

# **PhD**

## **Title and Author**

Sustainable Small Tanneries in Colombia through a Systematic Approach on Conflict Resolution and Socialization of Cleaner Production

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## **Abstract (~500 words)**

Micro and Small Enterprises (MSEs) are responsible for 70% of the industrial pollution in the developing countries. However, because of their specific characteristics, the existing laws and policies usually bypass them. They have difficulties climbing the social ladder. Traditionally, the interests of MSEs have been put aside relative to those of the larger industries because of their lack of negotiating power. As a result, it was never clear how to deal with MSEs in countries like Colombia where they, nevertheless, represent 99.4% of the number of enterprises.

Just applying environmental laws would raise production costs and, thus, threaten the viability of the MSEs, resulting in more social unrest. However, although Cleaner Production (CP) seems to be well suited, CP programs for MSEs are not broadly implemented and end-of-pipe approaches still dominate and entail high investments for MSEs.

No surprising, MSEs are in frequent conflict with authorities.

Working with MSEs impacting upon water bodies implies designing and implementing, jointly with the target group, a strategy based on the necessity to put an end to the social exclusion and to a mostly technology driven end-of-pipe focus. The strategy is based on internal strengthening of the target communities, and on building strategic alliances in order to face the different issues at stake. The approach is based on understanding the context and the specific needs of the MSEs, elements which are usually absent in the mainstream consulting approach.

This research proposes five principles to deal with underprivileged communities (100 micro-tanners with indigenous background impacting the upper basin of the Bogotá River), based on the theories of negotiation, conflict resolution and managed learning. It follows a process of six cyclic steps that are critically reflective and that follow a systematic process aimed at raising the negotiating power of MSEs, at focusing at multilevel and multidisciplinary interventions, and at leading the marginalized communities to learn to solve their own problems.

Results showed that empowering communities can result in success for the environment. Technical solutions are better worked out once the impending social challenges are faced and consensus has been built with all the stakeholders involved. A mutual learning process showed that recognizing interdependency and long term-relationships between authorities and communities were essential to build consensus and commitments. Between 2004-2009 reductions in pollution loads of 32-68% in Chromium, 60-72% in BOD<sub>5</sub>, and savings in water use between 24-68% on the liquid discharges to the river were measured. Tanners are doing solid valuation from the grease and hair residues. They bought a land plot for this common purpose. The tanneries were legalized by the authorities and were grouped on 7 water associations for water use. Inter related land problems were handled with the institutions. A decision making tool was created for tanneries. The tool is based on sustainability indicators. These technical results were obtained with the research done in SWITCH with the UNIVERSIDAD NACIONAL. This work, thus, proposes a paradigm shift in dealing with MSEs.

This work with MSEs in the area of Bogotá may have consequences for the approach chosen in cities around the world that are tackling the issues of pollution of river systems and of sustainability of marginalized communities. Six years of action research has proven the impact that can be realized when conflicts can be resolved for the benefits of all.

### **Relevance for the river system**

Even though it is clear that the biggest polluter of the Bogota River is the city of Bogota because of the wastewater it generates, focusing on cleaning up the upper part of the catchment could provide hope and encouragement for recovery of the river further downstream. The upper catchment before the river reaches Bogota, accounts for perhaps only 5-10% of the pollution load but there are some important water users. A water treatment plant (called Tibitoc with a capacity of  $4\text{m}^3/\text{s}$ ) supplies the northern part of the city with water abstracted from the river. It is also an important zone of horticultural cultivation. Both these users face operational difficulties because of high contamination levels of the river.

### **SWITCH Deliverable Contribution**

This PhD research has made possible the research by UNAL on workpackage 4.2. Specifically, the deliverable 4.2.2 describes the systematic approach developed as action research.

It supported the paradigm shift proposed by the SWITCH project in dealing with micro-SMEs: Technical solutions are better worked out once the impending social challenges are faced and consensus has been built with all the stakeholders involved.

Three indicators created to make a diagnosis of the conflict were at the base of the monitoring tool for tanneries developed by UNAL.

This research was successful at making authorities and communities to be in speaking terms after decades of conflicts. It created strategic alliances that empowered the socially excluded groups. Cleaner Production, a technical solution based on preventive strategies and supporting Integrative Water Management was successfully implemented as the tanners went through positive behavioural change.

## **Description of how PhD contributes to goals/objectives of deliverables**

This research in the area of Bogotá with small enterprises may have implications for cities around the world that are tackling the issues of environmental pollution on river systems and of sustainability of marginalized industries.

It has developed for the SWITCH project, the tool SASI (Systematic Approach for Social Inclusion) that supports the transition towards sustainability of informal micro industries.

This action research has proven the impact that can be realized when conflicts can be resolved for the benefit of all parties involved. At the SWITCH meeting in Zaragoza, it inspired the fact that the conflicts can be seen as opportunities for positive change.

This research was a successful case of stakeholder engagement with a large diversity of actors. High decision makers belonging to the political arena were specifically involved for social inclusion purposes.