipality and a larger variety of interests regarding property rights, and local control and supervision is lacking. This is congruent with the fact that many authors state that the most difficult issue in Colombia is related to land property and zone planning (Forero, 2010). Land matters imply working on definitions of different development models, which are at the heart of the debates in developing societies in order to establish good governance (Van der Zaag and Bolding, 2005).

Besides land problems, local corruption constituted also a barrier that delayed a wide CP implementation.

Step 5 (agreements) was delayed (7 months) on the decisions to reopen the tanneries simply because of local corruption at CAR. The local director was found to privilege the tanneries that were paying him a personal fee. This local director was thrown out by the new administrative body in January 2007 once the local people denounced and acted proactively.

5.3 Regarding the CP's and the change agent's roles in the related conflict and the role of institutions towards participation and informality

CP role

CP was seen by the tanners as a key towards solving their problems. A trust building step where help was given on impending issues motivated the tanners to commit and seek to implement CP through trial and error. The Authority CAR was reluctant initially, possibly because they did not have the right control instruments for it (Fronzel *et al.*, 2005).

Besides internal barriers related to education, access to financing, lack of a CP policy that works in parallel with command and control, and the natural difficulties inherent in behavioural change within the communities, inter-related land issues

and corruption hampered the tanners from fully implementing CP on a broader scale.

Change agent's role

Since the change agent -researcher- (Schein, 1996) did not have a formal position of power; it turned out to be essential to work on building a trusting relationship with the community from the very beginning. The researcher's power to lead the process of change came from the fact that the tanners considered they chose the researcher as their facilitator or helper. The tanners developed a sense of belonging and commitment to their own process of change.

In order to handle the conflict, the change agent needed besides what was stated on the theory by Schein (1996), (a) to build strong leadership, (b) to identify committed and strategic people -champions- within the different allies, (c) to be independent, and (d) not being afraid of working in the political arena.

The independency was determined even from academic constraints to act in cases where public denunciations were needed in order to follow the set strategy. Following the strategy was not without difficulties since it asked in multiple occasions to fight against prejudices towards underprivileged groups.

Participation and Informality

Even though the authority decided to support the CP implementation project (SWITCH) through an action research, high degree participative approaches are not being reached as of the year 2010 by the authority. It could be possible that once the policy on integrated water management is enforced by the Ministry, highly participative approaches shall become more frequent.

The approach from the institutions towards informal industries has encountered even more barriers.

A parallel process that was facilitated through this research on a comprehensive judicial action claiming for the tanner's rights as socially excluded people was taken into consideration by the Highest Court in 2007. This action was finally dismissed as the judges considered that the tanners had lost all the opportunities that the formal system had offered to them. The latter is congruent with Guio's results (2004), stating that the institutions in Colombia have a low solving capacity of the water problems such as industrial pollution and of supporting informal businesses to acquire environmental status and social recognition.

The legal actions taken as a sole strategy towards solving the pollution problem of the Bogotá River at the tanneries has proven to be ineffective for the past 20 years (CAR, 1998). This previous experience was taken necessarily as a historic control to be compared with the solution and the results derived from this research.

6. CONCLUSIONS

Within the scope of this study, the following conclusions can be drawn:

- This research constitutes a paradigm shift since commitment to the CP implementation was a precondition to start implementing a project.
- It is advisable that the CP policy measuring loads instead of concentrations be integrated into the formal framework of the authorities and does not respond only to voluntary agreements.
- The decentralized development model has brought efficiency to the solution of several local issues. Nevertheless, the lack of effective supervision and control over the local budgets from the Central Government might be causing barriers to good governance in the water sector in Colombia.
- The definition and involvement of parties implies more steps than just a stakeholders' analysis. It includes (a) building relationship between the negotiator and the stakeholders, (b) defining the best alternatives to a non negotiation agreement (BATNAS), (c) determining the initial(s) definition(s) of the problem, (d) determining the nature of the relationships: short or long term basis, and (e) defining possible allies.
- The integration of a community that has been breaking the rules for decades is a shared responsibility with the concerned institutions rather than just the responsibility of the community itself. The responsibility of the Authority on the tanners' conflict entailing social inclusion had been neglected for years.
- Through the systematic 6 steps approach, the owners of the micro-SMEs showed to be knowledgeable regarding their own problems and willing to change. The micro-SMEs fully supported the process aiming at their own social inclusion.
- In water pollution problems dealing with marginalized groups, the development of conflict resolution mechanisms in the formal institutions can be a useful feature to be integrated into Colombian policies.
- Building the strategy of an action research is a dynamic process needing constant feed-back from the researcher and the target group. By being permanently reflective, the approach could be reshaped constantly to address an ongoing process of change.
- Initially, CP fitted the needs and interests of the micro-SMEs. CP implementation could be adapted to their budgets and did not threaten their identity as a small sized industry. CP did not fit initially to the end-of-pipe approach from CAR. Only in a later stage, a mixture between CP and end-of-pipe became acceptable to the institution.
- Effectively integrating land issues and environmental issues proved to be a priority.
- Along with the interrelated land issues, the micro-SMEs access to credits were the most difficult tasks to work on.
- The researcher's role implied a demanding and complex task that needed commitment to the process on a long term basis. The role was set as a change agent that needed to be able to be versatile and independent.

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