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Abstract

Shifting cultivation is a polemic topic as it involves environmental and social aspects which affects the life of many small farmers around the world. There are concerns about deforestation and biodiversity, as well as food provision, and the production of charcoal by farmers to provide for their families. The illegality of the slash and burn practices causes them problems with state's institutions. Researchers who have formerly investigated the situation of farmers working with slash and burn take different positions about environment and social aspects of the situation and there has not been extensive work in bringing actors involved to work together. In a community in the south of Brazil, a group of farmers has been given a new procedure to legalize their work in the municipality they live and started an association, nevertheless they still face problems, moreover in the same community farmers working illegally are still many. This case attempted to gather actors to discuss and propose improvements for the situation of the farmers and uses Soft System Methodology. To investigate the issues, interviews were performed and meetings arranged. Written material was also studied to complement the data. After this first phase, a graphical representation of the situation was made and based on that, the work proceeded with meetings with the actors to identify and prioritize main issues. The result was proposals for improvement in coordination of activities and resources, together with close cooperation among farmers and state institutions. The proposals chosen suggested that a more coordinated and communicative action between farmers and institutions is the best way forward however underlying issues were identified and could be an obstacle for the improvements. The overall conclusion is that the intervention succeeded in gathering the actors to discuss together and to propose changes nevertheless decision making to approve the changes is still an issue. In addition, communication is affected by historical and cultural factors unfamiliar to the involved.

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1 Introduction

Slash and burn or shifting cultivation is one of many paradigms of environmental and sustainability concerns. On the one hand there are the consequences of deforestation for plant and animal's biodiversity and on the other hand there is the social situation of small scale farmers who use slash and burn cultivation as the only or primary choice to make a living. All over the world, shifting cultivation has been used, in different cultures and settings also in different ecosystems; in Europe it was widely used in the end of the eighteen century (Myllyntaus et al., 2002); Nowadays, it is practiced mostly in the tropics; In Africa it is still largely used; about 60% of Africa's food comes from Slash and Burn agriculture (Dion, 2010).Nevertheless, It brings different concerns in each place; for example, regulations and increase in populations can make farmers decrease fallow time which is not optimal, as in the case of Laos (Roder et al., 1997). In tropical Americas, (Kass and Somarriba, 1999) different systems of fallow in shifting cultivation are used; as example, in Peruvian Amazon swidden agriculture is source of cash for the peasants and its traditional use shows that it is not an "important cause of deforestation" (Smith et al., 1998). Although charcoal use in Brazil is mainly industrial (Chidumayo and Gumbo, 2013), the small scale production is seen in different areas around the country. In the north of Brazil in the Amazon region, there is evidence of slash and burn being practiced around the time of colonization of the country or just before by indigenous people (Francis and Knowles, 2001). Shifting cultivation in Brazil has been a controversial subject, according to the Brazilian Forest Code (Jusbrasil, 1993) forest's areas should be preserved, nevertheless, there are studies showing that slash and burn can be practiced without great negative consequences for the environment. One example, in a study in the Amazon area, the use of slash and burn exercised in the production of Brazil nut decrease the chances of changing forest areas in crops or pastures, which is one of the main causes of deforestation (Paiva et al., 2011). Shifting cultivation is also a common practice in the Brazilian Atlantic forest, in the coast, a diversity of crops are cultivated by indigenous groups and "caiçaras" who are inhabitants of Brazilian Atlantic coast (Peroni and Hanazaki, 2002). In the traditional shifting cultivation, the trees are used as source of nutrients for the soil making the use of chemicals unnecessary; it does not degrade soil (Brady, 1996). But this has also changed and it is argued that there is difference between traditional shifting cultivators and the "shifted cultivator" who are migrants that started only recently practicing slash-and-burn and do not take into account the environment(Kleinman et al., 1995).

All these examples have at least one thing in common, simple people wishing to continue with their work and institutions helping or fighting them, the latter, for not proceeding according to the environmental laws implemented in the recent years in most of the countries. Nevertheless, if managed in right conditions, slash and burn can be sustainable (Kleinman et al., 1995). That is the case of some of the Biguaçu farmers. Many of the community's inhabitants work with slash and burn ("roça de toco") were different products are cultivated, specifically cassava, which is one of the main crop produced in the region. This practice has been used in the community for decades, but the land use has also

changed during the years, mainly because of the restrictions of the use of slash and burn(Fantini et al., n.d.). These restrictions have affected the farmers' life in a negative way. Nevertheless, these small farmers have been presented a new way of doing shifting cultivation which gives the possibility for extraction of charcoal with less impact on the environment. In addition, different research projects have started and comprehend significant changes in some of the farmers' life. These projects involve mainly the Santa Catarina state university and EPAGRI - Agricultural and Rural Research Agency; the efforts are concentrated in helping them in the environmental aspect of their work and even those not participating in the projects have been benefited by the results in one way or the other.

These activities with the farmers motivated some of them to find a way to join efforts, which resulted in one association[1] created in 2013. This association counts with the assistance of the institutions[2] mentioned previously and it has the aim of helping the farmers with the products' packaging, developing their own brand, following standards and helping the sale of the products. Although the association is a big step in helping the farmers monetarily and in marketing their work, its success does not motivated many of the farmers in the region to join the new institution and illegal activities are still common practice. Before the start of the association and the new legal ways of extracting wood for the charcoal production, they were afraid and lived in a never-ending worry about the inspections; which now a days, occurs seldom in that specific area (but neighbor communities are still under pressure with this kind of monitoring). However, the report of the illegalities continues and usually come from citizens and institutions' workers, also from government officials monitoring the area. Therefore, associated farmers want to bring more participants to join the association and set them free from the stressful situation that illegal work brings with it, also to make the association stronger; but they are finding difficulties in convincing them to become members. Those working illegally think that it is not worth the effort and they still do not trust institutions even knowing that the cooperation with them gave possibility for the start of a new improved life for some farmers; Moreover, the association has its issues internally, as commonly happens with new organized group of people working together; even though the participants know each other from before, they are not used to collaborate in the way this partnership requires. In addition, personal matters between them and institutions make the cooperation difficult and the work slow. Many changes have happened to these farmers in the latest years and they need to understand and learn how to deal with the new situation. The production and trade of charcoal is a controversial topic and it has its impacts in forests and people. Laws and policies are frequently questioned and governmental institutions are most of the time involved as decision makers; many times their involvement is seen as damaging and biased by the way their internal work and staff is structured. Cultural and political factors have great influence in the way the problem is approached. Much of the discussion about this topic involves those that are worried about the environmental damages and those that do not see it as a threat to the ecosystem (considering the small scale production).

This study aims to understand how the changes are affecting the charcoal farmers and their current situation, it uses a systemic approach. The central point is the way communication with institutions is perceived to help the development of the farmers' present state of affairs in the community of Tres Riachos. Specifically, the effect institutions have upon them and their own institution: the farmer's association. In addition to that, facts that influence some farmers that do not want to participate in the association, the 'legal institution'.

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[1] Association - An organized body of people who have an interest, activity, or purpose in common; a society. (FARLEX,2011)

[2] [2] Institution -
An established organization or foundation, especially one dedicated to education, public service, or culture(FARL EX,2011)
In this work, the word institution is used to refer to particular governmental and public services organizations

The main question is: what is the institutions' role in this process?

Credibility of institutions has decreased the latest years, one sign of it is the increasing number of citizens organizing themselves to action groups and social movements outside the political system (Werner, 2000). In view of this situation, political culture is changing and due to increase of awareness, small farmers are seeing the advantages of being associated, which is one of the departure points of this study. The willingness of leaving the illegal activities to engage in participatory group activities, challenging state's institutions to help them and civil society to accept that they are part of a community are their motivation; communication has a crucial role in this process. Since the work with the farmers started, different institutions have been involved but the work is resumed to those working legally, which is a common approach in such cases. Referring to the law, institutions can easily transfer the problem to legality of the issue. Following, a short description of the institutions involved in the case.

Institutions involved in farmers' issues

IBAMA - Brazilian Institute of Environment and Renewable Natural Resources

They are not closely involved in the farmers' issues and there are different opinions about their role. Farmers say they are the ones to be blamed for the inspections. Nevertheless, the inspections are done by the environmental police who have close collaboration with IBAMA.

Environmental police

Inspections and law enforcement; protection of environment and natural resources.

FAMABI – Environment Agency of Biguaçu

It was implemented to help decentralizing the work of the Santa Catarina State; one of its responsibilities is the licensing of farmers activities regarding the slash and burn.

EPAGRI – Agricultural and Rural Research Agency

Work with research in the SC state; many o farmers projects are financed by EPAGRI

FATMA – Environmental Foundation

Not very clear their participation in farmers' issues; one person involved but not representing the foundation. They also do the inspections and many times works with IBAMA and the environmental police

UFSC – University of Santa Catarina

Responsible for many of the projects with farmers, have their trust and respect

1.1 Study area description

Tres Riachos is located in the municipality of Biguaçu in the state of Santa Catarina, south region of Brazil. The town has its origin back in the 1787 with São Miguel village settled followed by Tres Riachos among others; however there is no accurate information about the beginning of its territory. Its population at the time of the origin was made of immigrants coming from Portugal - Azores region, Africa and Germany, being the great majority Azoreans. Located on the Brazilian coast, its Atlantic forest biome has numerous species of plants and animals. The municipality's agricultural production includes banana, orange, sugar cane, beans, cassava among other products. The population of Biguaçu is estimated to be approximately 60.000. Around 90% of the population lives in the urban area and the remaining live in the rural zone (IBGE, 2016).

Demography

Total area: 367,891 km2

Population density:156,94 pop./ km2

Total number of citizens: 64.488 (estimative 2015)

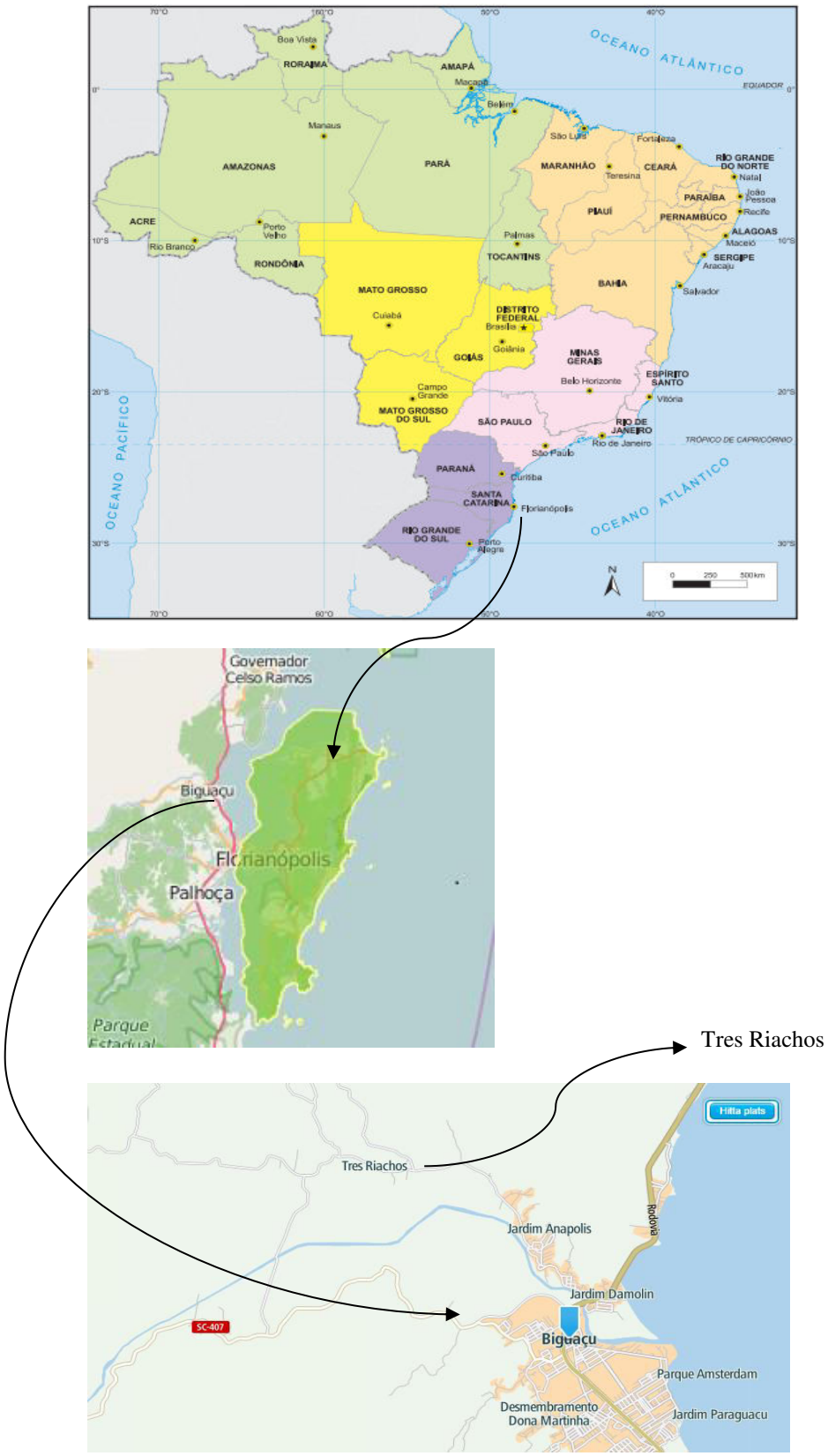

Figure 1- IBGE,2016. Location of Tres Riachos in the Municipality of Biguaçu.

1.2 Problem statement

In Biguaçu, farmers have been practicing slash and burn agriculture for many years; mainly, the charcoal is sold illegally in markets; they also cultivate crops for sale and for own consumption. It is usual practice in the region but as it is illegal, the authorities try to stop it with frequent inspections. Nevertheless, some projects initiated some years ago have helped the farmers to legalize their work and drive attention to their problems. Some farmers follow the new rules and have started an association which is struggling to get a place in the market concurring with the illegal charcoal. The farmers wish to bring those still working illegally to the association but they have not succeeded. Although the association is seen as a success for many it has still faced barriers and need assistance.

Considering the relevant institutions in the case, they are working with different issues in an uncoordinated way and responsibilities are not clear for the representatives. Farmers need assistance and there is a wish to succeed to make the case of farmers a reference for other farmers in the country who are facing the same problems. An understanding of the involved and the issues is necessary to start making the improvements achieved remain.

1.3 Objectives and Research questions

Charcoal production as subsistence small-scale farming is common in Biguaçu but this has been the cause of many issues related to the environmental law changes that happened some years ago. Farmers in the region are trying to cope with the changes in different ways. This paper attempts to understand the situation of the farmers due to these changes. The aim is to 1) describe and analyze the main actors involved in the situation of the charcoal farmers and to examine critically what are the main issues the farmers are facing; 2) take a systems approach to understand, identify and describe some of the issues; and 3) propose ways of addressing them. This study attempts to explore their situation in relation to institutions involved and their own association answering the questions below.

Main Research Question:

What influences the situation of farmers practicing slash and burn in Tres Riachos in relation to institutions and which of these can be improved?

Specific questions:

What are the main issues faced by farmers producing charcoal legally as perceived by them in the community of Biguaçu?

How are the different institutions in the state of SC involved in the situation of Biguaçu's farmers?

What changes could be brought about towards improvement in this situation?

1.3.1 Thoughts behind the central questions to be addressed

Theoretical level: Contribute to the discussion of the institutionalization challenges of farmers; the role of the institutions and the paradigms of the production of charcoal.

Methodological level : Give some insights about the Soft System Methodology applied in the case of the farmers - considering time restrictions and other factors.

Practical level: Change/improvement in farmers' practice

There are different aspects that could be focused on this study; as examples, the specific environmental impacts (positive or negative) or the social effects of farmers' illegal work. However important to the farmers' situation they may be, the focus is on the influence of the institutions in farmers' issues.

1.4 Constraints

Time is the main constraint in this study as the time the researcher spent on site was limited.

1.5 The importance of the study

There are many farmers in different regions in Brazil which have the production of charcoal as their main living income. It has many implications for the environment and for them in the society, as they can be seen as environmental criminals. The work done in Biguaçu has improved the situation of some of them and can be seen as a reference for other communities in Brazil; but some aspects can be considered to make their achievements permanent and serve as basis for other farmers in the same situation. The systemic study bring together many of the actors involved in the problematic situation, help them and improve learning, it also increase understanding of the problems farmers working with charcoal production are facing.

2 Theoretical perspectives

Situations in Natural Resource Management are complex, usually includes problematical social world expressed by different worldviews, social exclusion and including minority groups; Soft Systems Methodology with its inquiry and learning approach offers a flexible framework where parts are involved in discussion and provide models of purposeful activities which results in a learning system. It leads to a debate about different world views, communication among actors take place and give opportunity to critical reflection and learning. The debate about how they see their situation, the relationships involved, leading them to reflect about activities that can improve their condition socially and politically is essential. The learning, as a desirable consequence, helps in approaching future real-world complex situations. Therefore, it is important to understand how the communication take place and who is involved in practice. I propose to look at the institutions involved and guided by some of Habermas main ideas in his theory of communication, I'll question and challenge the way the farmers are seen and the means adopted by the institutions for tackling the farmers' problem

2.1 Systems Thinking

Systems thinking ideas, as a holistic thinking, exist for long time in history but it has formed as a concept nearly in the middle of 19th century. From this point, the system concept has developed until its different practices nowadays. The main notion of systems thinking is its opposition to the reductionist rationality which is an approach to understand something to its compounds.

According to Checkland (1999, s.318) System Thinking can be defined as:

"An epistemology which, when applied to human activity is based upon the four basic ideas: emergence, hierarchy, communication, and control as characteristics of systems. When applied to natural or designed systems the crucial characteristic is the emergent properties of the whole".

The idea of systems thinking relate to the interplay between parts which compose a whole. It presents the world as we see it outside ourselves, described holistically. A 'System' can be seen as a group of elements connected together to form a whole and having properties of the whole instead of the parts (for example: alcohol which has a flammable property in a colorless liquid and its compounds, which separately is not flammable). The systems concept used in systems thinking can be mapped in systems classes, as the preview example of alcohol, or as all living systems in earth. The latest can be classified as 'natural system'. There is also manmade systems called 'designed physical systems', as cars or trains made for a purpose. There are even 'abstracts systems' such as mathematics. Systems can be represented in a design activity through a human act which gives definition for a

fourth class of system: 'the human activity system'. These systems are made with a purpose to show or arrange things as a whole, including activities to achieve the goal or purpose of it. Working with the Systems thinking concepts implies working with a problem or situation using systems way of thinking. This 'way of thinking' implies a description of the external world taking into consideration the observer's own purposes which are meaningful for him. This description should include the boundaries of the system in concern with anything that crosses the boundaries as inputs and outputs as the system can be a part of wider systems or has subsystems in itself. Systems Thinking in its simple meaning represents the thinking about the world outside ourselves in a holistically way.

Initially, systems thinking movement was turned to the 'problem-solving' application to real world problems. Following this idea of how to solve problems, using engineering approaches, the hard systems thinking is brought into use as the engineer's contribution, with the development and use of hard systems engineering methodology (Checkland, 1999). It supports the idea of the world containing systems with close relation to each other and that can be engineered to achieve the objectives, it does not consider the presence of conflicting worldviews. According to Checkland (1999), in a system thinking there will be: "an observer who gives an account of the world or part of it, in systems terms; his purpose in so doing; his definition of his system or systems; the principle which makes them coherent entities; the means and mechanism by which they tend to maintain their integrity; their boundaries, inputs, outputs, and components; their structure. Finally their behavior may be described in terms of inputs and outputs or via state descriptions". It is important to note that since the start of the systems thinking ideas, until today, systems thinking have developed three main waves. These waves are stated by Midgley (2000) : the first wave, integrating applied science as quantitative and human relations; the second wave 'systems' were no longer seen as real world entities, but as "constructs to add understanding " (ibid. p.193). The third wave started discussing the limitations of previous waves. These waves starting appearing due to criticism; as the second wave critiques of the first wave regarding its approaches and some systems thinkers were using their specific insights when intervening and not considering the involved at all. Then the third wave critiques of the second one due to its insufficient accountability of the power relations in the interventions, that "it is useful for facilitating the practical interest in mutual understanding but without explicit consideration of power relations and their ideological effects, second wave could give rise to 'distorted communication' " Midgley (2000); on this ground, the third wave is born with, among others, Ulrich's (1998) Critical Systems Heuristics , which draws upon Churchmans' boundaries systems and Habermas' theory of communicative action. In a synthesized way, systems thinking through the time evolutes in different ways with the latest's ones focusing on critical views (third wave) and on learning and reflection (second wave), as it will be described below with the SSM.

