Working together for environmental management:
A collaborative learning approach

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Abstract

Researchers and managers of the recently created Yungas Biosphere Reserve in Northwestern Argentina are facing the complex task of planning future land uses for the area. Essential to the success of the UNESCO Reserve is the integration of a diverse set of goals derived from conservation, sustainable forestry and local development interests. In light of this diversity of objectives, it is necessary to bring together experts from many disciplines. Increased collaboration must also be cultivated between agencies based on a collaborative learning approach that explicitly incorporates the human dimension of natural resources management. We present a participatory framework developed with the objective of building a platform for shared learning, exploring multiple perspectives and negotiating a collective path towards a successful land use planning in the region. This approach proposes the integration of a number of technologies including GIS, which serves as the common language between the stakeholders.

Keywords: community visioning, soft systems, strategic land use planning, Yungas Biosphere Reserve

1.   Introduction

The recently created Yungas Biosphere Reserve in Northwestern Argentina is faced with a number of challenges to meet its mandate of sustainable development. Yungas is a word used to describe tropical and subtropical forests that can only be found on the eastern slopes of the Andes Mountains in South America. The Yungas region is an area of varied topography ranging from humid forest ecosystems and sub-tropical seasonal forest to misty pastures. This narrow ecological band runs for more than 4000km, from Northern Venezuela to the province of Catamarca in Northern Argentina (Brown et al., 2001). As warm, moist air from the Amazon rainforest moves westward, it rises up the eastern side of the Andes, cools and condenses, forming a zone of high precipitation and seasonally persistent cloud cover. Precipitation levels and type vary along steep altitudinal gradients and result in the formation of different forest types and associated fauna (Brown & Grau, 1993). Together with the forest in Northeastern Argentina, these forests occupy less than 2% of Argentina's land base, but represent more than 50% of the country's biodiversity (Brown & Grau, 1993).

The following are the key features that make the Yungas Biosphere Reserve unique when compared to any other Yungas region within Argentina:
- It is the largest continuous Yungas surface in Argentina, which also continues undisturbed into the Bolivian Yungas which together form a continuously forested area of more than 3 million ha (Grau & Brown, 2000).
- It contains 30% more plant and animal species than any other Yungas region in Argentina. This is due to its larger surface area, a complete altitudinal gradient, a good degree of conservation, a high number of endemic species, a history of stability and isolation, and its geographical location.
- This large pristine landscape creates a safe haven for threatened animals, such as the jaguar (*Panthera onca*), tapir (*Tapirus terrestris*), pecari (*Tayassu albirostris* and *T.pecari*), toucan (*Ramphastos toco*) and others (Grau & Brown, 2000).
- With its abundant forest and non-forest resources and important watersheds the area sustains the economic development of the Pedemonte region. Particularly important in this regard is the water needed to irrigate approximately 200 000 ha of agriculture critical to the region.
- It also has the highest concentration of aboriginal and campesinos[1] communities who live in close contact with the mountain forest and posses a high level of traditional knowledge of the local biodiversity. These communities also harvest a variety of species that are in risk of extinction (Levy *et al.*, 1997).

Some of the anthropogenic disturbances in the Yungas and future threats are:
1. Most of the lowland forests have been converted into agricultural fields, a process that continues to expand.
2. Structural diversity of the forests and wildlife biodiversity has been greatly impacted by the extractive unsustainable forest practices still in place.

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[1] The campesinos are a cultural and genetic mix between the Spaniards and aboriginals
[2] A substantial portion of this section is based on Reboratti, 1995

3. The mining and energy sectors have greatly contributed to fragmenting the forest through their practices of prospecting and extraction by placing numerous roads into the heart of the Yungas that lead to hunting and illegal logging.
4. Livestock grazing in the forest and highland grasslands are having detrimental impacts on these areas and need to be managed for sustainable practices.

Due to these intense human activities almost 90% of the Yungas ecosystem presents some kind of anthropogenic alteration, both inside and outside of the protected areas. Together these issues define the crisis in this region and, if something is not done soon, it is quite likely that the outcome in this region will not be a favorable one.

The Yungas Biosphere Reserve was incorporated into the United Nations Educational, Scientific and Cultural Organization (UNESCO) Biosphere program in 2002 due to the conservation potentials and the anthropogenic pressures outlined, but has yet to develop goals, objectives and strategies to guide its management. Presently the management in the region continues as usual, the core areas (previously existing parks and reserves) is under the control and management of the National Parks board. All the rest of the areas inside the RBYungas continue to be managed independently by their municipalities, overseen by the provincial governments. The unique biophysical characteristics of the threatened premontane forest, the persistent degradation of the montane subtropical and temperate forest, and the susceptible livelihoods of traditional people urge us to define a strategy for the land use in the region. The biosphere reserve calls for new forms of institutional co-operation and increased integration between levels of economic and political decision making (UNESCO, 2000). The concept builds on the idea that humans and nature are intrinsically linked and the only way to conserve and protect our remaining natural places is to work closely with the people living there.