One approach that according to Midgley (2000) belongs to the second wave of systems thinking is Soft System Methodology; which add the human experiences to the systems engineering, introducing the idea of 'worldview'; accepting different worldviews as a scheme to organize and engage in a discussion about change. This results in bringing a complex situation to a multiple understandings and perspectives of the desirable state, obtained with the 'systems' as devices developed through a learning process. The Soft System Methodology and its approach described above was further improved by the creation of the LUMAS model (Learning for a User by a Methodology-informed Approach to a Situation). The model helps make sense of real worlds. The LUMAS model represents what happens when using a methodology in a specific situation in a specific moment in time. For details see Appendix1.

According to Checkland (1999) The LUMAS model make a representation of how SSM was developed. Its characteristics differs from the hard systems thinking in a way that it leads to improvements and not to systems that can be engineered; more specifically, in view of systems approach 'hard' and 'soft' system according to Chekland's are defined: in 'hard systems analysis, there is a conception of system to be engineered and in Soft

systems, there will be always many versions of the system to be designed, making impossible to set objectives and boundaries (Checkland, 1999). He continues describing the hard systems thinking as a problem-solving approach; it recognizes a problem and works for its solution believing that circumstances observed are predictable; in soft systems, goals lack clear definition making it difficult to tackle them, as they involve social systems. Therefore, hard systems thinking is not convenient to be used in a set of circumstances in which the problem cannot be stated clearly; it is successful when used in situations where specific techniques are used to achieve an end and it does not consider conflicting worldviews. However, some of the hard methodologies techniques can be used in a specific phase of the Soft System methodology: the conceptual model in the Human Activity System; with the use of a quantitative model, the use of a particular method is needed; a report for quality of water or erosion of soil. The Soft System Methodology starts with a motivation to bring about an improvement to a situation and the result of its methodology applied leads to learning, consequently to the decision of taking actions. Additionally, SSM uses a sequence of phases; these phases do not need to be used in sequence, allowing unexpected responses in a later phase, in contrast with Hard systems thinking where there is a necessary sequence to be followed to achieve the goals. These characteristics of the SSM makes it suitable for a situation as the charcoal farmers, as different views of the situation makes it difficult to use a goal oriented approach.

2.2 Communication theory

Following, a short account of Habermas' main ideas in his communication theory, which help to analyze the themes generated with the SSM applied.

Habermas communicative action theory, brings the Critical Theory to the sociolinguistics and gives it a communicative direction. Habermas' work in communication presents the 'possibilities of democratic transformation through a notion of a social action as communicative'(Harrington, 2005).Habermas theory of communication is based on the idea of communication that relates to the world about us to others, including our intentions, feelings and desires and with those we are always making claims considering the validity of what we are saying, in respect of the truth of it, taking into account the objective world (theory of truth). Also claims concerning the rightness, appropriateness or legitimacy regarding the values and norms of our social world. Claims can be contested and criticized; the idea of rationality includes the reasons for and against these claims (Habermas, 1984)The use of the communicative rationality striving mutual understanding without threats or pressure is the base for this rationality. In the communicative action, the actors seek consensus and measures it against truth, rightness and sincerity furthermore the process of reaching understanding includes the definition of a situation by the participants according to their pre-interpreted lifeworld " A definition of the situation by another party that prima facie diverges from one's own presents a problem of a peculiar sort; for in cooperative processes of interpretation no participant has a monopoly on correct interpretation. For both parties the interpretive task consists in incorporating the others interpretation of the situation into one's own…" (ibid., p.100). In addition of the communicative action model, social actors have the same capacity as social scientific representatives meaning that the latter cannot claim for the right alone to define the situation. The lifeworld is seen as a complement to the communicative action and it is connected to the 'system'. Lifeworld includes the cultural tradition based on social integration which is the fundament for the communicative action; the system (market, state) is based on system integrations (ex. Subsystem economy and administration), the lifeworld and system's rationalities are primarily communicative (reaching understanding) for the first one and instrumental (strategic) for the latter. The instrumental rationality of the

system is threatening the lifeworld rationality and it is seen as a distortion of communication, in a 'colonization of the lifeworld '. According to Habermas (ibid., p. 100) "the communicative action in the lifeworld has the capacity to resist colonization by the system". In short, Habermas' concept of the lifeworld represents civil society and the communicative interaction in it, including people's understanding of situations. His critique above, the system intruding the lifeworld means limiting people's critical awareness. His notion of distortion of communication, is based on what disturb the ideal speech communication and also a communicative competence. "The more social circumstances approximate to an ideal speech situation, the more a social order based on the autonomous action of free and equal individuals will emerge". (Crotty, 1998). Communication leads to consensus and emancipation in an attempt to liberate from power domination. System (state) is not acting based on mutual understanding but it is the result of people's actions, regulating their behavior with threats and bans. Habermas presents one way to overcome the power relation is the use of collective goals; where those higher in the structure of power relations use their power to set collective goals claiming that it is of general interest. But the balance can be established by letting those subject of the power structure can analyze the goals carefully and critically to accept or reject them. That would overcome one distortion in communication.

Examples of the distortion in communication can be found in social situations where people experience deficit of communication in lifeworld as cases of social inequality, conflicts of different kind and conflicting political debates, which are not aiming to an open dialogue. Technocracy is an example of distortion in communication where actors in public participation or conflict situations are led by experts who do not facilitate the influence of those whose interests are in evidence. Interactions of actors with the aim of open communication which give opportunity for everyone to express his/her own opinion and main concerns, reflects an institution approach oriented to a participative democratic process. The distortion in communication is present in different areas(Craig and Muller, 2007), it can be seen in decision making where technocracy is a resource to be used when conflicts are solved with the help of experts considered to be the right people for the situation without a previous analysis of who would be the right people to be involved . Jansen(2002) as Habermas proposes an analysis of the technocratic structure in society, as public debates with experts and lay people; she gives alternatives to distorted communication through communicative practices. Jansen brings up the view of the use of expert technical language and knowledge to restrict people understanding and participation in debates, specifically, the idea of monologic institutions is presented, where knowledge of experts that are in control is used to deprive participation in debate. Distortion in communication is also considered by Deetz (Craig and Muller, 2007), specifically with his theory of discursive closure in its different forms; additionaly he discusses the distortion in decision making with the importance of good decisions being based in "appropriately distributed information, oppeness to alternative perspectives and reasoning based on personal insights and data rather than on authority relations." (Craig and Muller 2007, p. 460). This view brings the topic of technocracy as he argues that the use of expertise is preferred to the use of the communicative action. Science and technology are the many times seen as the only way to reach goals and implement policies and layperson is not capable to comprehend and debate. In fact, knowledge or expertise is an instrument available to help the transformation of a situation and can be a valuable part of a process of improvement. Nevertheless, technical knowledge can also be used by those having hidden interest to prevent participation of citizens in discussion of general concerns., the way technocratic capitalism is based on a scientization and the result in not creating a base for dialogue (Craig and Muller, 2007).

Considering practical aspects of communication, Habermas, based on his work on communicative theory, develop the discourse ethics, based on Kant's moral theory. Basically, he makes the discourse ethics in a discoursing about practical questions of how one should act. A norm to be acceptable, cannot be set on a monological way but through

discourse that will critically evaluate its statement of being just for all parties. Therefore practical discourse is considered a form of argumentative decision making (Habermas, 1990); argumentation to avoid participants from proposing or stipulate to others what is good for them and argumentation to counterbalance power asymmetries. The base of the discourse theory, Habermas takes from Kant's moral philosophy, he uses the attributes: deontological, cognitivist, formalist and universalist. In Discourse Ethics and in Habermas' sense, these attributes are a procedure of moral argumentation (ibid.1990), where normative validity of norms and commands of action should be explained by moral philosophy as deontological ethics or appropriateness of norms or commands. Considering the cognitive ethics, it need to "answer the question of how to justify normative statements"(ibid, p.197) like what should I/we do? How should I/we act? The formalist attribute, take into account how something is viewed from the moral position and the argumentation involves all concerned's participation, freely and equally that together seek for the truth, without any coercion, (ibid., 1990). By Universalist, a moral rule is not connected to a specific culture or time; The forms of communication supported by Habermas comprehends the communicative action and discourse which can be distinguished, as for the first one " the validity of the utterances is naively presupposed in order to exchange information "and the second one " validity claim that have been problematized become explicit topics of discussion but no information is exchanged" (Craig&Muller 2007, p.454) . The communicative action introduces the dialogic use of communicative rationality in a communication among individuals who interact, validity claim is the core of communicative concept to reach understanding. With discourse, the problematized questions raised in a dialogue are discussed, and it gives a procedure of argumentation in deciding moral questions, independently of participants ways of life; normative validity claims are debated as right or wrong and the questions are not tied to a specific community or period of time (Habermas, 1990).The idea of argumentation and reflection that follows a democratic process leads to agreement that can be reached in problematic situations. This is one of the core messages in Habermas' work in communication. Another work that takes into consideration the communicative power of dialogue is Freire's 'Pedagogy of the Oppressed' where he presents power asymmetry in the society and discusses the importance of critical consciousness in his educational project. His theory of liberation is based on consideration of aspects of communication, which leads to a process of social revolution. As the critical consciousness leads to learning to comprehend conflicts in social, political and economic aspects of life. He describes dialogue 'as indispensable component of the process of learning and knowing' leading to change. He gives focus on the power aspects present in the structure of the society.

2.3 The influence of Habermas' Critical Theory in Systems Thinking

I intend to mention in this part the influence of Habermas in Systems Thinking with the work of Werner (1998), even though I have not used his approach in the case, it helped in the analysis of the whole case.

Systemic intervention attempts to bring together theory and practice with participation and reflection to improve complicated situations. People's different viewpoints and society's own social structures are many times building misunderstandings and distorting communication among the parties. Social exclusion and land conflicts are some of the main causes of problems in natural resource management. The systemic analysis of a situation together with the critique of societies' emerging political and social cultures helps understand better the matters that affects civil society and the reasons behind them. "the systems movement will make a real contribution toward communicative systems

rationalization if it puts the systems idea to work on the job of dealing critically with conditions"(Werner, 1988). Werner brings the idea of a critical systems thinking where systems and critique ideas are interlinked and cannot be separated Werner (2003). Nevertheless, the system has to have its boundaries recognized to make the critique attempt succeed. When bringing both together, systems thinking can be practiced critically. He believes the use of boundary critique introduced can help pragmatizing Habermas. Habermas' ideas of 'ideal speech situation' with undistorted communication are seen as a utopia by many. Werner (ibid.) brings the use of systems ideas to deal critically with the normal conditions of a speech situation. Nevertheless, he highlights the fact that a methodology cannot replace citizen's attempts of institutionalizing "socially relevant decision making, democratic participation and majority vote among sovereign and equal (not "equally rational!") Citizens" (a.a. ,p.160). And that ", systems practice should not misunderstand itself as a guarantor of socially rational decision making; it cannot, and need not, "monologically" justify the social acceptability of its designs."

3 Methodology

The concept of Methodology used here is defined as " a set of principles of method which in any particular situation have to be reduced to a method uniquely suitable to that particular situation."(Checkland, 1999). This means the way the user makes use of the methodology in a particular situation. Given the meaning of methodology in use in this report, the Soft Systems Methodology is explained next.

3.1 Soft System Methodology (SSM)

Soft System Methodology is an action oriented process which deals with problematic social situations. Considering that these situations include people who have different world views and who act with purpose, the methodology helps to take action to improve the state of the things, facilitating social learning. It is useful when goals for an improved situation are difficult to be agreed by all the parts involved. The situation is studied, analyzed and described; concepts are formed as possible actions to help making the situation better. The focus is on a model of human activities where improvements are suggested. The Figure 2 below expresses the methodology with its activities. There are two kinds of activities: the 'real world activity' involving people in the problem situation and the 'systems thinking activities' which may or may not involve the group in the problem situation.

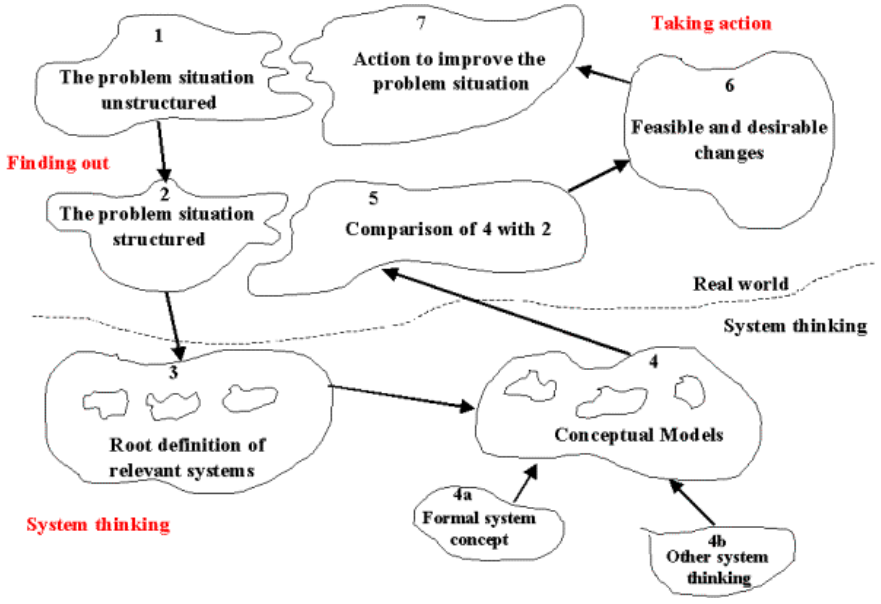

Figure 2 - The 7 steps of SSM – Figure adapted by the author from Checkland, 1999

Summarizing figure 2 - Stages 1 and 2 are made to represent the situation, stage 3 consists of naming some relevant 'systems' and putting together definitions of what these systems represent. Stage 4 corresponds to the step of making conceptual models of the human activity system. These models are then, in stage 5 compared to the real situation and debated. Stage 6 will define the possible changes and stage 7, will be the actions based on stage 6 to improve the situation. But an inquiry approach involves also learning, according to Wilson (1990)' One has to engage in a learning process in order to improve a situation'. Based on Kolb model of the learning cycle (ibid.), he presents two learning dimensions (incorporating four major modes of learning) which according to him are characteristics of people's ways of learning, the prehension and Transformation; these dimensions can be integrated resulting in a cyclical mode of learning. For details see Appendix 2.
Wilson argues that an effective inquire process requires the four learning styles presented before; considering that our learning styles might affect the way we enter in a new problematic situation. As a result, we might use the four learning styles in the different phases of the methodology. These are represented in figure 5 (See Wilson (1990) for detailed information about the learning styles). The learning cycle, the representation of the learning styles, together with the enquiry process is used to create an organized process that can be reutilized and reflected upon. This inquiry process requires the use of the learning styles to be effective therefore it is represented in the figure 5 together with the Soft System Inquiry. The inquiry process in SSM comprises the use of learning styles competencies; which are included in four different phases of learning; the first one, the diverging phase (SSM Inquire stage) , facilitate the involvement in an unbiased and opened way, capturing different worldviews; the next phase includes the assimilation learning style (SSM Situation description), this comprehends the idea associated with our observations; When the development of possible actions starts, the convergence ability is used in the third phase and the last phase includes accommodative skills, when the real situation is evaluated against the models built and action is planned. The SSM stages and the learning process associated to them are explained in details in Appendix 3. Following is a summary of the SSM steps and those that were employed.

Table 1 - Summary of seven steps of SSM

Stage	**Process**	**Tools examples**	**Learning opportunity (analyst role facilitator and active learner)**		**Employed in real case**
Stage1	Inquiry starts	Interviews, participant observation	**Alternative views watch and observe**	Concrete experience with Reflective observation	***Employed***
Stage2	Information described and represented	Mind mapping		Assimilation with meaning of the situation	***Employed***
Stage 3	-Development of statements of relevant systems :CATWOE -Root Definition	Debate, brainstorming	**Modeling and concept building**	Articulation of assumptions, definition of changes Form propositions Think creatively, Understand how things would be in an improved state, organize, represent Use of technical knowledge and techniques (the facilitator) Assimilating: modeling and concept building	***Employed***
Stage 4	**Human Activities System**: Develop subsystems, identify inputs and outputs, locate boundaries, measures of performance, agree on decision process, clarify environmental effects, and communicate the model. (Wilson, 1990) Use of basic science research and technology development hard system analysis	Group discussion (considering consensus making or general agreement)			***Employed***
Stage 7	Strategic planning: Detailed plan of action This stage was not fulfilled as there was a time restriction from the researcher but an action plan is prepared to be proposed	SWOT analysis	**Carrying out plans**	Carry out plan, interacting with people	***Not employed***

3.2 Methodology in use

The methodology in use includes interviews, observations, group discussions (aiming democratic participation) and reflective thinking which goal is to give opportunity for change.
Monitoring is an activity outside the system which is responsible for keeping track of all activities and which will have a responsible person or group of persons. It is a set of activities to monitor and take control actions. The criterion of this monitoring action is set by the performance criteria defined in the '5 Es': Efficacy, Efficiency, Effectiveness, Ethicality and Elegance. For the first three 'Es' the meanings can be described with the questions: is there a produced output, using minimum resource? Is it a transformation worth doing? The last two 'Es' correspond to a morally correct (ethically) and an elegant transformation.

4 Findings

4.1 Application of methodology and analysis of outcomes

In this section, the methodology used is described from the first meeting to the last gathering with the actors involved. The stages of SSM, methods used and the results are presented.
The initial proposal of this work was to carry out a systemic action research which means, action undertaken to bring about change using a systemic approach(Checkland, 1999). As the time frame for the research would not allow performing a complete action research with its series of actions in the steps of the SSM methodology, a short version of the methodology was carried out without last stage where the changes are implemented.
One of the main characteristics of the SSM is the possibility to create a particular methodology to the particular situation, which means adapting the methods and the sequence of the stages according to the development of the process and the results of previous steps. This gives freedom to go back to the stages, facilitating the reflection, adapting and giving opportunity for learning.
Following is the detailed description of the stages carried out.

4.2 Stages 1 and 2 - Inquiry and description of the situation

In this stage, the purpose is to look at problematic situations and describe it in written/graphical form, including structures, processes and climate, also issues and concerns.
This stage includes understanding and expressing the situation; the researcher started with the first contact with the actors, read the literature made available from people involved in projects with farmers, participated in presentations and informal conversations; then the interviews were made and observations were gathered in the community.
To have a better understanding of the learning process during the steps of the methodology in use, the learning cycle is represented in each of the stages and described in appendix 3.
Data gathering
Research participants and sites:
The research participants were 11 farmers, 2 managers (EPAGRI), 1 representative of the Rural workers union, 1 agronomic engineer (FAMABI), 1 representant of the Agriculture department of the Biguaçu municipality, 2 technicians (EPAGRI local), 1 agronomic engineer (FATMA), 1 professor of the UFSC and one engineer (EPAGRI Central)
The sites were the University in Florianoplois SC, EPAGRI Florianoplois, Biguaçu city center (EPAGRI local, agriculture department, FAMABI)
Tres Riachos, the community where the farmers live and work.
Data gathering process

In the first visit, the researcher spent five days among the participants, two days in Florianopolis and three days in Biguaçu and the community of Tres Riachos; at this time most of the data was collected through interviews, informal conversations and one meeting with the EPAGRI local. The second visit, two days were spent in the community and one meeting with four participants: three farmers and one agriculture engineer. This meeting took approximately two hours. The third visit took place in the community where a meeting was held with representatives of the different institutions to present the work done and discuss the proposals. The interviews were an important source of data but staying among the farmers for a few days gave also input to the reflections about the data collected to address of the research questions. Meetings were also source of valuable insight when the discussions took place, context as relational dynamics and non-verbal cues helped further. One important characteristic of the SSM is the openness to the emergent topics, issues and thoughts. The researcher is expected to be ready to entertain new ideas, without judging or questioning.

Data: Open-ended interviews, participant observation (in meetings), archival records.

The main source of data was the interviews, where the researcher had the opportunity to talk with actors of different backgrounds and views. Nevertheless, the other sources of data gave additional complementary data. The analysis of data to build a coherent set of followed the steps described following. In this case, the main source of data was the open-interviews. SSM gives the researcher the possibility to use the methods she considers adequate for the specific case, nevertheless there is an emphasis about the importance of the reflection and learning. In this case, the open interviews gave possibility to relate to topics seemed important to the participant. Therefore, the continuous reflection helped the decision to try to get more information from the participants and also contact new participants to have a better understanding of the situation. A logbook was created with the intention of noting specific feelings, considering that it would help trying to keep the bias of the researcher's own interpretation separated from the emerging issues. The participants were introduced to the researcher by the informant from EPAGRI and also by the farmers who were the main contact in the field. The very first contact with the professor who offered the opportunity for the study was done from Sweden. Then the first meeting was scheduled in the city of Florianopolis where part of the study was performed in the university and in the EPAGRI's facilities.

The SSM real world activities including stages 1 and 2 started with a meeting with professor Fantini in the university. He provided a summary of the farmers' state of affairs. After this meeting, some more details about the situation were given by a researcher from EPAGRI, the State Environmental Agency, who is involved in different projects with the farmers. He was the informant and helped with the logistics during the visit in the community.

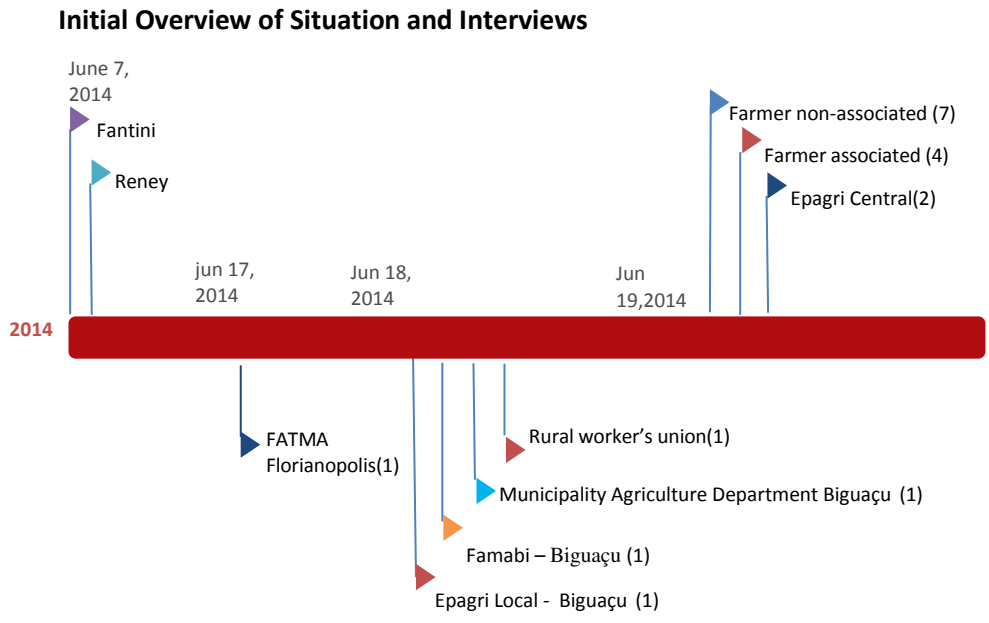

Figure 3 - Representation of the meetings and interviews.

The graph shows the first meetings with professor Fantini and with Reney (the researcher from EPAGRI), on June 7th and the other interviews in the same week. The number in parenthesis shows the number of people interviewed. At this stage, after the interviews, the representation of the issues in form of mind mapping was done and after first analysis, the researcher decided to contact two other actors connected to EPAGRI who were not scheduled for interviews but who could give some valuable information about the EPAGRI's view of the farmer's situation. It is important to notice that some actors that have some kind of connection to the situation were not interviewed; no meeting or interview with IBAMA, with the priest responsible for the church where the actors gather for the meetings, with farmers from nearby communities.

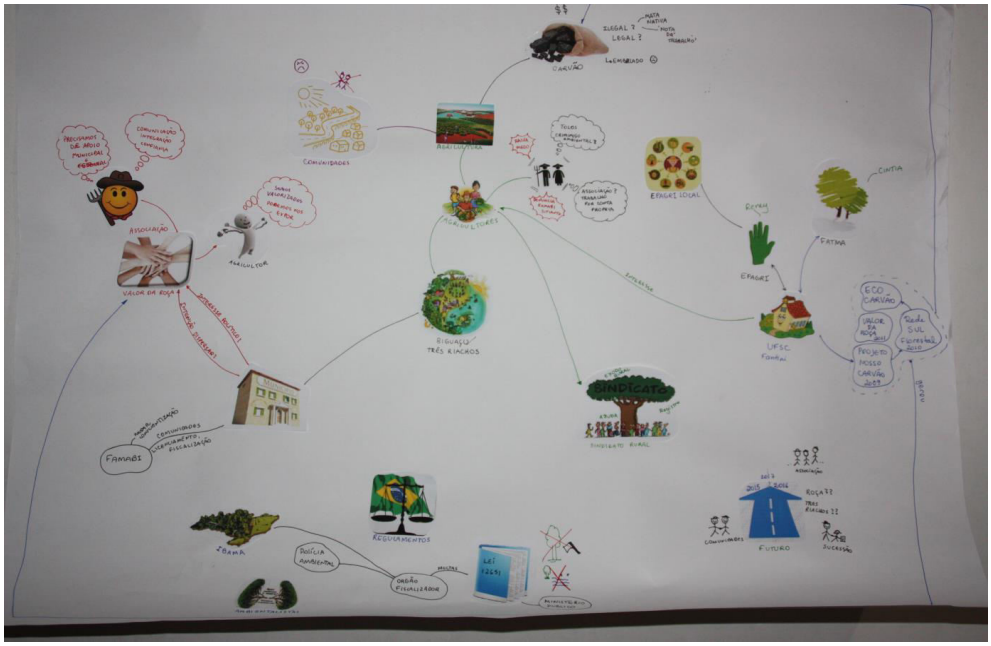

Figure 4 - Rich picture – simplified drawing

Pictures' originals can be found in the Appendix 4.
Meetings notes can be found in Appendix 5.
Pictures of meetings can be found in Appendix 10.
Situational context
The farmers at the community of Sao Matheus in Biguaçu are facing many challenges, even though their situation has improved since the intervention of the university and EPAGRI, via different projects, they still have some challenges ahead. Their situation changed from illegal activities in shifting cultivation, to a group of respected business farmers, recognized in the community and proud of their achievements. The main reason for that, are the efforts gathered from the different institutions to help them making their work legal.
The following timeline (Figure 8) gives an overview of the main facts and projects carried out in the communities of Biguaçu involving the studied farmers and institutions.

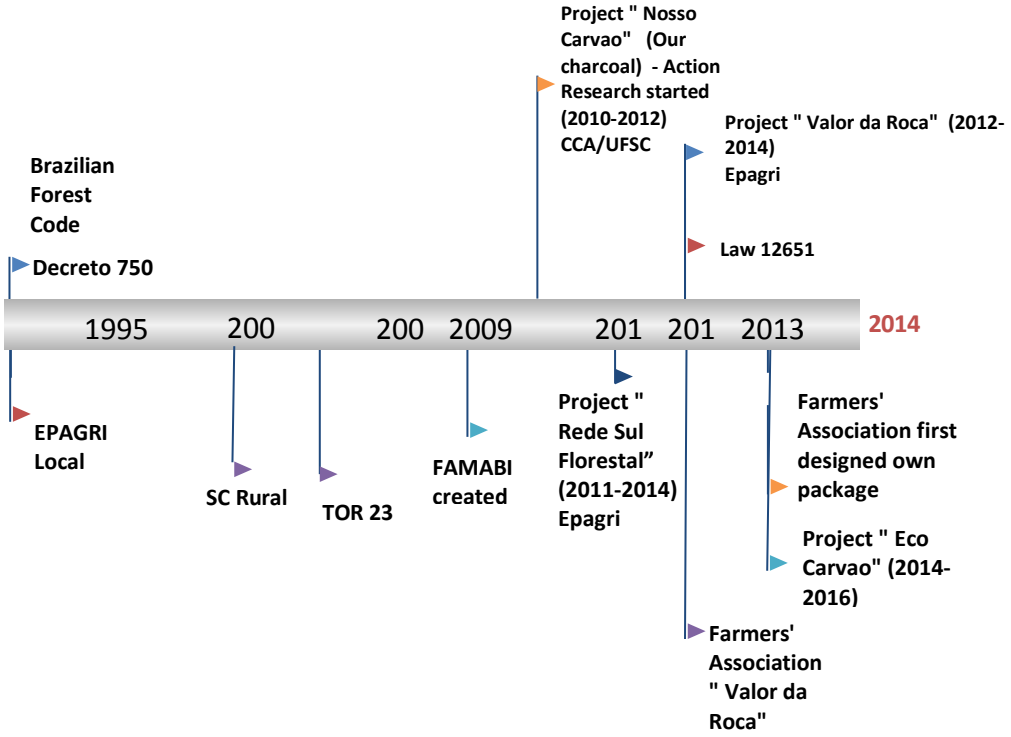

Figure 5 - Timeline: representation of the main events in the farmers' case

Back in 1965 (not in the timeline) the 'new' Brazilian environmental code was created for soil, water management and forest conservation; after the creation, there have been many changes in the code; one of them, in 1993, the Atlantic Forest law (Jusbrasil, 1993) was made, it forbids the slash and burn in the Atlantic Forest. By this time, the inspection on farms launched, affecting many farmers in Brazil. In the same year the EPAGRI Local was created aiming at helping farmers in social and technical areas, among others, promoting their growth in a sustainable way.
The turning point for the farmers' situation in Biguaçu happened in 2006. A study financed by the World Bank started the "SC Rural", aiming to find out, among other things, why farmers were not participating in activities offered by EPAGRI Local.
In the year of 2007, the research project "TOR 23" was conducted, based on Paulo Freire's literacy method GENERATIVE WORD/THEMES with the purpose of understanding the lack of participation in the activities offered by EPAGRI and suggesting improvements to the situation.
Then, after the previous study, different action research projects started; in 2009: the project "Nosso Carvao", which aimed at improve the charcoal production to an eco-friendly one and Raising farmers quality of life; in 2011, project "Rede Sul Florestal", which purpose was the creation of a network of researchers from the south of Brazil to optimize resources for the problems related to the use of the forest for the charcoal production; and the project " Valor da Roça", 2012 to help farmers' communities with strategies for qualitative differentiation of their products, to achieve different markets and customers. This project also inspired the creation of the farmers' association in 2013.
In 2014, the project "ECO Carvao" began to study the quality of charcoal and green house gas produced in the slash and burn and also transaction costs in the production chain.
Other events represented in the timeline are the creation of FAMABI in 2009, the environmental agency of the municipality of Biguaçu; the law 12651 which is a new update of the Atlantic Forest Law with change in the environmental regulation.

Themes of concern

The themes of concern were generated in the two meetings described previously in chapter 3.

A team to bring together institutions and farmers (articulation of the actors represented in the rich picture)
Cooperation between municipality and farmers' association
(There is a belief that a number of farmers are not motivated to join the association because of the decrease of inspection in the community's farms so they can continue working illegally).

Association regulations (Some of the rules are preventing new farmers from participating)

Regularization of farmers – Farmers Union together with Municipality.

A cooperation between FAMABI and UFSC to create a legislation to allow the use of the forest with the cycle of 10 years.

FAMABI – There is no clear process about how to work with the farmers
A project for young farmers in Biguaçu (EPAGRI local)

Cooperation between farmers' association and EPAGRI local (A system to improve the management of the association, to consolidate its activities and to improve farmers cooperation and trust)

Two of the statements above are chosen by the actors to be developed in the Human Activity System, the first one in the first meeting and the second one in the second meeting.

4.3 Models of Human Activity Systems, comparison and debate of desirable and feasible change.

Following the development of the *statements 1 and 2* are described, the definition of the system using TWO CAGES and elaboration of Human Activity Systems is done.

After gathering information, the description and analysis of the situation, the next stages include using System Thinking to design the proposal for changes. First transformation statements are created followed by definition of relevant systems using TWO CAGES and development of Human Activities systems.

The statements 1 and 2 discussed previously are expanded using the mnemonics two cages and the root definitions are developed.

4.3.1 Transformation statement (1)

4.3.1.1 Stages 3 and 4 – root definition

A team to bring together institutions and farmers (articulation of the actors in the rich picture)

When analyzing the rich picture together with professor Fantini and professor Sandro, their main concern was the need to bring together all the actors to work for the benefit of the farmers.
There is one group called 'a rede' (the network) which is mainly for researchers who exchange emails and meet when needed and is used to discuss projects (when there is one happening), share knowledge and debate issues; this group involves a large number of people, some are represented in the rich picture. The network involves other states in the south of Brazil in order to work together in similar issues and to share experience.
What engages attention in articulating people (in this case) is the construction of a strong group which is responsible of making things happen through responsibility taking, managing resources and making concrete actions to improve farmers' situation.

Aiming at an improved future, in a way which resources are well divided and decisions can be taken with responsibility taking, with the involvement of farmers in a more participative way, the transformation statement was expanded with the mnemonic TWO CAGES.

TWO CAGES:

Table 2 - Transformation statement expanded with the use of the mnemonic TWO CAGES
Transformation

Transformation	A system to ***improve*** responsibility taking by coordinating institutions and farmers efforts in order to strength connections and to ***improve*** farmers' situation regarding technical, social and financial aspects.
Worldview	To improve farmers' situation in the region(in the state of SC) and to improve resource management of institutions when working together. There is a need to rise farmers to a condition of social acceptance, including making the farmers' association stronger and working on legislations. Changes in policies regarding shifting cultivation are needed, to make the achievements obtained by the farmers permanent and show that slash and burn can be considered sustainable if rules are followed. The results of an improved situation can be used by other communities as a reference to help other groups of farmers in the same situation.
Owners **(decisions makers in an improved state)**	Farmers, ufsc (Fantini?), FAMABI (municipality), EPAGRI, FATMA The group will have one representative of each institution and a representative of the farmers. Each member of the group contributes with his or her expertise to help to realize the transformation.
Customers **Benefit or be affected**	Farmers, society (other communities will benefit from the outcomes of the group)
Actors **(Manage and carry out the human activites in the transformation statement)**	Farmers, UFSC (Prof Fantini), FAMABI (municipality), EPAGRI(Researchers and directors of research?) EPAGRI local (extensionistas), FATMA All the actors have a part in the realization of the transformation, in this group
Guardian **(monitor the transformation)**	EPAGRI Will monitor the process and make sure that all voices are heard, makes sure that the group is moving forward and also can take final decisions.
Environment **(resources and constraints affecting the activities of the transformation)**	Conflicting views concerning responsibilities, resources, legislations, worldviews, politics, institutions structure and directives, level of knowledge (ex.too technical maybe difficult for farmers to follow)
System **(Activities which should be done to achieve a transformation)**	Meetings, working communication process, monitor progress, use a network to make decisions known to other institutions which should be involved in the process

Root Definition

A system to coordinate institutions and farmers efforts in order to strength connections, to improve responsibility taking and to improve farmers situation regarding technical, social and financial aspects. A system that is owned by farmers,UFSC, FAMABI, EPAGRI, FATMA and operated by the same for the benefit of the farmers, society and environment, with EPAGRI as the transformation guardians and aware of the constraints of conflicting

views concerning responsibilities, resources, legislations, worldviews, politics, institutions structure and directives. The system should have its foundation in participative democratic process which should be transparent for the actors and the public.
The human activities system model starts to be formulated with the transformation statements in the root definition as the base for the elaboration of the activities.
Conceptual Model of the Human Activity System
After the definitions in of the statements of relevant system in stage 3, the Human Activity System model was developed. This is a proposal of activities people will do and how they will do them to achieve the desired future.

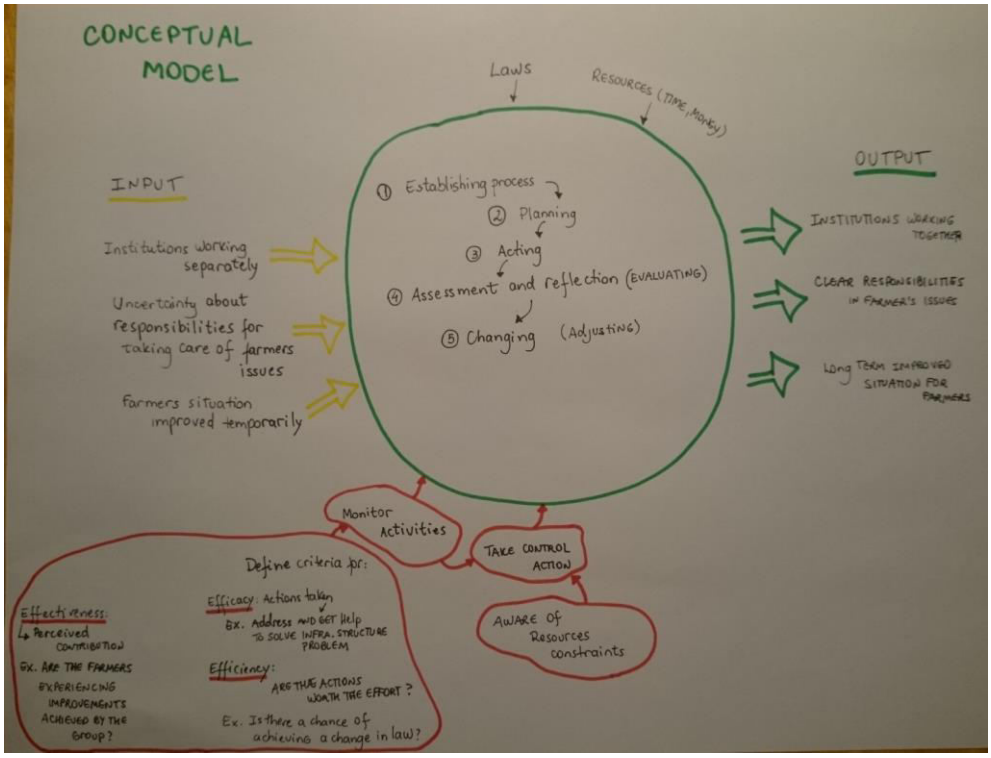

Figure 5 - Conceptual Model of the Human Activity System applied for the transformation statement 1

Drawing the boundaries means what is under the control of the owners and actors and what is not(Wilson, 1990)
The conceptual model determines the significant human activities, which are linked to each other. In this case, there is a need to coordinate activities to help the institutions achieve progress in the working issues. A process has to be established where all the actors can compromise in following the activities needed for a desired outcome: Planning which issues are more important to start working, starting the real actions and doing the assessment/ reflection about the outcomes. Monitoring based on the measures of performance, can be done by a guardian, in this case two people, being one farmer and one from one institution, part of the group, who will continuously make sure things are happening in the process, taking action when needed. The measure of performance is used to evaluate if the system proposed is giving an outcome with the minimum of resources and contributing for achievement of a long term purpose. In this case, the criteria can be expanded as:
Efficacy – clear and evident account of actions taken to solve or address different matter, for ex. working done in legislation, addressing infra-structure problems and getting help from institutions to solve them, analysis of viability and proposal of new specific projects for the community.
Efficiency – Judgment by the monitoring group or group's participants that actions done by the group are worth the effort, for ex. Is there a chance of achieving a change in law considering the time and resources available?
Effectiveness – perceived contribution for the matters of the farmers, for ex. Are the farmers experiencing improvements achieved by the group, does the group works with long term solutions?

After the definition of the conceptual model and monitoring activities, the comparison table was prepared. It has the activities of the conceptual model developed in more specific actions. Finally, the activities proposed were discussed with the actors.

4.3.1.2 Stages 5 and 6 – Comparison and debating desirable and feasible change

In the stage 5, the comparison is done. We set up structured discussion about change, the proposed activities for a improved future are discussed and debated with the participants. This discussion was held in a meeting involving not only the previous participants of the interviews and conversations; many were not present at the meeting for the discussion of the rich picture and the selection of issues but the rich picture was presented again to all participants and then the comparison table was used to discuss the activities.