This paper outlines the collaborative, cooperative and learning (CCL) approach that explicitly deals with participatory aspects of a land use planning exercise and will guide a forthcoming case study in a single Yungas Biosphere Reserve watershed. Section 2 outlines the rationale for the development of a different approach to managing our natural resources. Section 3 provides a conceptual overview of the planning process which is described in greater detail in Section 4 where the CCL approach is specifically outlined. We conclude the paper with a brief summary statement in Section 5.

2.   Why a different approach is needed

There is an abundant literature describing all the problems our planet is facing. From the loss of biodiversity and ecosystems that are necessary to support healthy communities to the ever growing population and worldwide increase of extreme poverty. On the other hand, much less work can be found that explicitly address the needed strategic actions that are crucial to address these growing issues. In our case, Geist and Lambin (2002) concluded that agricultural expansion is the main proximate cause leading land-use change associated with tropical deforestation, while the underlying forces are explained by multiple factors and drivers acting synergistically rather than by single-factor causation. Economic, institutional, technological, cultural, and demographic variables interplay in public and individual land use decisions, which lead to a fair bit of

complexity in even defining the problem to be addressed in concrete terminology. In this sense, land use allocation can be construed as a classical example of a wicked problem (Rittel & Webber, 1973; Rittel & Webber, 1984). One of the fundamental aspects of a wicked problem is that finding an optimal solution is impossible due to the fact that wicked problems have no clear stopping rules, have an enumerable set of possible solutions and can only be evaluated as better or worse (not right or wrong) as that evaluation is a heavily value laden process. When taken together we can conclude from this that no universal policy for controlling tropical deforestation can likely be conceived.

Faced with these complex issues, natural resource scientists have to move away from the idea of finding the optimal solution to a problem; solutions that seem good in the short term, but are not necessarily good in the long term (Giampetro & Pastore, 1999) as solving a particularly defined aspect of a wicked problem invariably leads to the discovery of an even more wicked problem that underlies it. This is certainly problematic since as scientists, one of our roles is to aid in the management of complex social-ecological systems that are characterized by multiple scales of interaction and response, multiple objectives and actors, non-linear trajectories, uncertainties and time lags. In light of this, the idea of producing "silver bullets" must be discarded. The solutions that are classically used to address issues (solvable components of a wicked problem) in this complex system normally do not solve the larger problem. These solutions might be successful at camouflaging the problem, at least for a while, but the "reductionist treatment of natural variability is the short-term success that leads to long-term failure" (Ashby, 2001). We need to start by recognizing that all that we propose, from theories, to technologies, to methods, have limitations, and that the application of any of these can do more harm than good if carried beyond their limits. A change in approach is needed when addressing complex environmental problems; we are all part of one complex social-ecological system, there are no experts in this system, nor can there be (Ludwig, 2001).

Particular attention should be paid to the challenges being presented to science as it seeks to explicitly deal with the human dimension of natural resources management. To accomplish this important task there has to be a softening of the barrier between scientists and local managers. Researchers have to become part of the system under investigation (action-research) and move away from the idea that resource managers are the 'insiders' and the researchers are the 'outsiders' (Douthwaite *et al.*, 2001; Hagmann *et al.*, 2002). Integrated natural resource management has to focus on the "interactions of humans with each other and with their natural environment, and the decisions they make about using and managing resources" (Lal *et al.*, 2001).

Funtowicz and Ravetz (1993) suggest that to address the complex environmental challenges of (post)modern societies, people who are affected by management decisions and people involved in making those decisions must come together to build platforms for shared learning, exploring multiple perspectives on the problem or system, and negotiating a collective path forward to more sustainable outcomes. In fact creativity (both introspectively derived and as emergent from the collective) is the single most important aspects coming to terms with wicked problems. Because of this, we are compelled to move away from puzzle-solving science and reliance on experts, and

towards a form of innovation management that utilizes a multi-actor learn-and-select approach (Douthwaite, 2002). In particular, scientists have to start by taking up the role of education more seriously as effective and insightful solutions are far more likely to be born of well informed constituents. In this way capacity can be built into the social-ecological system, capacity of the local, regional, national and global managers at addressing the complexity of problems that they are faced with. This has to be done through new complementary and innovative ways of collaborating, communicating and learning (CCL).

This goes back to the problem that not enough work is being done to understand and improve how us humans manage and plan environments. We believe that if there is any possibility of moving towards a more sustainable future, it will be through efforts of large-scale planning that foster CCL and adequately evolving adaptive management processes. In this case, large scale planning refers to region-based theories such as, ecoregion, bioregion, and watershed theories. Implementing these theories is not enough; the planning process has to be based in methods that foster CCL. If we want to move away from a more traditional compartmentalized approach towards integrated planning and management of our landscapes, we are going to have to bring people together from very diverse backgrounds. We need to realize that nobody is an expert and communally we all shape our landscapes. While strictly speaking, a perfectly holistic approach is likely unattainable, we can move in that direction by fostering those processes that yield high quality collaboration, communication and learning between involved parties.