Table 3 – Comparison table showing the result about the desirable and feasible changes

Phases in Conceptual Model	Activity in Conceptual Model	Present in Real World?	How well? (other comment)	Include in Agenda?	Desirable?	Feasible?	Include in Debate?
Establishing process	Define the process for the group, members appointed, place to meet	Informal e-mail Project's planning		Yes	Yes	Maybe	Yes
Planning	Plan for periodic meetings Plan the issues to be discussed Place to meet	parrtially		Yes	Yes	Yes	Yes
Acting	Start following the plan and do an assessment/ reflection in each meeting to analyze the outcomes and risk analysis after the evaluation of the worked issue	partially		Yes	Yes	Yes	Yes
Evaluating	Changes needed in the process?	Yes		Yes	Yes	Yes	Yes
Adjusting	Make adjustments according to the evaluation	Yes		Yes	Yes	Yes	Yes

In the comparison table above, the activities in the conceptual model were elaborated and compared to real world. A discussion took place to analyze if they exist in present situation and if the answer was 'yes' it should be discussed in which degree it happened. In this case, a spontaneous comparison to a network of researchers took place. This network or group started during a phase of projects with the farmers. This comparison to the network gave opportunity for the participants to talk about the weaknesses of the discussed group. Then the discussion about desirable and feasible changes started but was biased by the view the actors had of the group of researchers' network. The proposal with the new group is to translate ideas, suggestions, constraints, barriers for the farmers into real action for improvement. It sets some boundaries for the action as: size of the group, clear responsibilities, the most important actors that can bring into reality the improvements to the community; also which will be the boundaries for the group in the beginning (community, city or state). To make these activities a reality, it is crucial the development in details of the group process. The discussion brought up some doubts about the process of the method used; if the activities could be done as proposed or if people were being too optimistic without considering the real possibilities of performing tasks in such a proposed group. Here the discussion of desirable and feasible should agree with what people consider a valid proposal to achieve the transformation, in this case to articulate actors involved the farmers' issues. It was easy to agree on the desirable but the aspect of being feasible can be tricky. It would involve compromising from people and institutions and they were not sure if they could agree on that, further discussion was needed. When proposing the formation of the group, the researcher had in mind the concepts of adaptive co-management. The whole concept was not proposed at that time as it would need hours and days to work on such process but main ideas can be taken as suggestion. Additional information can be found in (Armitage et al., 2008) different projects connected to the farmers considered many aspects of the farmers' situation and interconnectivity of institutions, the improvement and legalization of the charcoal production etc. One aspect that should be considered and which led to the proposal of the group is that projects have life cycle, begin and end. The group will work continuously with suggestion for projects and other issues which can be done without too many investments. The suggestion for the responsible of the activities or responsible for the group is done based on what the researcher observed and concluded. EPAGRI works directly with farmers, both in research and in local assistance along with training, the institution would be most suitable for being responsible for the group and the activities.

Action Plan

Table 3- Action plan for the activities defined in the previous step

Activity	**Who will be responsible?**	**How the activity is done**	**What resources needed?**	**When start action and duration: Short, medium and long term**	**Criteria for performance Efficiency, Effectiveness, Efficacy**
Define the process for the group, members appointed, place to meet	EPAGRI	A responsible person is appointed, will define the first steps and a simple manual for the group procedures	People Time	short	Minimum use of resources (time and money)
Plan for periodic meetings Plan the issues to be discussed Place to meet	EPAGRI	Set dates for the meetings in advance so people can book the dates; collect information from farmers for the issues to be discussed	People, time	short	
Changes needed in the process?	Farmers and institutions	Evaluation of the outcomes and propose changes	People, place, time	medium	
Make adjustments according to the evaluation	EPAGRI	Adjust the changes to the procedure manual of the group, perform changes in the plan	Time	long	

The action plan is defining how the real action will take place for the activities proposed. In this case, the activities from the comparison table are taken, the responsible is appointed for arranging the activity, participating in debate and monitoring (if no one else is designated for the task).

4.3.1.3 Stage 7

In Stage 7 the implementation of the suggested changes are done. Nevertheless, the researcher was not able to continue the work in this stage.
2- Cooperation between municipality and farmers' association

When the meeting with farmers, FAMABI, FATMA took place to present the rich picture and to discuss the issues , one issue was clearly worrying them, the need for having more participants in the association, they believe the main cause is the lack of inspection on the farmers' lands and the fact they are suspicious about the advantages of working together and legally in the association. It is important to make the association stronger and to make the improvements achieved by the farmers permanent. One fact has to be mentioned here, there was no non-associated farmers in this meeting, which, might have affected the discussion and selection of the issue. Nevertheless, this is an important matter, as it has the purpose to make non-associated farmers work in a more environmental friendly way and to follow the local procedures in the municipality to continue with slash and burn. The tentative statement was developed in the meeting with the actors, there were a lot of discussions about the issues and there were a willingness to work with all of them, but the actors voted and there were two which came into first and second place; the first one was discarded by the researcher as it has already some work going on with the issue, then the second one was the next to be considered.

4.3.2 Transformation statement (2)

4.3.2.1 Stages 3 and 4 – root definition

Following the transformation statement is expanded with TWO CAGES and the root definition is done.

TWO CAGES:

Table 6 - Transformation statement expanded with the use of the mnemonic TWO CAGES

Transformation	A system to increase participation in the association (**increase awareness about farmers association**) in order to make it stronger, being performed through periodic and random visits and inspections in the community and seminars for the farmers. This raises awareness about environmental issues, contributes to improve farmers' situation socially and economically and start a close cooperation between municipality and farmers
Worldview	To empower farmers to have a recognized place in the community, to strength their business through the association, motivating other farmers to join and to understand the advantages of working legally and in a sustainable way. This process increases the cooperation with municipality and it will also influence the way the municipality, as institution, perceive farmers working with shifting cultivation
Owners **(decisions makers in an improved state)**	FAMABI (Environment Agency of Biguaçu),farmers association
Customers **Benefit or be affected**	farmers, municipality, association, society
Actors **(Manage and carry out the human activities in the transformation statement)**	farmers, association, municipality, EPAGRI local, rural workers' Union, environmental police, university The actors participating can include the IBAMA(Brazilian Institute of Environment) and the Federal Police Department
Guardian **(monitor the transformation)**	FAMABI (Environment Agency of Biguaçu), association A group with members of both institutions should be responsible for the monitoring of the transformation
Environment **(resources and constraints affecting the activities of the transformation)**	Municipality resources, divergent opinions about farmers business, bureaucracy, local market
System **(Activities which should be done to achieve a transformation)**	Meetings with the farmers and with institutions as IBAMA, Police, visits to farmers, seminars, evaluation

Root Definition:

A system to increase participation in the association (increase the awareness about the advantages of joining the association) in order to make it stronger, to improve the farmers' situation in the region, show that they can continue with their business in a sustainable way and to facilitate cooperation between municipality and farmers, owned by FAMABI and farmers' association and operated by farmers, association and Municipality for the benefit of the farmers and the environment, in order to achieve empowerment of the farmers with FAMABI and farmers as the guardians of the transformation and aware of the constraints of municipality resources, divergent opinion about farmers business, bureaucracy and local market .

The formulation of the system models follows based on the transformation statement in the root definition.

Conceptual Model of the Human Activity System

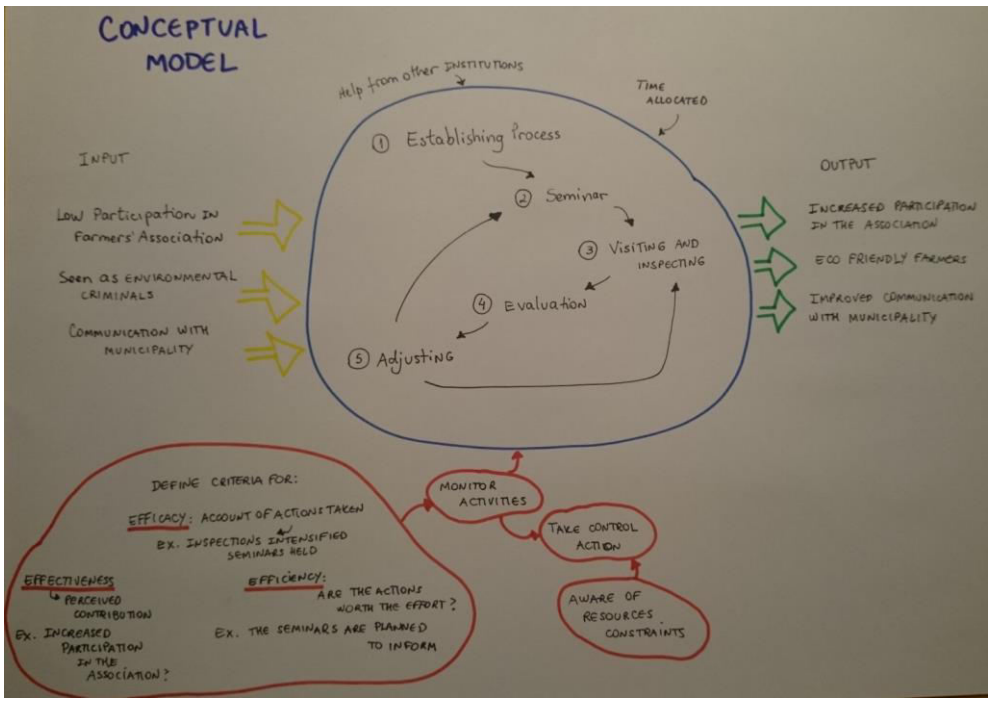

Figure 6 - Conceptual Model of the Human Activity System applied for transformation statement 2

In this conceptual model, there are two activities which aim to help increase participation in the farmers' association: inspection and awareness raising activities, including seminars, informal conversations together with inspections. The municipality is the main responsible for the activities, working closely with the association and with help from EPAGRI local. The activities outside the boundaries are the ones not directly controlled by the actors, as time (which is subject to the managers in the institutions) and help from other institutions as university, IBAMA, EPAGRI and others made relevant during the process. Monitoring according to the criteria for performance, are done by representatives of municipality and farmers, they will follow up the process and recommend action and adjustment when needed.
The measure of performance to this transformation is:
Efficacy – clear and evident account of actions taken to solve or address different matters, ex. Inspections intensified, seminar held, printed information available.
Efficiency – Judgement by the monitoring group or group's participants that actions done by the group are worth the effort and time, for ex. Inspections do not take much time, bringing about other problems not related to it, the seminars are also planned to inform, other problems should be addressed in separated meetings.
Effectiveness – perceived contribution to the matters of the farmers, in the long term, for ex. Increased participation in the farmers' association, increased co-operation with municipality
The comparison table has the activities of the conceptual model for the presented transformation and the activities proposed were discussed with the actors.

4.3.2.2 Stages 5 and 6 – Comparison and debating desirable and feasible change

Table 5 - Comparison table showing the result about the desirable and feasible changes

Phases in Conceptual Model	Activity in Conceptual Model	Present in Real World?	How well? (other comment)	Include in Agenda?	Desirable?	Feasible?	Include in Debate?
Establishing process	Forming group Spread information Prepare seminar - Topics -> environment awareness and understand that they can do business without harming the environment. - Information about why the association is important - Information of the next steps Prepare visits and inspection -Periodic and random choice (weekly)	No	Resistance from the Secretary of agriculture to farmers' issues	Yes	Yes	Yes	Yes
Phases in Conceptual Model	Activity in Conceptual Model	Present in Real World?	How well? (other comment)	Include in Agenda?	Desirable?	Feasible?	Include in Debate?
Visiting and inspecting	Prepare visit -paper? Only talking? Inspection and awareness in the area randomly	Partially	More inspection	Yes	Yes	Yes	Yes
Evaluating	Evaluating in a regular basis	no		Yes	Yes	Yes	Yes
Adjusting	Perform changes needed in the process	no		Yes	Yes	Yes	Yes

The activities in conceptual model are developed in the table above, the main objective with these activities are to increase awareness among farmers about the advantage of joining the association and to increase understanding about why they should follow the environmental rules and laws to practice shifting cultivation. With these activities the inclusion of farmers in the process will give input to how to reach the farmers bringing them in the process through participation. The inspection is done by the municipality through FAMABI but the

open meetings will help clarify why and the purpose of the inspections. The action plan proposed after the analysis of the comparison table shows how the activities can be done, responsibilities and performance measures. The activities discussed were not presented in real life or were partly presented but no concrete similarities with the proposed activities could be pointed out.

Action Plan

Table 6 - Action plan for the activities defined in the previous step

Activity	**Who will be responsible?**	**How the activity is done**	**What resources needed?**	**When start action and duration: Short, medium and long term**	**Criteria for performance Efficiency, Effectiveness, Efficacy**
Establishing process	FAMABI (Environment Agency of Biguaçu), Farmers' association	One representative of FAMABI starts pointing out people for the group after consulting associated farmers and EPAGRI The tasks are divided for the preparation of seminar and written information; Visits and inspections are task to be prepared at FAMABI		Long term action with start as soon as FAMABI is prepared	Effectiveness: Have the activities been planned for a long term? For ex. has a written process been developed by FAMABI to ensure continuity in case of change of personal?
Seminar	FAMABI, EPAGRI local, Farmers association	The group can be divided to do the different tasks, presentation has to be prepared and as option, other institutions can be invited for the presentation	Money for printed material, cost man/hour for preparation of seminar	Long term as this activity need to be carried out from time to time	Efficiency: Have the preparation been done with minimum of resources and time?
Visiting and inspecting	Municipality FAMABI	The inspection and increase awareness by means of information; well thought-out written material to be prepared	Money for printed material, cost man/hour for preparation of seminar	Long term	Efficacy: Are the visits and inspection happening?
Evaluating	FAMABI, EPAGRI local, Farmers association	Book dates for the evaluation	Cost man/hour for the evaluation	Long term	Efficacy: Are the evaluations taking place?
Adjusting	FAMABI, EPAGRI local, Farmers association	Analyze the changes needed after the evaluation and perform changes	Cost Man/hour for the changes to be performed, other cost for the changes needed	Long term	Efficiency: Can the changes needed be performed with low cost and time?

4.3.2.3 Stage 7

In Stage 7 the implementation of the suggested changes are done. Nevertheless, the researcher was not able to continue the work in this stage.
Theoretical framework and steps of analysis can be found in Appendix 6.

5 Discussion

The main purpose of this study is to understand the farmers' situation and its involvement with institutions. The previous sections presented the intervention itself, the results of it. SSM is used to try to improve a real-world problematic situation. In each of its use for a particular situation the process is expressed by the LUMAS model (Checkland and Poulter, 2007). The researcher perceives the situation, tailors the methodology for the specific approach for the situation which produces an improved situation and gives opportunity for learning. In this chapter, an analysis of the situation, guided by the LUMAS model with some theoretical explanations and insights of the methodology will be discussed. I'll also make an attempt to use Habermas' theory of communication to try to find aspects in the communication that are being distorted or to create a basis for the communication to take place It includes the present situation of the slash and burn farmers in the community and a discussion of the main themes present in the data.

5.1 Situation change

In the previous chapters, the situation of farmers practicing shifting cultivation was presented. Their life changed with the changes on the forest code. These farmers had lived most part of their lives practicing slash and burn then a new change in the law started causing social and economic problems to them. The solution for these people was to continue illegally with the practices. These changes in the regulation brought consequences to the community in Biguaçu and in many other places in Brazil. One example is the community's youth who left for better work conditions and job security in the cities. They did not want to feel afraid as their parents working with slash and burn. Additionally, the natural landscape is changing as result of the environmental law; farmers are cultivating Eucalypt as it is not native vegetation and its use is not so restrictive. With the implementation of new routines in the municipality, farmers can work with slash and burn but in a controlled way. Nevertheless, those who adopted this new working condition, have problems with infrastructure, as services and installations which could make their job easier; there is always the questioning about the public institutions motives for not providing such services. The situation is complicated, there are many involved but no coordination of what to do in the different issues that emerges which are related to their activities. Besides, the actors have different views and opinions about what to prioritize and how to do it. Moreover the communication among them is not the most favorable. These are some aspects that came up with the study.

The possibility of working legally caused division of the farmers in the community as those working legally and those working illegally; this means that many of the slash and burn workers did not adopt the new rules to work without violating the environmental law. There are still procedures to clear forest for crop production in a practice that is considered destructive for forest lands. Those that adopted the new way of cutting and plotting small forest plots are empowered for being the new generation of slash and burn farmers; they are proud of their achievement and started working associated. However, the situation of those still practicing slash and burn in the less sustainable way (meaning illegally) in the community is less stressful regarding the inspections, as it decreased when some farmers

start working according to the municipality' new policy. As a preliminary approach, the proposal was to understand the way all the changes were affecting the farmers' situation; After collecting the data and summarizing the situation in a mind map, the participants had the opportunity to see the result and discuss the main problems. They agreed that much was going on and not surprisingly the result of the first steps of the methodology showed many different issues in political, cultural and social areas. The participants highlighted those they considered needed immediate action in detriment of others. Nevertheless, the issues are interconnected which, many times, make difficult to act in on matter and not in another. However, the procedures used in the case resulted in two concrete proposals for improvement: the creation of a group to coordinate the approach to the issues related to Biguaçu's farmers working with slash and burn legally or illegally. This would bring improvements to the community and help other communities which could take similar approaches. The other proposal considers a close cooperation with the municipality, especially to strength the association in an attempt to bring other farmers to join it.
Some social and political aspects that were highlighted as a resulted from the research need to be addressed otherwise any improvement will be difficult to be implemented or will not last longer. These aspects are discussed below and in the next sub-chapter and are the power and trust in the interrelations of the actors. In view of the changes in the community, the distinct element of power in the situation appears which is mainly related to decision making. Some of the actors have more power to decide and decisions are made mostly on institutions' management level without taking into account different actors' point of view. Considering the main stakeholders in this case, there are the farmers, university, EPAGRI, EPAGRI local, municipality, FAMABI. Next in importance are the farmers' union, IBAMA and FATMA (there are not many specific reference of the two latest in the data gathered).

5.1.1 Power relation concerning decision making

The importance and influence diagram helps identify the most relevant actors in farmers' situational context where risks and partnerships can be analyzed. An analysis of it can be seen in Appendix 7.

5.1.2 Theoretical explanations and insights

Throughout the previous chapters, the intervention was described where actors were involved to define opportunities for improvements. The results of the intervention were then analyzed from a perspective of communication and some constraints were identified. Now an attempt is done to understand the reasons behind the constraints and the effect they might have in the situation.
Although there is a focus in communication, this work will not enter the means of the dialogue as such as the communicative act of speech with exception of some extracts that serve to help understand the theory, the focus will be on the base for a successful dialogue in a complex situation, identifying technocracy that restrain communication and assuming that communication in a critical view is used to overcome injustice, power and domination for a more liberating concept of dialogue where all are equal able to participate in a reflective process.
Two main themes are present in different forms and meanings in the graphical representation of the situation (mind map): trust and power. Another theme is also taken as sub-category: motivation, as it is related to the two first themes in different ways. They are grouped and represented in Appendix 8: the analysis of the underlying trust and power relations are considered below and they are seen as a main component for the improvement of the situation and as fundamental success factor underlying the activities proposed with the use of the methodology. The SSM applied in a situation suggests an action oriented approach with cultural and political considerations. Focusing on the communication process and its main success factors, the issues of trust and power were evident as constraints and distortion in communication is connected to them.
Power - control and knowledge: its effects in how cooperation is seen among actors

Shifting cultivation is a complex topic as introduced in this work, understanding the situation helps one realize the different worldviews involved. Many of the studies in the area focus in the environmental problem which is the main worry for the researchers in natural resource management. Nevertheless, the influence in peoples' lives is also very important and need to be considered in a more systemic way, to avoid leaving outside important actors involved in the situation. According to the actors' views, underlying aspects of communication has been resulting in different approaches to the situation by all sides.

The life of small farmers described in this study has not been easy, in the community where they live, the practice of slash and burn is common, and has been like that for many generations. Even knowing that the practices are illegal they did not know other way to make money for living. In the context they have been living, it did not give them the opportunity to understand the valid norms of their social context, working against the law and being the target of the environmental police, but at the same time being accepted by the community (as it is a small world of family generations, friends and acquaintances living in the same locality). Even the illegality of their work was difficult for them to understand, as stated by some actors. The communicative interaction with the state was complicated, they were certain that the system was causing them problems; the law and inspections were affecting their living income. But some farmers wanted to leave the illegality and with new ways of working they can continue with the shifting cultivation. This gave them new perspectives about the future, nevertheless they still remember the years of repression. Therefore, I argue that their lifeworld is not unproblematic; as concept of the lifeworld suggests "Subjects acting communicatively always come to an understanding in the horizon of a lifeworld. Their lifeworld is formed from more or less diffuse always unproblematic, background convictions. This lifeworld background serves as a source of situation definitions that are presupposed by participants as unproblematic" (Habermas 1984, p.70) .The norms and values of their lifeworld background has been unclear: those working ilegally are accepted by the community but definitely not accepted by the system and as consequence, institutions and their actions give the farmers the belief of system wishing to undermine their activities, even those working legally are skeptical, this is one of the main constraints in the communication among them. Considering the situation in another perspective, the institutions representatives use the existing law as basis for action, it gives them the motivated power to act through inspections which leads to high fees; power of the system functions as the steering media in actors' social system, according to Parson (Habermas, 1987), what supports power is the way force or threaten sanctions, without being dependent of cooperation from people. In my view, this concept of power describes well the actions from the institutions in case, nevertheless one alternative to overcome it, can be found in the idea of collective goals to balance power relations. Using it means reaching an understanding by a process of discussion between institutions and farmers. It is not a discussion about the law itself but how to proceed to find common goals to make it understandable and find out if it can be applicable in another way. One first step has been achieved with the new rules implemented by the municipality for the right to do shifting cultivation but there are still some questions that need to be discussed by the involved as for ex. the bureaucracy of the new procedures which was named by some farmers still working illegally.

The Knowledge Aspect

One example related to distortion in communication is the institutions use of technocratic approach, insisting in the use of modern techniques and procedures to agriculture; introducing what is believed be the best alternative for farmers without being open to listen to what the farmers regard as important. For example, the work of 'EPAGRI local' is focused on new technologies, their time is used to introduce farmers to new modern processes and tools. "our assistance is given for helping the use of modern models" technician. Nevertheless, even though not allowed to work with the farmers practicing slash and burn illegaly, there is a motivation of helping them in some way. Technology is one of the driving forces of our modern society, and many times, institutions' technicians are trusted without questioning. Parson's presents the latter as assumptions of moral and prestige possession in a pre-modern society (Parson cited in Habermas, 1987, p.275) 'characterized by the view of moral leadership in sacred institutions'. This gives a base to understand the moral influence still regulating the way citizens sees the system. Moreover,

institutions may have a tendency to use this influence as a way to affect people's convictions and not making use of mechanisms of reaching understanding. One explanation could be that we trust too much in the fact that science will solve all our problems. A communicative action based on understanding according to Habermas makes no disregard of the competence in institutions' possession but brings it as a condition to be discussed and used in a search for reaching understanding. Therefore, the belief that the ongoing projects will solve the farmers' problems can be analyzed in a critical way. Relying in science as the only way to solve problems is a risk as its resources are limited by money and time. Improvements in situations can be achieved with the help of new methods and science, used in specific parts of an improvement process. However, citizens, the ones most affected could be regarded as the center of the solution including their view and understanding of the situation, so communicative action would be used instead of the instrumental one. Some could present opposing reasons as farmers not able to participate in such technical and managerial discussions; nevertheless good decisions are made on argumentation based on personal knowledge, information, openness to alternative worldviews and data (Craig and Muller, 2007) I would then argue that science and experience (farmers) can work together if there is opportunity and a respectful dialogue.

The communication process is complicated but with a restructuration of approach from the old way of thinking to new emancipating ways challenging the institutions management knowledge is possible. (Habermas, 1984), This means institutions internally start analyzing their working process towards the citizens which could result in improvements. If actions are taken to engage the parts in a process of change and critical thinking it can result in building and environment of trust and valorization of people. Knowledge and expertise are crucial in this case but farmers need the expertise in their own conditions and terms. In fact, the approaches which are based on scientific ground, are being developed and bring great improvements for the community but still the technocracy is present when institutions are relying deeply in these projects without proposing a deep restructuration of its communicative approach to the farmers.

Another example of technocracy, is the case of the association, the farmers are relying on the knowledge offered by the university and EPAGRI; the farmers' association gets support in developing brand, work strategies, group working etc. but EPAGRI's management is striving to draw back the involvement of its people and the use of resources, as they believe the association will manage on its own, such decisions are made in a strategic way without involving all the actors. This causes anxiety in the association's members as they know that it is difficult to continue without institutions' help. Furthermore, considering the activities proposed in this study for the improvement of the situation, they are relying completely in the decision makers willing to spend time and money; that means a process has to be approved as a part of the institutions work, independently of the specific personnel involvement. The way it is working today, they are relying only in short to medium time projects which might not be a good option as it will bring only temporary improvements to the situation. It is important to find a long term solution, considering the risk of change of personnel as result of change of political power in institutions. The power relation is evident, the management has the power to decide which are the goals and farmers are in disadvantage as they are not offered the option of argumentation resulting in unbalance in power. The justification that resources are not available forever is common which exemplify the way system is structured through strategic action. Colonization of the lifeworld can occur in different forms as power control and use of knowledge and money, subsystems as institutions are driven in terms of results; short projects, achievement of goals as outputs, fewer people involved, less money, strategic and instrumental action prevails over the communicative reason. Nevertheless, a more communicative reason with participation in decision making can be considered and the long term planning can be analyzed as the benefits will be used by a great number of other farmers in form of knowledge acquired.

One aspect that can be highlighted is that the social benefit of the intervention depends on the willingness of the involved to help the group in question. The important activities of the SSM are the meetings organized. They gather actors to have meaningful discussion and together propose possible changes for improvements so the actors need to take part. Nevertheless, one of the meetings, the last one, did not have the participation of the main decision makers, it was considered very important because it aimed to have a discussion about the changes proposed,. Municipality and EPAGRI management were not present to discuss the issues and the changes proposed. This raises the question whether the

management is really interested in farmers' issues and in a communicative neutral dialogue, Jansen (2002) presents distortion in communication as the technocratic structures preventing neutral dialogue where leaders can affirm they speak for the people but refuse to listen to the people causing a distortion in the communicative relation. One may wonder how much trust relation is affected in this case. The objective with the use of SSM is to start a communicative process of those concerned and affected by the situation. But data showed a frustration, mainly among farmers, they feel not listened by the decision makers. Jansen suggests that a neutral dialogue can be motivated if 'in a truly democratic state, all institutional spokesperson would be instructed in the rules of neutral dialogue rather than in the principles of technocratic management..' (ibid, p.483). It is clear that it is not enough to encourage farmers to a dialogue with institutions but also to promote institutions change towards an increase of communicative competence. In view of the social aspect of the whole situation where farmers were on the margin of society for decades; afraid, not feeling respected by the authorities, it is understandable that they are suspicious of any improvement and support from the authorities.

Learning process to resist power

One main achievement of farmers in Biguaçu is the possibility of working legally, this was certainly possible only through the project realized using Paulo Freire thematic investigation to increase the farmers participation in institutions activities (Uller-Gómez, 2008). Among other things, this work helped farmers develop their critical thinking and communicative abilities as the changes started after the study and with the help of the institutions involved. Actually, it is clear that a learning process started at that point in time; This learning motivates and empower them to speak for themselves and actively participate in the community. It leads to emancipation and an attempt to liberate from power control (Harrington, 2005). The start of the association is an example of effort to emancipation; it gave them social status in the community, better acceptance and opened the doors for new opportunities. But some aspects were identified in the intervention, which shows that their journey is just starting. One aspect is that there is much work around the association and the farmers working legally, the belief that the associations' success will bring the other farmers to work legally make the work with the illegal farmers less important. It seems that the learning process is still encouraged but only for those joining the association. In fact, equal or even more focus is needed on those working illegally to increase the trust in institutions and in farmers' association, this could result in a change of mentality and acceptance of the environmental laws .However, the significance of the association is not just the business itself but the social impact it gave to the community, the lifeworld of the next generation. There is a considerable social importance which they might not be aware of. This exemplify the idea of lifeworld defending themselves against the system 'lifeworld has the capacity to resist colonization by the system' (Harrington 2005, p. 281). The farmers are aware of the advantage of associating themselves and fighting for their place; they understand the power of working together and being visible for the community and for the state, they have started their emancipation and can question norms. Moreover, if they use the basis of rational discourse to get answer to their questions, using argumentation, it would also promote learning. Questioning what is right or wrong, just or unjust in a common ground without constraints, with all voices being heard and where only the force of the better argument matters brings the the practice of discourse in a way that can be emancipatory. Nevertheless, if the connection of this movement of liberation with the start of the association can have consequences if it fails as a group. If the business for any reason fails, it will weakness farmers' capacity to resist social injustice and they might lose the little influence they have with those in control. The communicative reason is the power of the people; an acquisition of communicative competence has the capacity of changing that and not only for the farmers but also from the institutions side. I argue here that the learning for a communicative approach to improve the situation is not only resting on the lifeworld but also in the system. I challenge institutions to enter in a learning process for a change of attitude

Power and Control

One of the themes generated in the intervention which was selected to developed, as an activity aiming for improvement, is the 'cooperation between municipality and farmer's association '. The discussion and proposal of this topic started because some of the actors involved believed that the only way of bringing farmers to the association is to start again

the inspections. They are convinced that the repression of state power is the only form of making farmers change.
At this point, one can question if they really found emancipation, or if the importance of bringing people to the association is constraining their reflective process. However, through some more discussion, the participants could agree in adding a work to increase awareness of the environmental aspect of slash and burn practices. This was one important moment of reflection, considering that instead of moving away from the repression of many years, which caused so much frustration and fear, they want it back. The methodology gives importance to listening to peoples' worldviews, nevertheless the proposal for an improvement which leads to the restart of the inspections, gives opportunity for careful consideration of what is the best alternative. Paulo Freire, in his work, 'Pedagogy of the oppressed'(Freire, 2000) introduces the importance of the reflection about the oppression and its causes. Liberation is a process to achieve freedom, and freedom is to give place to a new being: no longer oppressor, no longer oppressed. But to achieve this, they need to perceive the reality of oppression as a 'limiting situation that they can transform'. To escape oppression of a situation and see the possibility to make something good of it requires critical thinking and a wish to improve things for oneself and others, to be able to see how this lead to whole new world of opportunities. Here one example about how a basis for discourse could be started and could give opportunity for learning. The question is: could we see the request for 'increase of inspection' as an intensification of repression from the state? The discussion would lead to a debate of a claim that could be accepted or rejected (being invalid). To exemplify the pragmatics of it, we could lead the discussion with formulations as: What is right to do irrespective of our own interest? Are we considering what is good for all? Would this be good for farmers working illegally (considering that they are the ones most affected but are not participating in the meeting)? Can we try to find the answers in an argumentation with the actors? Can this issue be discussed and agreed based on the best argument? This would be an opportunity for change, where all could learn.
Control and knowledge are present in different social interactions, specifically in a power interrelationship. The main issue when analyzing the power relation in this case is the fact that slash and burn is considered illegal practice and many nations have campaigns for abolishing it. Nevertheless, studies have shown that it is not always the case, as the work the university is doing together with EPAGRI through different projects. The university is behind the work with FAMABI to regularize farmers' work. But illegal workers are still seen as a problem; Institutions' management is reluctant in breaking the barrier among institutions and them. There is not much communication and no effort to bring illegal workers to work legally. " We have instructions from the management for not involving with them" EPAGRI worker. One more example where a practical discourse could be initiated; even though this is a matter inside institutions and not a norm in itself, it can also be regarded as a rule adopted in the institutions regarding farmers working illegally, nevertheless, we can consider it as an issue that is in the interest of all, therefore as in a practical discourse, an argumentation could be initiated, involving the actors and the argument to be discussed is the justification of the action. However, the question is: it is possible to make parties concerned agree that it is the interest of all (just for all parties) that EPAGRI local workers are needed in the work with farmers practicing slash and burn? We can make use of practical discourse remembering that it is "not a procedure for generating justified norms but a procedure for testing the validity of norms that are being proposed and hypothetically considered for adoption" (Habermas1990, p.103). Therefore the suggestion is to bring it to discussion to test its validity. In that way it would be an introduction to an argumentative decision making.
Although some institutions' representatives have a willingness to help, there is clear barrier between the institutions, as public service, and the farmers; the communication is distorted. In Habermas' concept, the ground for generating an ideal speech situation without exclusion, the communication reasoning, is based on the theory of truth, "everyone have a free and equal opportunity to participate in the conversation and exchange rationality debatable grounds for their views – without exclusion, manipulation or coercion"(Harrington, 2005) most importantly this base for communication is the first approach to enter in a practical discourse because what is being discussed is a real problematic issue connected to existing law, the acts are related to legality of the actions, which I will not discuss here, the proposal is not the discussion of the validity of the law but the problematic communication to make the interaction among actors happen. In fact,

Terms as 'legally and illegally' are directly connected to law and has social implications; they motivate actions from institutions side, depending on farmers attending one 'group' or the other. However, It does not mean that approach to the communication process can be ignored, the lack of knowledge about the subject can be the basis of illegal acts by the farmers; System and lifeworld are conflicting: on the one hand there are institutions which want to comply with the law; experts, engineers and technical staff struggling to make the farmers understand that they should follow the legislations and rules; on the other hand, the farmers lack of information and mistrust in institutions. The inspections on farmers' land made them afraid of contact and they believed institutions involved were against them; they were seen and pursued as criminals and the law should be followed, resulting in inspections and high fees to be paid in case of being caught doing illegal practices of slash and burn. The denunciation of the illegal work comes from different actors as institutions and citizens. The repressive institutional system is present in communication structures both inside institutions and towards citizens, also in the lifeworld; institutions representatives do not have the opportunity of debate competently the issue of farmers, so they are left outside the institutions' decision and lay people tend to follow what institutions present as the right way of acting (for example, citizens report the illegal practices, without understanding all the problems involved). This represents the constraints in the communicative action. Even though management ensured their willing to help, their actions are clearly excluding people's participation. The opposite of a neutral dialogue is a refusal to listen to people, making clear the technocratic management of institutions.(Jansen, 2002). One may argue that slash and burn is illegal according to the law therefore there is reason for the institutions to act the way they do but there are still many disagreements about the environmental aspects of it (as stated in the beginning of this work); Nevertheless, there is also another possible approach, the work with the community and the clarification of new ways of working with slash and burn.

These are some examples of distortion in communication observed; not only the lack of participation mentioned before but the interviews showed that institutions management are viewed as not truly being sympathetic to the cause of the farmers. They have the belief that the effort will not give results as the extinction of this kind of practice is more likely to occur. Given their view of the situation, one of the consequences is the lack of confidence towards institutions discussed next.

Trust and its effect upon communication

In the previous section, trust appears as one of the main issues in the relationship among the actors and it is one reason for distortion in communication. " Without the general trust people have in each other, society itself would disintegrate" (Möllering, 2006). Trust is crucial to society and without it no true communication can take place. In all relationships and partnerships, trust is basis for success. The theory of communication brings the complexity of system and lifeworld where system is trying to regulate the lifeworld and lifeworld reacting to the system through social action. Power and trust aspects are behind many of the issues between the two worlds, here the state (institutions involved) and farmers. One can ask where trust is placed in the communicative relationship of actors and which can be the causes affecting it. In the previous section, power issues were discussed, power is one constraint that is distorting dialogue among actors and a communication based on trust is difficult to take place. It was made clear that the university is trusted by farmers and this aspects is relevant for trust in the context of the farmers. Considering the distortion in communication by the expert and managerial knowledge, taking into account that university is a representative of the technocratic elistism of society, in my view, it is interesting that they have the farmers trust. Has the communication between them been characterized by the process of reaching understanding as the theory of communication suggests? Has this trust being 'motivated rationally through agreement based on reasons?' (Habermas 1990, p.280). The way farmers presented their view tend to confirm that at least of some of this process was present in the communication between them. Nevertheless mistrust is present in most of the relations among actors. Surprisingly, mistrust is not only behind institutions farmers' relationships but also among farmers. Farmers are skeptical, the mistrust seems to be a cultural fact and the result is that they do not want to work together; Hardin provides a view of trust based on a multiple range of interactions about many different issues which gives knowledge to trusting someone. In a small community, people may know each other and the limits of each one's trustworthiness (Hardin, 2002). In my understanding, this concept of trust he presents fits the way farmers see each other, nevertheless, a more extensive work is necessary to draw conclusions about the lack of trust

among farmers. Nevertheless, the aspect of trust is mainly related to relationship with institutions; “The municipality does not help us, they fell into discredit”, farmer’s view about the institution’s involvement in their problems. In the relation with the institutions, Freire’s idea of relationship among state and citizens can help understand their mistrust; “every approach to the oppressed by the elites, as a class, is couched in terms of the false generosity” (Freire 2000,p.133) which explains the way farmers see help from institutions with discredit. Farmers tend to identify intuitions as having hidden intentions. One explanation can be that it is a cultural remaining from years of oppression from the state, as Freire presents considering his experience in the countries’ diverse forms of oppression of the minorities. In addition, we need to take into account, the fact that institutions leaders have different views and there is confusion in their role when working with this specific case of slash and burn. This view is contradictory to the view of some of its personal who have the credibility of the farmers but the municipality as institution does not inspire trust and confidence. This conflicts with Giddens’s (Bachmann and Zaheer, 2006) view of “how actors can have trust in abstract systems or institutions”. He describes that actors perceive the system (institutions) when interacting with other actors, for example, experts representing the institutions. One explanation could be the different opinion between institutions’ management and technicians, they do not share the same view of the situation and how to handle it. Another example that emerged in the last meeting is that there is no clear understanding of responsibilities from institutions; about who should work with the associations’ issues to help them succeed and who should work with illegal farmers; the role of the farmers’ union and other questions were raised. FAMABI, which is closely working with the legalization of the slash and burn practices, has partially the trust of farmers together with the university, but through one person who is engaged in helping them. Additionally, mistrust in institutions can also be understood in a historical context; generations of farmers have experienced fear and lack of confidence on state power. “ When I was a child, my mom had to hide the sugarcane bagasse” farmer about the inspection when she was a child. The fact that the farmer as a child perceive the use of power as sanction to her family fits the concept of communicative relationship been distorted as her judgment about trusting the system might be affected by her experience.

It can be argued that farmers have always been acting illegally but data shows that very little or no clarifications about the rules were given to them. EPAGRI together with the university are responsible for many of the projects with those working legally but EPAGRI’s local management is clear about keeping distance of illegal farmers and is restrict about the possibility of helping the association with projects. The government agencies’ management declare willingness to help the farmers, however, when discussing the situation of illegal farmers, they are convinced that those practicing slash and burn are not agriculturalist and cannot be treated as such, “this people working with the extraction of the forest are not farmers, the environmental agency fight against them” institution’s manager statement. Representatives do not believe farmers are capable of changing from the ‘extrativism’ culture; that farmers are not able to leave behind generations of illegal practice inherited in the culture. Despite the fact that this statement was not given in a conversation between the parties, it is made known as formal statement of a representative, and it appears to be the view of the institutions’ representatives. This previous statement from the management or the opinion held by them, can propagate mistrust in farmers among people inside the institutions, even though I am not discussing specifically the utterances, this view of people working with slash and burn not being farmers would be enough for the actors to test the validity claim and enter in an argumentation where such statements can be justified, discussed in a tentative to arrive at a consensus. Exemplify how to test the validity of the claim in the previous statement, it could be claim to truth (ex. Use evidence to justify) Is there stated anywhere that people working with slash and burn are not farmers? The Claim to rightness: Is it right that the environmental agency fights slash and burn farmers and not consider helping them in other more sustainable ways of working? The outcome of such argumentation could lead to a new approach to farmers’ situation.

Despite the mistrust in public organizations, farmers rely in the help given by the university. “the university is interested but the municipality is not “ farmer. Here, there is an open communication with the university, trust and willing of co-operation. Many times, in conversations with the farmers, they said they were surprised that the university was interested on them. They built a relationship of trust with the university, as they treated them as equal, promoting a positive atmosphere of confidence and open dialogue.

Habermas(Harrington, 2005)holds the view that, a collective democratic communication expresses solidarity and trust; and this communicative social process leads to a democratic transformation and results of this change are social actions taken; for instance, the farmers gathering to discuss their issues and social rights. The data shows that farmers are not convicted that institutions want to help them. Trust is the outcome of a process of open dialogue and participative democracy, where argumentation in equal conditions for the participants happens. Dialogue is the base for trust, "Founding itself upon love, humility and faith, dialogue becomes a horizontal relationship of which mutual trust between the dialoguers is the logical consequence." (Freire,2000,p.91). Creating a ground for true, neutral communication is a precondition for a relationship based on trust. There is a climate of mistrust and it was generated by different cultural, historical and relational aspects and it requires engagement of the parts to change it. Nooteboom (1996 cited in Möllering, 2006, p.79) expresses that "If not already in place, trust has to be built up. It is as much the result of cooperation as a condition for it. All one can do is to select conditions that are conductive to the emergency of trust". Considering that the parts are willing to cooperate, a relationship of trust can be built but a true commitment and engagement has to happen and actors have to leave behind the history of fear and mistrust.

Motivation

Initially, one of the objectives of this study was to understand why farmers working illegally do not want to and participate in the farmers' association. In the interviews with them, this subject was one of the topics and mainly the answers were that they do not like change, they want to work alone and it will increase their work. Additionally, institutions, do not want to be involved and have the opinion that the change should come from the farmers. These are some of the outcomes of the short time spent with the actors and show some of the apparent causes of non interest in joining the association. Nevertheless, the researcher have come to the conclusion that it would be necessary a more specific work to find out the answer and it would be very useful to be used in other communities.
The aspects discussed above are highlighting the result of the interventions and social relations behind the situation of the famers. The suggestions for improvement came from a short but intensive work with some of those affected. It may help lay ground for a further work with systems intervention nevertheless, there are issues that have to be reflected by institutions regarding the work with communities and the improvements suggested can even be discussed more along the way for its implementation. As Werner (2000) points out: "systems practice should not misunderstand itself as a guarantor of socially rational decision making; it cannot, and need not, "monologically" justify the social acceptability of its designs".

5.2 Methodological insights

Through the use of the methodology, the case of the farmers working with slash and burn showed to be a complicated one with many actors involved. The first steps of the methodology gathered information and showed that there is a willing to help but no true commitment from the parts. The intervention was short yet could identify cultural and political issues with information gathered from different actors with diverse background and worldviews; it gave opportunity to understand the complexity of worldviews among people in the same group. There are many improvements that could be carried out and were suggested by the actors but for this application of the methodology at that point in time, two were chosen, one is related to the interaction of the actors to be interconnected in a way of joining efforts and the other is a close cooperation with the municipality for the strength of the association. With the implementation of the changes, the 'real world problem situation' is improved by the change of state to a 'new improved situation'. Nevertheless, the learning generated some new perception of the methodology and its use.
The reflection about the user specific approach adopted, in the context of the community and the methods utilized give opportunity for new experimentation with some changes for the use of the methodology and methods in a better way. By this, I mean the methodology certainly gives opportunity for learning and that is the main advantage with it. The process can be improved and the continuation of the work takes in consideration the improvements

and also its use in new similar situations. First point to be considered is the timeframe, the main disadvantage when using the methodology was the lack of time of the researcher; not only in the preparation phase but also during and in the final close up from the researchers' side. SSM give many chances to a meaningful overview of a situation and the best use of it happens when it is prepared thinking thoughtfully. As instance, one should plan carefully which actors are the stakeholders and should participate. In this case, the researcher was offered a great help with the actors involved, however some actors that are relevant for the discussion of future steps were not involved. Another point related to lack of time is the knowledge and use of methods. One might need to have time to get acquainted with methods chosen and pros and cons of its application for oneself and others. Specifically, the use of vote as a method to choose among different items discussed. Wilson (Wilson, 1990) indicates that voting does not facilitate consensus in decision making; it is a majority-rule technique. Even though SSM does not strive for a consensus, a discussion and a general agreement would be a better choice. One need to be a careful planning to give time for discussion and not being forced to vote due to lack of time. Additionally, when using methods and facilitating, one has to be analyzing the participants answers while the discussion is still ongoing; this requires preparation and facilitation skills. When debating the changes proposed in the last meeting, the participants were answering 'yes' to the questions about 'desirable' and 'feasible' changes without considering the real possibility of implementing the changes (see Comparison table in chapter 4) ; this was highlighted by a professor invited and it would had passed unnoticed by the researcher who was facilitating the discussion. This might be related to the culture aspect where people acts thinking of the good of the community without considering the real challenge of the things they are committing to.

Furthermore, considering the time spent in the field, if the researcher had stayed longer, another meeting could be arranged with those that missed or were not invited for the meetings. Likewise, extended time in the community would help understanding better hidden social norms and rules. Considering time frame, on one hand there is the disadvantage of not implementing all steps of the methodology; on the other hand, due to the way the political processes are, it could take very long time to see something happen because of the bureaucracy and delay in decision making from the institutions part. Second point chosen to be considered is the democratic process; In a democratic participative process according to Habermas' theory of communicative action, actors should have the same rights and opportunities to debate in equal bases. Critically thinking in the conditions to satisfy the democratic participation, in this case, actors should be given the opportunity to come to the meeting, because of a misunderstanding, farmers working illegally with slash and burn did not participate in any of the meetings. The discussion and decisions for improvements affect them as stakeholders but there were not there. Once more, it is very important to make sure at least one representative of each group is present, to make sure that the democratic process can take place and all voices are heard. Other stakeholders that did not come to the last meeting were municipalities and EPAGRI's management; this caused a frustration because if those that have the power to decide do not want to be involved, there is no democratic process as no decision can be taken or discussed; it can be a waste of time. One reason can be that they are not the ones asking for improvements. This might be another point to be considered before doing the systemic investigation; the actors need to be asked if they are really interested and able to engage in the discussion of the issues. Bringing Institutions' managers and lay people together is not an easy task and asks for a preparation before the intervention just to make sure they will participate. It is a problem to make the relationship among state representative and lay people change. This is the main constraint to build a communication in Habermas sense where power and cultural aspects are stronger than the willing to cooperate. This view fits the critique of the second wave of systems thinking for not taking enough consideration of power relationships in interventions.

Considering the set of procedures of SSM, the experience was important; even not using all the methodology's activities, its use involved six of them out of seven. Some of the activities were carried out by the researcher herself as the creation of the transformation statement and the generation of the model with the 'transforming' activities. That could be done together with the actors involved and could have resulted in different models. Although there are opportunities for improvement, farmers and representatives of the institutions acknowledged that the representation of the situation with the mind map presented in the meetings was new for them and very interesting, seeing themselves in a

drawing with feelings including many of the actors in the same picture simultaneously, gave them the possibility to see their situation in a new way. Also it is important to mention that in the same meetings, there was an atmosphere of respect and interest in others opinions and views. This gives also place for a learning environment, because if people is respected and accepted for what they are and not for their academic degrees or achievements, they will be open for new ways of thinking and will be able to discuss and discover a new world of possibilities. But to facilitate learning is challenging and interesting as it is very difficult to perceive how much someone learned in the situation.

6 Conclusion

The starting point of this study was to understand the situation of farmers practicing slash and burn and their relation to institutions. Furthermore, it aimed to learn how the institutions were involved and what changes would improve their situation. based on discussion with the participants, it would propose actions to change the situation for the better, this was carried out using Soft System Methodology. As stated before in the first chapter, slash and burn is a topic that has been researched and in the majority of the cases the main focus is the damages to the environment. In many of the cases, very little is considered about social and communication aspects involved. Therefore, this study using systemic inquiry can be useful to other communities facing issues with slash and burn farming. The use of systemic inquiry and its advantages is also demonstrated by Bosh (Bosch et al., 2007).

The situation of the farmers is complex, involving many actors and different responsibilities. In this case, considering the steps of the methodology, it provided a framework to facilitate the encounter of the actors, the result are two proposals for improvements which they are related to the farmers' association and partially to farmers working illegally; They are: the cooperation with institutions and the work with illegal farmers that are reluctant in joining the association and leaving illegal practices. The proposals were agreed by the parts but a question remains about the possibility of being implemented as important decision makers did not participate in the discussion. Despite this, they participants could decide the best way forward with the actions. The analysis also showed that important actors as EPAGRI local and farmers' union are involved in a limited way. Indeed, they can be the ones helping increase the visibility of farmers' business and improving communication with the institutions. One limitation observed is the lack of representation of one important actor in the study, IBAMA, their participation could have contributed with different interpretation of some of the issues.

This research shows that institutions have different and many times isolated ways to deal with issues related to slash and burn farmers. Institutions' management and representatives do not agree about the way to handle the situation, causing frustration among the involved. This problably prevent more improvements in farmers' situation.

Further more, this study shows that the situation of farmers in the community of Sao Mateus is characterized by the presence of lack of trust and the influence of power structures which causes distortion in communication and prevents a more participative decision making. The analysis reveals also some example of opportunities for the start of debate among actors in a search for agreement about certain claims. These issues need to be addressed to benefit both sides and inspire other communities in the country to start a work with slash and burn farmers. Furthermore, knowledge about the underlying reasons for distorted communication can help policy makers involved in the work with slash and burn activities to look over their decisions and find ways to improve the situation of farmers. It can also help farmers learning process to improve communication and capability to argue in favor of their needs. The association is a powerful example of the struggle of a group of shifting cultivators who wanted to succeed. Finally, This investigation brought together farmers and institutions to discuss farmers' situation in a way that they could express feelings, fears and hope for the future. The farmers working illegally need more attention of the institutions in order to help them understand and change the way they practice slash and burn. However, this requires a change of attitude of the institutions and a willing to

cooperate when necessary. In addition, a more extensive work with those practicing illegal slash and burn to understand their worldview is crucial to find a way to integrate them in the society by their own terms.

7 Reflection

A thesis work is challenging; to have the pieces on place as theory and practice is complicated. But it is also very interesting specially the practical part of it. Working with SSM which involves complex situations and different worldviews is a new experience, even though I only worked with two cases, I could learn how two different cultures with similar problems have different ways of dealing with them. The way one approaches the situation differs in each case, I learned different things this time which complement my previous experience. Analyzing the aspect of contact with people involved, it is very difficult not to take sides, which is not desirable in a case, one need to be critical to avoid bias. Another aspect that was important for my learning was the field work. I thought that it would not be so difficult to conduct the practical part as I participated in another case using SSM in the Systems Thinking course. But it was really tricky being alone and having to decide, making mistakes and going back to do it differently. It is also a very good aspect of the methodology, it gives the possibility of analyzing previous steps and make changes, it is flexible and gives more freedom in adjusting things in previous steps. Nevertheless, regarding the logistics of it, it would be so much more complicated if I did not have everything ready when I got there. I was amazed by the kindness with all practicalities when arriving, then people I met were so kind and helpful it made me feel welcome. I think because of that I do not feel that so long time has passed since I was there.
There are some aspect of the methodology that I find complicated, as the chance to meet all the actors in so little time. The time frame is very important, I found very difficult to do almost all the steps in the short time I spent there, I think one has to meet different actors many times and if possible, it is good to spend more time at the place to be able to understand the culture. Even though it is the country I come from there are particularities in small communities that one might not be aware of and only spending time there help understand it better. Another point that it crucial is the planning of the whole process of a thesis. I have not been able to finish the work on time and this happened because I was not careful in analyzing the risks of not having time to finish in an acceptable timeframe. This was one of the most important learning part of this thesis. Overall, there were many different leaning moments which I hope I can use in other projects.

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Appendix 1

LUMAS Model

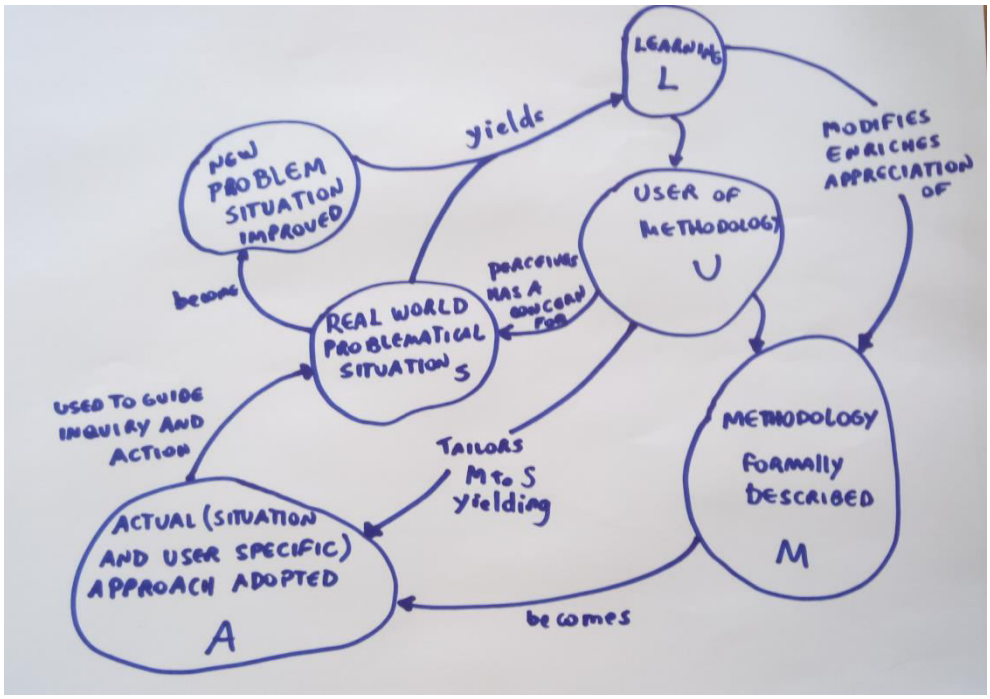


Figure 6- LUMAS model, Learning for a user by a Methodology-informed Approach to a problem Situation, adapted by the author from Chekland, 1999.

Following the LUMAS model in figure 2, Starting from user 'U' perceiving an issue in a situation 'S' and appreciating the methodology 'M', which is adapted to a specific approach 'A' for situation 'S'. To summarize, LUMAS model is a process which makes use of methodological principles to support an approach used in a specific situation, it results in learning which gives place for an improved condition. The learning in LUMAS can change 'U' and her future use of the theory as well as the whole LUMAS approach. The LUMAS' model, as a generic model, can be used with any methodology and its main concept applied in a case includes: the framework of ideas (systems concepts), the methodology (SSM) and the situation (change of it). All three parts embraced by the reflection and learning (what did I learn with the case?) constituting the documentation of learning and in this case the report and thesis.

Appendix 2

Kolb's model of the learning cycle

Prehension is how people convert real-world experience into ideas, including two learning modes: concrete experience and learning by way of abstract conceptualization; Transformation implies learning through reflective observation and through active experimentation. Based on these learning's styles, Kolb (ibid.) developed four learning orientations: The convergent learning style, which adopts the abstract conceptualization and active experimentation learning styles see figure 4; the divergent learning style which opt for the concrete experience and reflective observation; The accommodative learning style which adopts the active experimentation and concrete experience modes of learning and the assimilative learning style, that prefers the reflective observation and abstract conceptualization modes of learning.

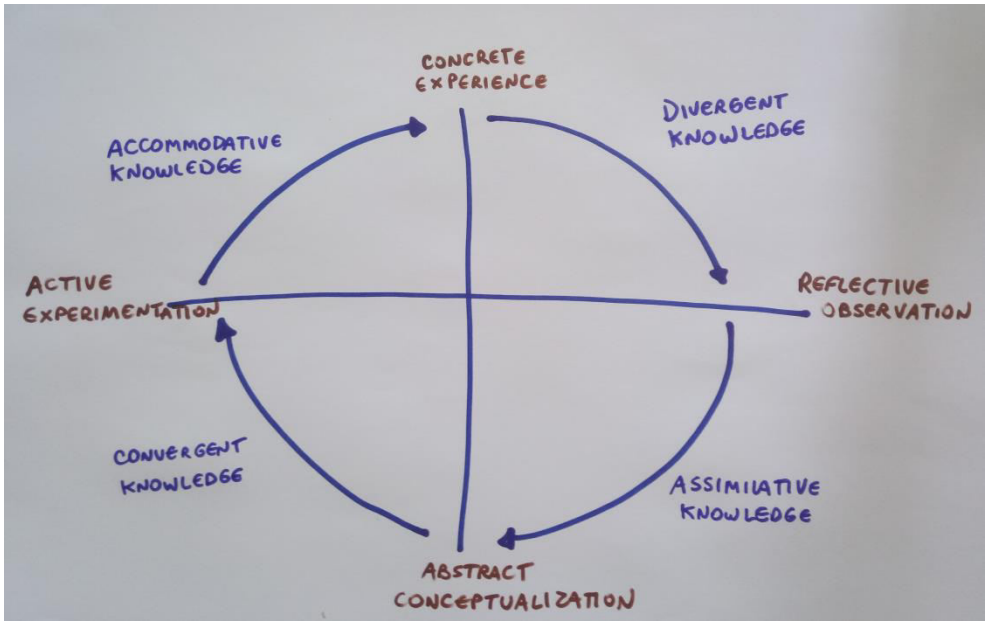


Figure 7- Kolb's model of the learning cycle adapted by the author from Wilson, 1990

Appendix 3

Soft System Methodology stages and learning cycles

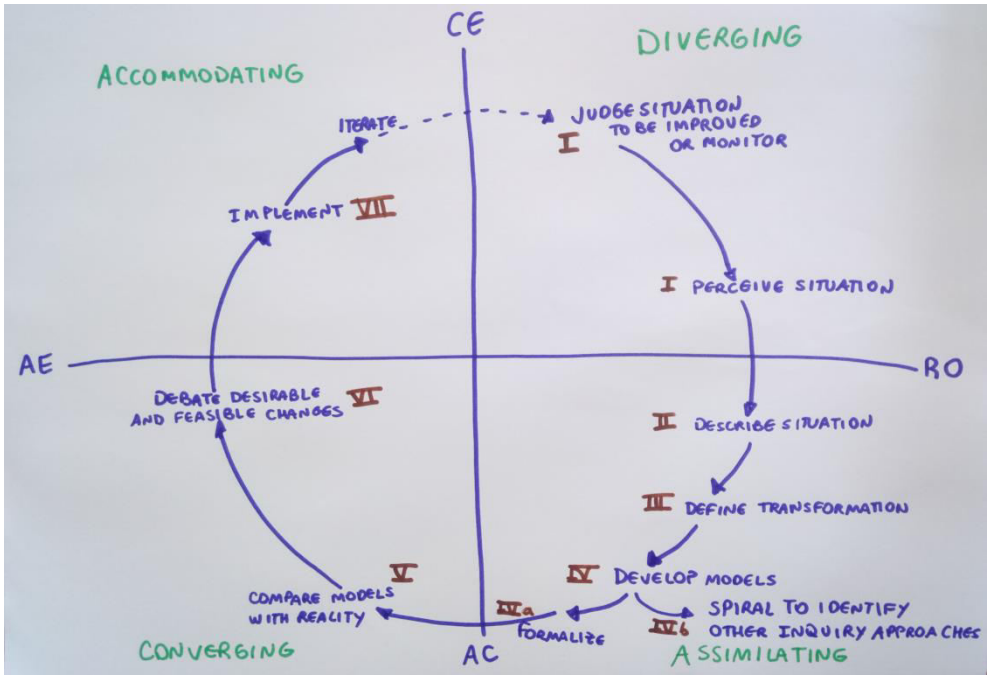


Figure 8- The process of soft system inquiry as an application of the learning cycle adapted by the author from Wilson 1990.

The learning styles are graphically represented in each step of the methodology in use to give a better understanding of how the learning is applied in that phase.
SSM stages 1 and 2
Stage 1 – Inquiry process – In this stage the inquiry starts with the perceived real world, the problem situation; It is important not to label problems and avoid bias from previous experiences, having an open-mind to get people's different perspectives. Capture peoples perspectives, engage people and events to understand the situation, avoid restricted point of views. It is also important to look up for reported information as articles, scientific studies and other kind of documents. Then in the stage2, the information obtained is described, with structures, processes and climates; the themes of concern are also represented. Using different inquiry techniques, the situation is reported in graphical and written form. Some of the techniques commonly used are pictorial technique and mind map.
SSM Stages 3 and 4
In the next stages the process of design and proposal of future improvements are started. The root definitions of relevant systems are developed then purposeful activity models are generated. These stages correlate with assimilative learning, including modeling and concept building. There are four inquiry actions involved in this stage: creation of transformation statements, the expansion of them using the mnemonic CATWOE which are features that the system should be considered to be a system definition. Formulations of conceptual models of human activities, based on previous steps including basic science research, hard systems analysis or technology development, are taken when necessary.
Stage 3 - Based on declared worldviews, systems are defined and recommendations for other kind of inquiries are made if needed.
Definition of relevant systems using CATWOE – The definition should be done for each issue brought up in the previous stage. The definition will include benefits that an improved state would bring and which are outlined in the mnemonic CATWOE (Wilson, 1990) summarized below.

CATWOE (TWO CAGES)
T- Transformation – The central activities to believed to reach the desired improved future.
C- Customer – people who will benefit or unfavorably affected by the transformation
A-Actors- who will be responsible for managing and carrying out the activities in the statement
O-Owners- Who will be the potential decision makers in the improved future.
E- Environment –resources and constraints impacting the transformation.
W- Weltanschauung- explain the values and assumptions of those developing the transformation statement.
The mnemonic CATWOE can be further improved with two more letters G and S.
G – Guardians – Those that will be responsible for monitoring the activities
S – System – The activities that should be done to achieve the transformation
In this stage, full definitions should be developed for each issue found in the stages 1 and 2. These can be used to discuss with actors about the main concerns they want to lift up. A statement is made to describe the activity system to be modeled, it is called "Root Definition "(Checkland, 1999)
In Stage 4 models are developed showing what activities would exist in an improved state. Modeling is a technique for learning and to reflect about what a changed state would be and it is represented by the abstract conceptualization in the learning cycle; it helps the understanding of events, organize them in our minds and represent an improved future. In this stage, the development of the Human Activity System is done, which is "a set of purposeful activities" (Wilson, 1990) the activities are to be set in agreement with people involved in the situation, considering their worldviews.
Stage 5 and 6
The objective of stage 5 is to test the Human Activities System developed in stage 4, communicate those and debate with a larger number of people involved, compare the abstract model conceived to the picture of the real world developed in stage 2. Different techniques guide the discussion as question generation technique or general discussion technique. Questions can help the discussion as: Does the proposals address real issues? Do the people involved see new aspects of the
situation or at least the proposed changes encourage discussion? In stage 6 the discussion about the future changes are started, aiming to take the participants to a view of future, a discussion of the meaning of desirability and feasibility of the proposals in relation to the CATWOE is taken.
Stage 7
Implementing: planning and taking action. It means carrying out the changes and living with the new reality. The analyst involvement can finish here when the debate is finished and the changes agreed. Nevertheless, the analyst can take part in the implementation of the changes, in case he/she is employed by an institution which is involved in the problematic situation. This stage is not the end of the application of the methodology, as there is the need of follow up actions of performance and monitoring to evaluate if the changes are taking place and if they are giving result as intended. The main steps of the methodology can be seen in the following table (table 1). In this table, the steps are presented, divided in process, tools examples that can be used in each step and the learning opportunities for each of them. In the 'stages' column, it is specified if the stage was employed in the case. The last stage, the changes are proposed and in case they are accepted, the implementation should not be complicated (considering the agreement among the parts). In many cases, at this stage, the one conducting the process of SSM can leave the group, someone involved in the case can be responsible for following up the implementation as it can take long time. In this case, the researcher had a very limited time to do the steps, so the last one was only proposed.

Learning cycle represented for phase 1 and 2:

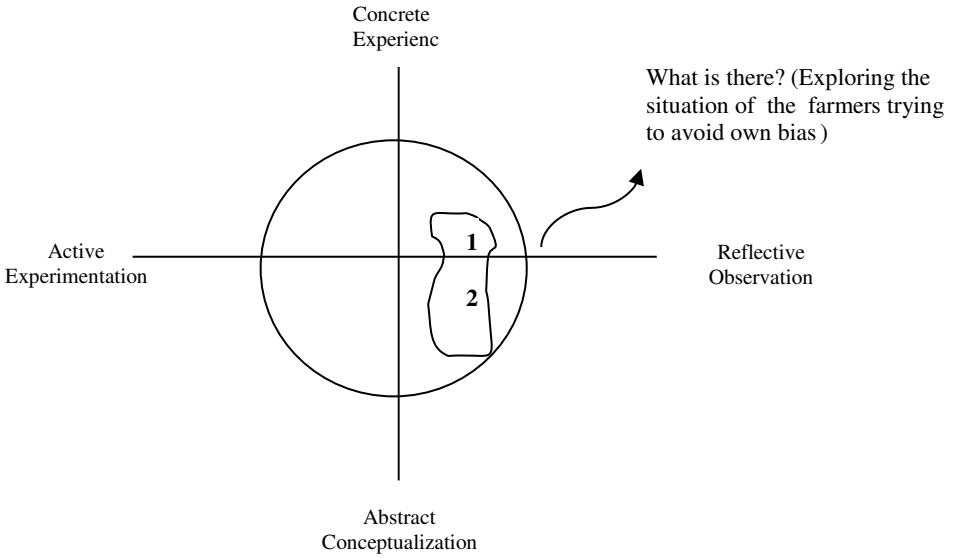


Figure 9- Representation of the learning cycle applied in the situation – phase 1 and 2

The representations 1 and 2 in the circle above are SSM's first and second stages, between the real experience and the reflective observation in the learning circle.
"To reflectively observe means to watch something and think about it without drawing conclusions" (Wilson, 1990)

Learning cycle represented for phase 3 and 4:

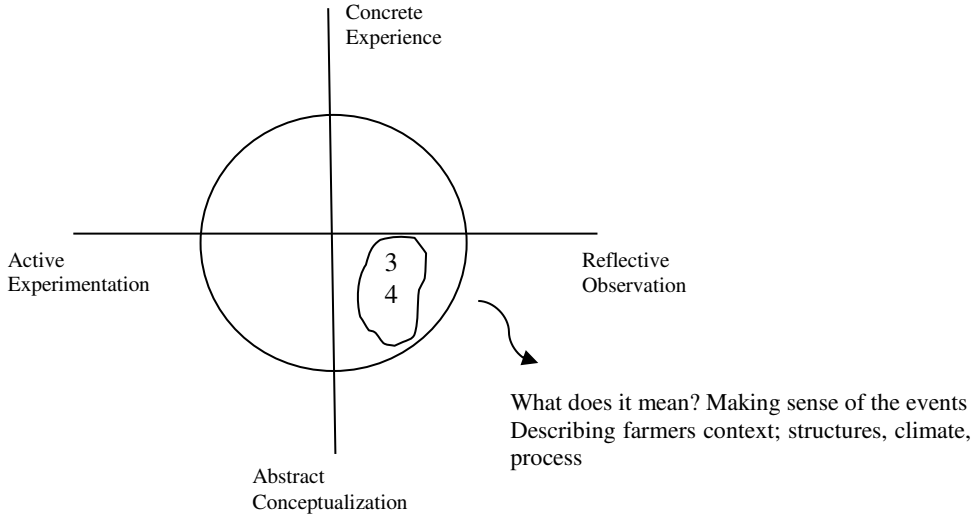


Figure 10- Representation of the learning cycle applied in the situation – Phases 3 and 4

Learning cycle represented for phases 5 and 6:

Learning cycle represented for phases 5 and 6:

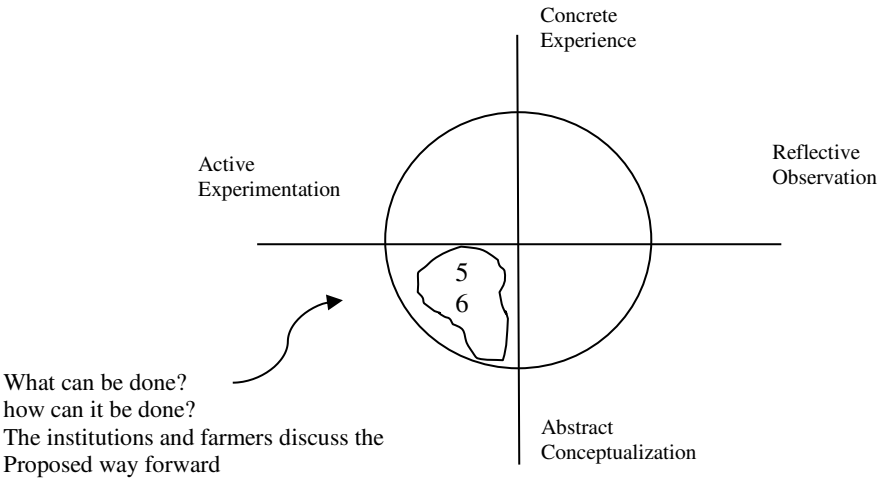


Figure 11 - Representation of the learning cycle applied in the situation – Phases 5 and 6

Appendix 4

Rich Picture

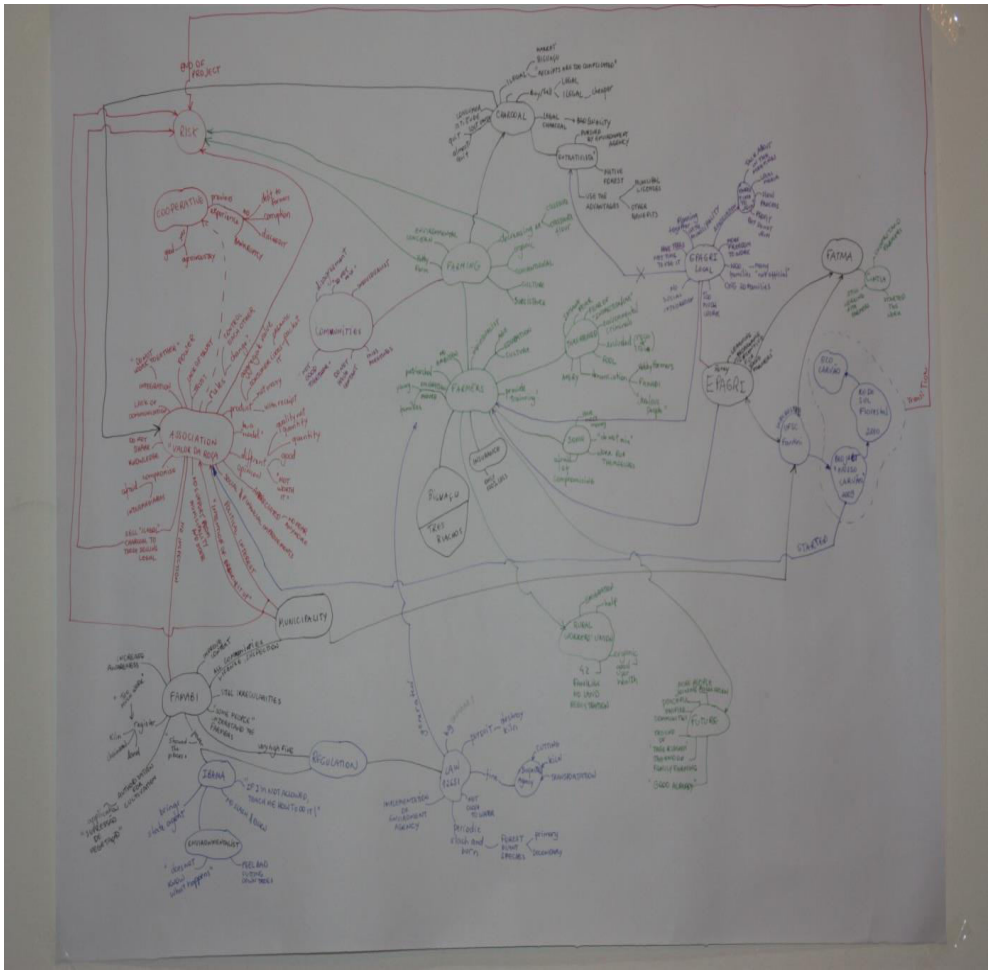


Figure 12 – Rich Picture

Simplified Mind Map

Figure 13- Simplified Mind Map

Appendix 5

Meetings Notes

Meetings: place 1 – University's facilities (Florianopolis), place 2 - home of one of the farmers (Tres Riachos) and place 3 - church facilities (Tres Riachos)

After the representation of the situation, the researcher set up one first meeting in Florianopolis in the university and another one with farmers and some representatives of the institutions. The purpose was to have a participative meeting where the actors would be able to point out the issues they considered relevant at the moment. The first meeting took place in the university and the attendants were the coordinator of the project and the specialist in the Systems Thinking methodology who would give his input about the methodology as his is not involved with the farmers' issues. The third person invited was not available at the date set for the meeting. The second meeting was held at one of the farmer's house and gathered 3 farmers and representatives of two institutions: one from the municipality and one from FATMA. First meeting with two of the actors had the intention of showing the mind map and discussing the issues that came up. This meeting did not generate the data for an analysis as only two participants were present and both were from the university. The second meeting was in the house of one of the farmers. The purpose of this meeting was to discuss the mind map and to select issues to focus the work as it is not possible to work with different issues due to the lack of time. The participants were three farmers, one person from FAMABI and one from FATMA. My roll in this meeting was participative as I was the facilitator. The meeting took three hours, I started showing the mind map then a discussion followed. The discussion took long time as the participants were eagle to talk about the problems as a way of relieving. It was clear that they did not have many opportunities to sit together to discuss. There were disagreements about some issues in the mind map. Partly because they did not believe people would do certain things illustrated in the map (putting illegal charcoal in association's package)and also some issues were a bit polemic as the power related words in the mind map. As I tried to make the participants tell the issues they could see in the mind map, more discussion started. There was a strong wish to be listened. One issue in the mind map clearly upset one of them, the fact that some people in the association were using illegal charcoal in the packets with associations' brand. "I do not believe there are people doing this! We have discussed this so many times in the association's meetings!", one of the participants. Another issue was about the municipality using their authority and power as an institution to try to bring the farmers to the institution to regulate their work. The issue of FAMABI or municipality not having clear way of working made the one representing FAMABI disagree, there is a strong conviction that they have a clear way of working and that all of them understand clearly the routines. Nevertheless, the meeting continued and some issues were chosen as important to work with. Every time one issue was suggested, it was followed by discussion; but after a while six issues were selected. Due to the lack of time the selection was performed after voting. One of the choices were influenced by one participant, the participant would stand and give a lot of reasons why they should choose that one, it was clear that it was not all participants preferred issue. "A cooperation between FAMABI and UFSC to create a legislation to allow the use of the forest with the cycle of 10 years" statement 5 in Themes of concern - chapter 3 . This is a work already discussed by the institutions and after reflection I did not use that one as it was a work the institutions were already discussing it. The issue that really made some of the participants engaged and eagle to discuss was the second choice "Cooperation between municipality and farmers' association" statement 2 in Themes of concern - chapter 3. The main intention of this one was to start the inspections in the farmers land. They believe this is the only way to bring

farmers to work legally and to join the association. As the inspections decreased with the creation of the association, according to some of the participants, farmers working illegally are taking the advantage and do not need to work legally to join the association, "The only way of bringing them to the association is to start the inspections" farmers' statement. The Third meeting happened together with the association's one year anniversary in the church's premises. Many farmers were gathered, I had not met many of them. Some managers from the institutions were expected to listen to my presentation but they did not come. The mind map was presented and the simplified one also, the participants were intensely curious about the mind map. Then I presented the issues we discussed in the previous meeting and continued the work with the two issues chosen before. The intention is to decide together how feasible and desirable are the actions suggested. The first one was "A team to bring together institutions and farmers (articulate all the actors registered in the rich picture). The feasible and desirable discussion ended in only 'yes' answers which was pointed out by the professor Sandro, who works with Systems Thinking in the university. The farmers were not very involved in this discussion; Prof Fantini (university) EPAGRI and FATMA were mainly the ones discussing. When notified that they were answering only yes, a discussion started. People tend to answer theoretically without critically analyze the real possibilities of implementation; even when there is a desire to make things happen.

One of the participants said "there is already the network", which is a group of institutions cooperation. This group works with farmers related issues, although farmers are not participating directly in the meetings. Then I explained that the intention of the group proposed was to use the resources in an efficient way and the farmers need to be present as they are the main interested in deciding what to prioritize. The second issue chosen "Cooperation between municipality and farmers' association" involved the farmers in a lively discussion. One aspect has to be noticed though; no farmers working illegally were present in this meeting and no institutions management either. Nevertheless, the data generated was considered valid for the analysis. The main intention with the statement was to reinitiate the inspection, mainly the farmers and municipality as they believe this is the only way of making the farmers join the association. But through discussion we could agree in having inspection together with a work to increase awareness through seminars and informal conversations. The last meeting organized with the actors was in the same day they would celebrate the 1st anniversary of the association; they had a workshop and I was going to present the work done. Institutions' management were invited, as they are the decision makers. The intention was to have a presentation followed by a discussion with the involved to validate the finding and promote a ground for further discussion, striving for a communicative action in a Habermas' sense even though considering the impossibility of reaching the perfect communication. However, the decision makers did not show up for the presentation (with the exception of the university), even though they confirmed their presence. In other words, those that have the power to authorize changes and resources were not there.

Appendix 6

Theoretical Framework and the steps of the analysis

An intervention in a conflicting situation as this study, where there is a complex network of human interaction involving different ideas, actions and emotions. To map all these interactions in a situation is very difficult; nevertheless, focusing in certain aspects can lead to the understanding of others due to their interconnectedness. Therefore, I select the themes that were evident from the analysis of the material generated during the intervention and contact with the actors. This qualitative research in the form of a case study uses Soft Systems Methodology guided by a critical theoretical approach. An introduction to Critical System Thinking was given in chapter two and it was used mainly as a complement to the analysis of the data. The framework presented by Werner (2010) is intended to be used from the start of the intervention with the use of systems boundaries which was not the case in this work.
Following is a representation of the theoretical framework proposed for this study. Based on Crotty's exemplification of theoretical framework (Crotty, 1998) the table 9 represents the basic elements of this research process:

Table 9 - Basic elements of the research process

Epistemology	Theoretical perspective	Methodology	Methods
Subjectivist	Critical Inquiry	Soft System Methodology	Case study : • Interviews • Document analysis • Informal conversation • Observant participation (meetings)

The choice of the Critical inquiry as the theoretical perspective was based on the fact that the slash and burn issues are often related to situations of societal exclusion in communities and people working with shifting cultivation are seen as environmental criminals. Furthermore, the SSM itself is based on a promise of change, taking the participants in a reflective journey to achieve that. Similarly, Critical theory leads to challenge and questioning of equality and domination. In addition, critical theory specifically with its discursive reflection and analysis of distorted communication fits well its purpose of theoretical insights. Data analysis was ongoing throughout the different phases of the research process in SSM. Following are the different steps of the gathering data and analysis. It is important to mention that the farmer's situation in this case was already improving when the study started. Through various projects, the farmers started having the attention of different intuitions.

The whole process of data gathering was in Portuguese and transcribed to English in an appropriate manner to build the mind map. The use of open ended interviews with guided questions is an important aspect of the Soft System Methodology; being open minded and letting the subject flow from the participants' side is crucial, the researcher should not lead the conversation to her own interest on the subject. Although, the material is not completely

free from interpretations and constructions, as much as the researcher strives for it. Alvesson (2011) approach is used, which gives a relation from data to theory development; "we would claim that data are simply not capable of showing the right route to theory or screening good ideas from the bad. Rather, empirical material is an artifact of interpretations and the use of specific vocabularies…data is inextricably fused with theory" (Alvesson,2011,p.14). They further develop the idea of data being an interplay with theory and "…a partner for critical dialogue"(Alvesson,2011,p.14). Also, the case study using SSM as a research method, together with critical theory brings the research in empirical settings to reflect on the structural relations and societal interactions. Poutane and Kovalainen (2010) in their concept of case study with Critical Theory, describe the challenge of creating a connection of method, methodology, and diverse theory discussion. They point out that "no single clear how-to pattern for critical approach in empirical settings can be given, as there are varieties of ways to do critical analysis in case studies". My approach is to use some of the concepts of map analysis , as it was used for the first analysis of the data with the Mind Map technique (figure 10). The map helps to visualize the communicative processes in the context studied. The map analysis is a process which focus on the networking of joined concepts, instead of concentrating in counting them (Carley, 1993). This is the main tool to catch the structuring relationship of the concepts that come up in the empirical material. The focus on the structure of relations has the advantage of thinking about the assumptions when analyzing the data, making the researcher more aware of her anticipation of the facts. Together with the spiral of data gathering versus reflexive act (learning) in the different phases of the methodology, data and theory are interwoven in a complex process.

Appendix 7

Power Relation in Decision making with Venn diagram and importance and influence diagram

Venn Diagram

Figure 14 - Picture of the Venn diagram produced in the second meeting with the actors

Graphical representation of Venn diagram

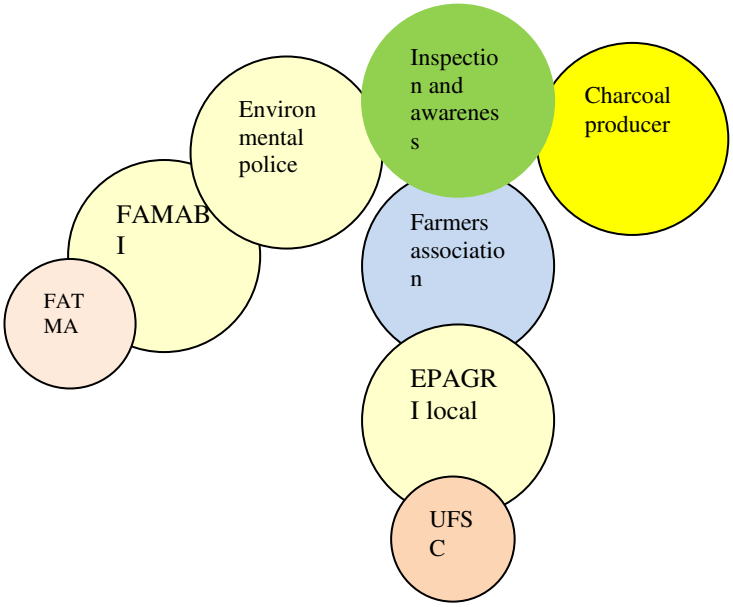


Figure 15 – Venn Diagram

In the second meeting at one of the farmers' house, after the work identifying the statements to work further in the methodology, the one chosen : 'cooperation between municipality and farmers association' used to prepare a Venn diagram. The participants were asked to illustrate the relationship among the actors and identify those who have more power in making the transformation happen. One of the objectives with this exercise is to make the participants discuss and have an overview of the closely involved in the issue. The size of the circles shows the power the actors are considered to have in the process. Participants agreed that the size would be approximately the same for most of the involved. Another aspect to be considered when using the diagram representation is the levels of interaction among the actors, near placed circles suggest close contact or communication possibilities. It is important to notice that the participants were considering mainly the start of the inspections with the statement. This explains why the environmental police is very close to the main circle. The picture shows clearly how the actors are related and perceive each other. The colors of the circles do not have any special significance in this representation.

Importance and Influence Diagram:

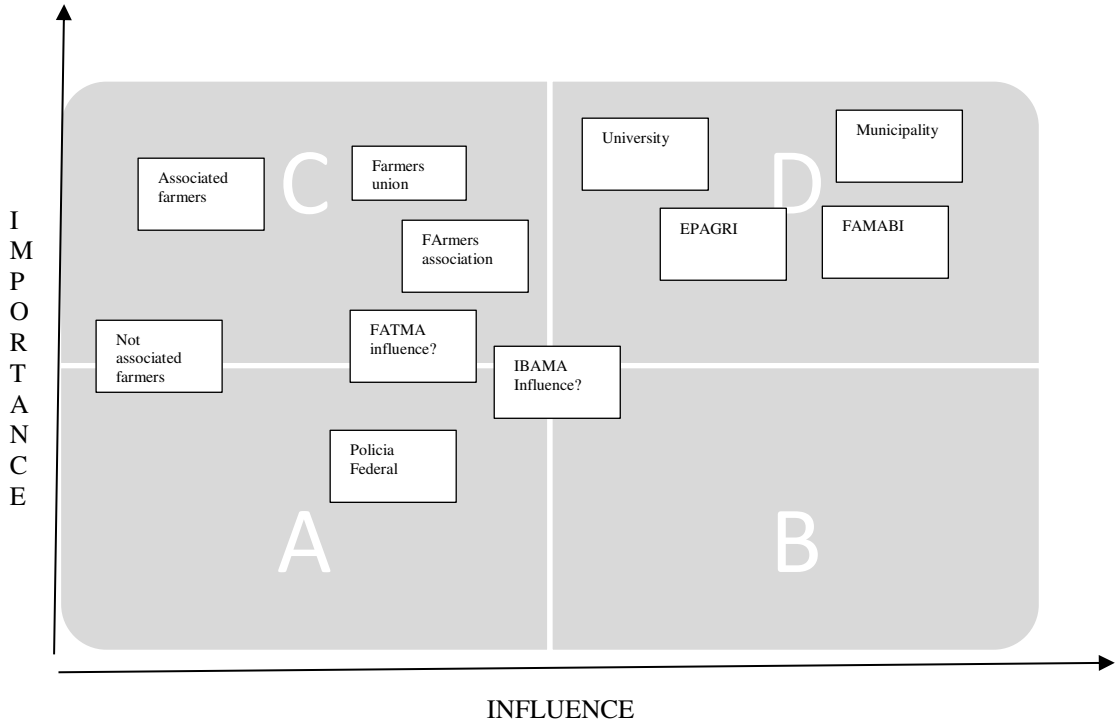


Figure 16 - Importance and influence diagram

The diagram exhibits the degree of influence or power the actors have over decisions connected to their issues. In the graph, those located on the "D" quadrant are subject of good working relationship, to assure support for farmers' issues. In the "C" quadrant are those who call for special initiative to protect their interests. The institutions closely involved in the case are placed in the "D" quadrant, they are important and have influence, they have the power to decide what can be done. Farmers' association is not a big one in number of participants but has more importance than the farmers independently, as they represent an institution formed to strength the work of the associated. They are recognized in the region as a new movement getting the attention of people and the news. Nevertheless, they influence is still not very significant; their relationship with the institutions as municipality and EPAGRI has to be improved. Farmers' union could be the one to lead the negotiations with institutions to improve and maintain farmers' conditions but that has very little influence as they do not inspire institutions' confidence. IBAMA (Brazilian Institute of Environment and Renewable Natural Resources) has no clear role; It was named by some of the actors but its influence is not certain. Farmers believe they are the main responsible for the inspections. IBAMA is mainly accused of caring out the inspections. Unfortunately, due to lack of time, not much information was gathered related to IBAMA and also about FATMA. Nevertheless, this can also be interpreted as their lack of influence and importance in the issues as they were not mentioned many times by the interviewees.

The situation is complex and the actors have different interests even though they all express willing to help. There is no coordination of the issues to be addressed, different views of who need to be responsible for the work with the farmers' issues and mistrust among the actors is correlated to many years of a relationship of fear and lack of true communication.

Appendix 8

Trust

Concepts connected to institution process and trust:

Trust in institutions and mechanism of government: threats, sanctions, dialogue chances, linguistic domination, monopoly of capital

Trust in public officers: skepticism, dialogue chances, equal opportunities to criticize ground

Trust in social group (other farmers in same community and other): skepticism, confidence, risk, meaning, integration.

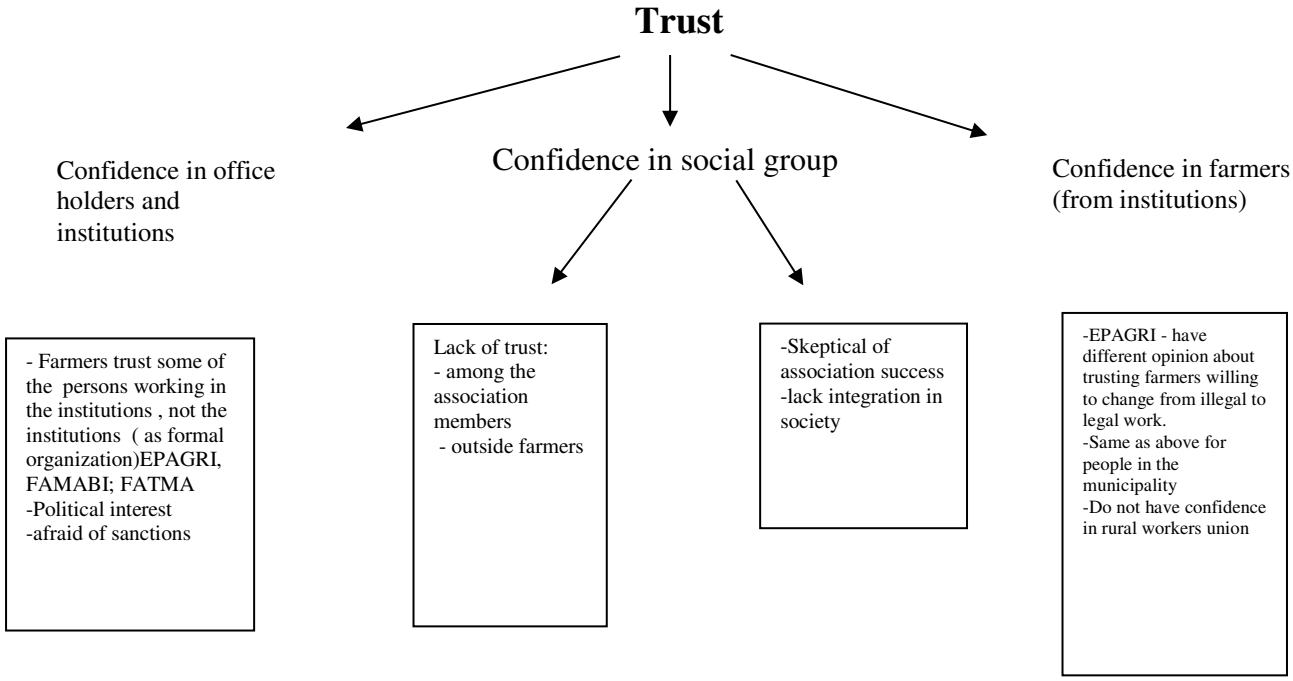


Figure 17 - Graphical representation of the aspects related to trust

Power

Institutional relationship (structure, social relationship, historical episodes, authority), policies, power and sub categories.

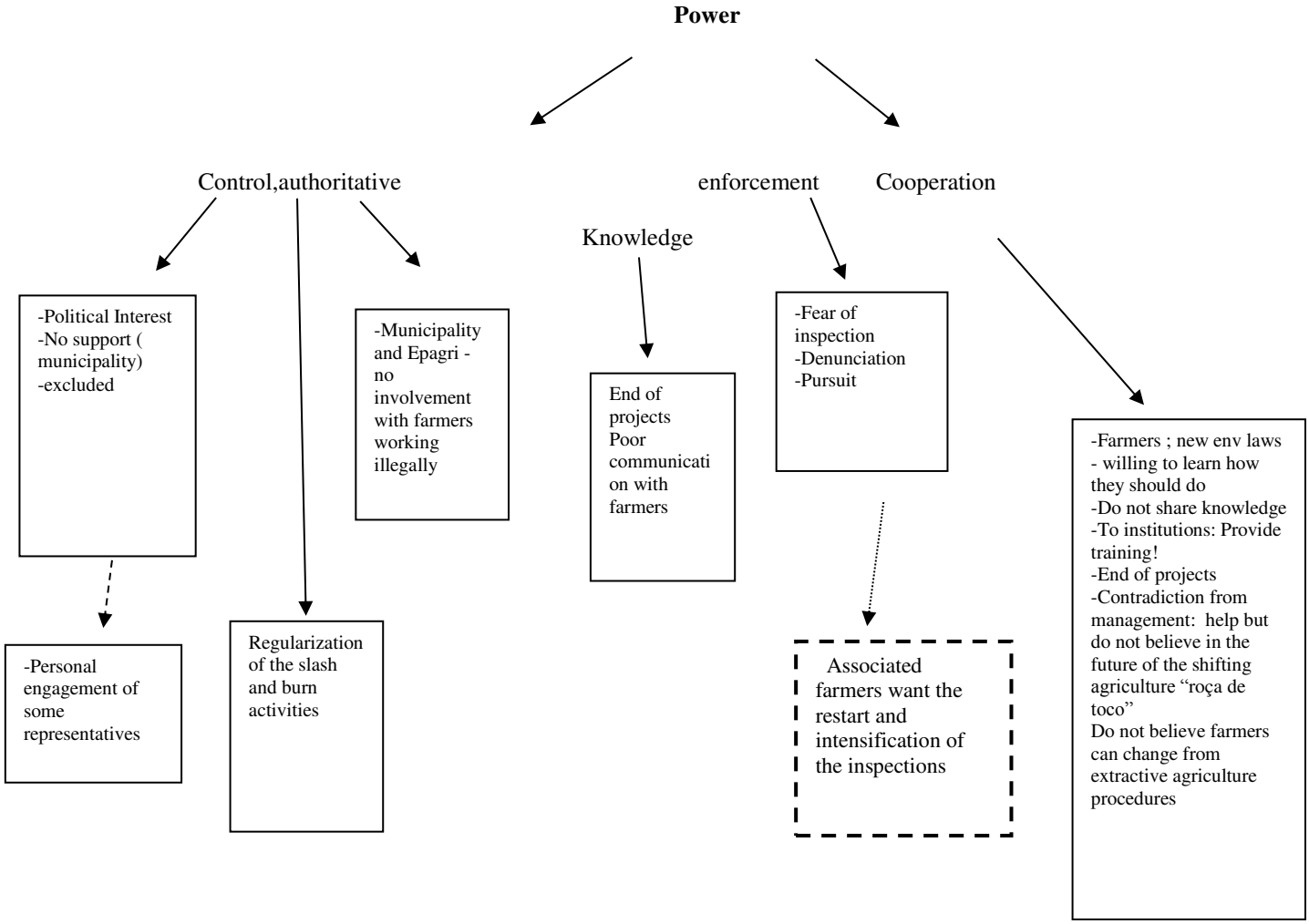


Figure 18 - Graphical representation of the aspects related to Power

Motivation

Concepts connected to motivation:

Motivation: Try (activities to reach a goal), means (methods to achieve the goal), need (interest)

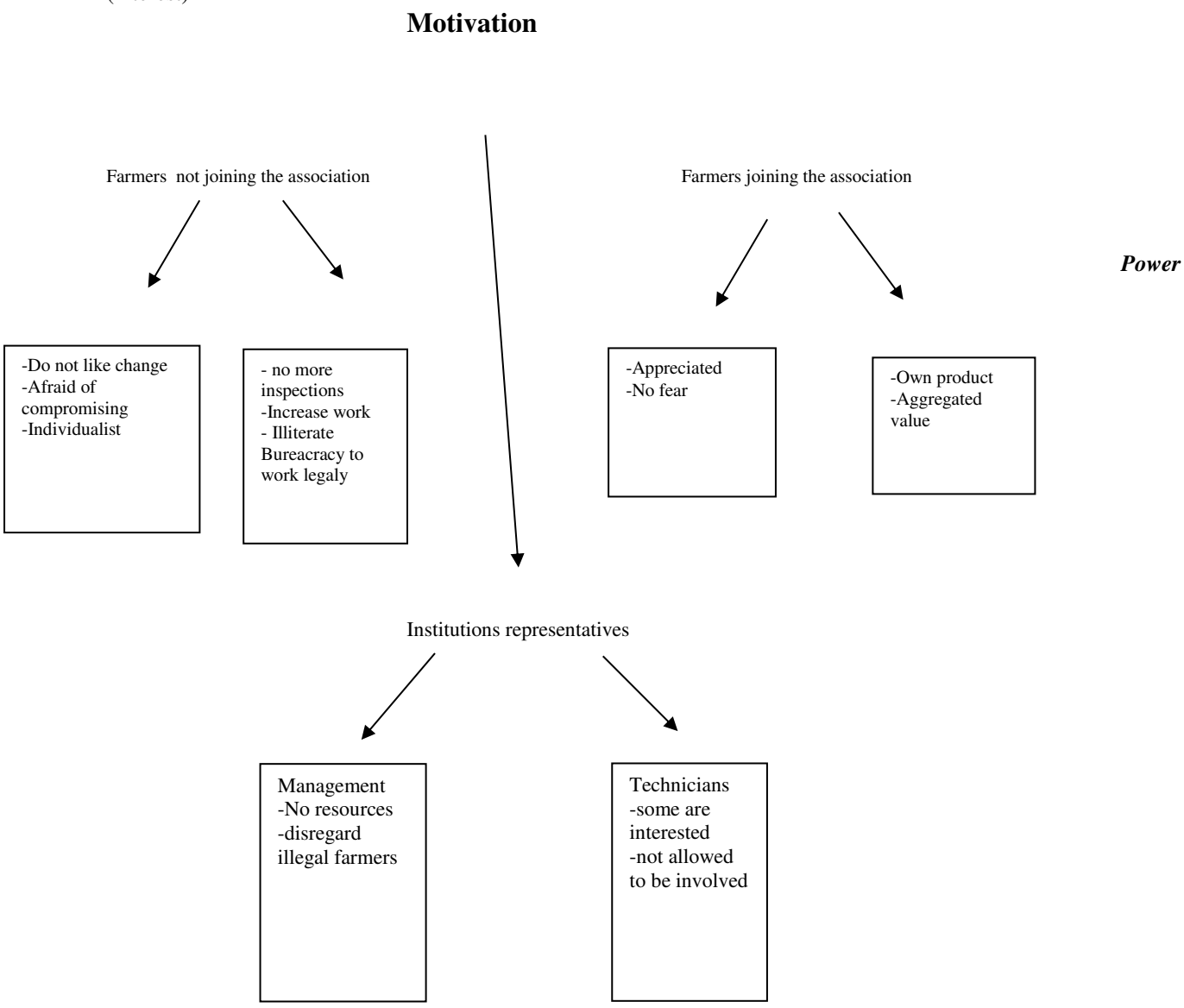


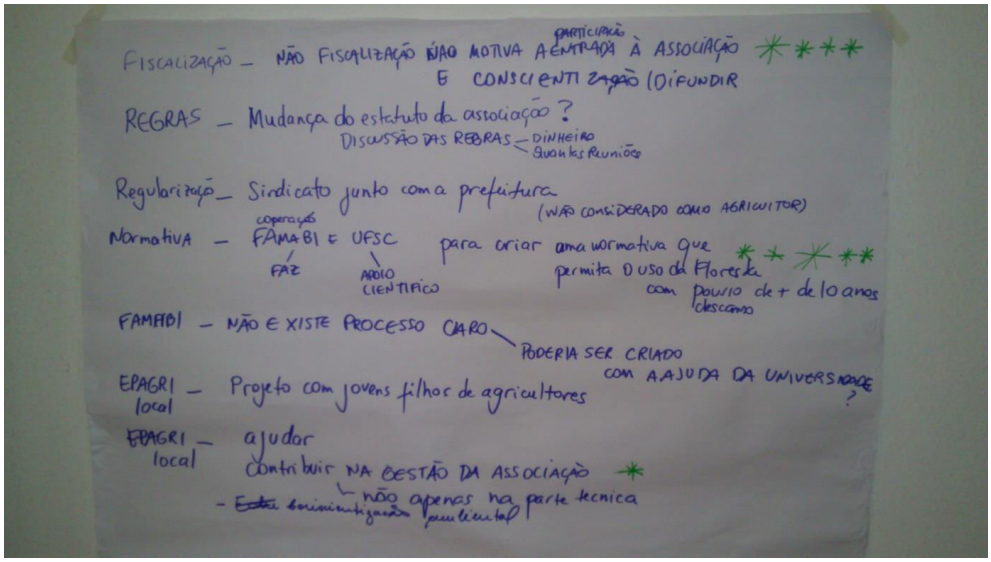
Figure 19- Graphical representation of the aspects related to Motivation

Appendix 9

Pictures of the second meeting in one of the farmer's house

Participants in the picture: From the left – Maria, Sofia, Adelmo,

Participants in the picture: from the left – Sofia, Maria, Adelmo,Romao Cintia



Picture of the statements generated in the meeting

Last meeting: debate desirable and feasible change