"Environment sustains us as creatures, landscapes display us as cultures"

D.W. Meinig

3.   The Big Picture

We propose an integral framework to guide the regional planning in the area. The objective of the framework is to improve the management of collaborative or multi-stakeholder processes in development initiatives. Theories of participatory learning and action (Pretty 1995; Chambers 1999) more commonly know as PLA are used as the intellectual ideology towards participation. The framework draws from a vast range of intellectual and scientific rationality, such as soft system and natural resources management (Checkland, 1981; Wilson & Morren, 1990), learning theories (Kolb, 1984; Senge, 1990), monitoring and evaluating methodologies (Woodhill & Robins, 1998), social capital (Pretty, 2003; Pretty & Ward, 2001) and business concepts of strategic planning.

The framework is termed integral because it follows an 'all quadrant' approach laid out by Wilber (2001). An all quadrant approach is accomplished by including both aspects of science: hard and soft methodologies. We also address both the individual and cultural aspects of the quadrant by explicitly addressing worldviews and individual differences. The whole point is to have an integral or holistic view of the problem and in this way address it in the appropriate manner. This helps us go beyond a narrow scope

(reductionism) that only addresses one aspect of the problem and fails to grasp the dynamics of the situation.

Figure 1 is a summary of key aspects to be considered in a multi stakeholder process (MSP). This initial model is simple and based on the action learning cycle of planning, acting and evaluating. It contains an initial assessment step as it is essential to determine if there is any potential for collaboration in the area before an MSP begins. Pretty (2003) argues that some type of social capital must exist before any effort is made towards sustainable management and development of natural resources. Social capital refers to the value of connectedness and trust between people and institutions, some characteristics are: relation of trust; reciprocity and exchanges; common rules, norms and sanctions; connectedness, networks and groups (Pretty, 2003). This implies a need to ensure that the different stakeholders involved have adequate capacity to participate in the process. In other words, learning will only happen at a societal level if it is supported by mechanisms of trust, shared understanding, and strong vertical and horizontal networks between agencies and stakeholder groups.
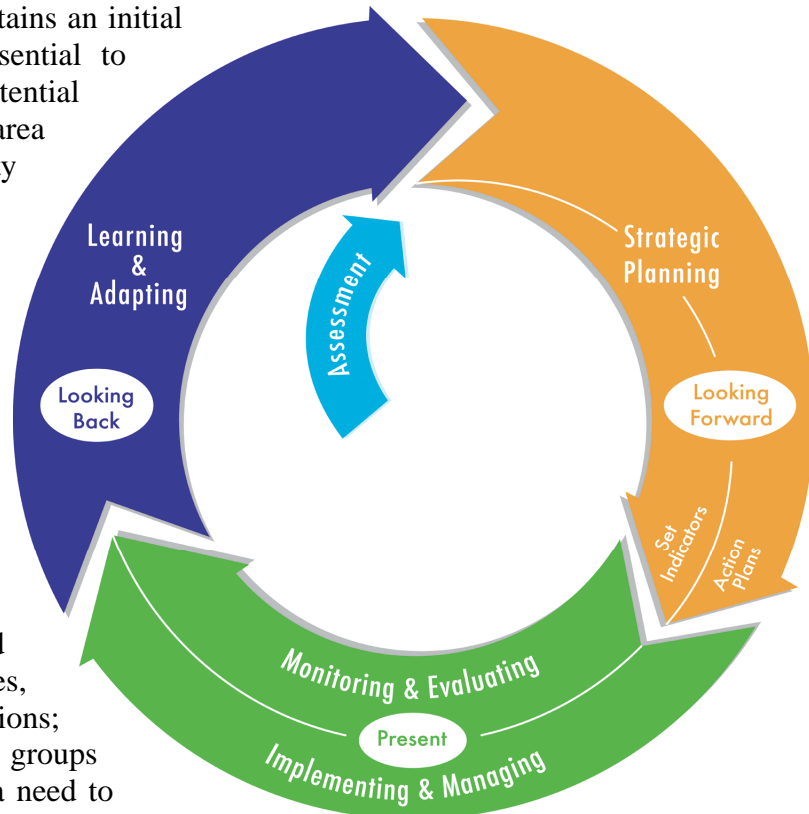

Figure 1: multi stakeholder process

3.1. Description of the initial cycle

To begin this process it is important to first evaluate the potential of the system to benefit from this approach. In other words, we have to understand the nature of the situation and stakeholders before beginning any process to determine what process is most applicable to a given situation. This is especially important when faced with complex problem as each one is quite unique and it is common mistake to blindly apply methodologies without fully comprehending the fit of methodology to situation. It is of no use to apply this methodology if the social system is broken down (i.e. high conflict areas, highly corrupt government agencies, authoritarian government systems, etc.). On the other hand, if social capital exists, depending on the level, emphasis through out the framework can

be placed on the less developed areas that lead to further development of social capital. This is in line with Wilber's integral approach. We might have highly trained and very knowledgeable individuals (the 'I' quadrant of the integral approach) but lack a pluralistic view, in such a way that only one type of knowledge is accounted for (the 'We' quadrant of the integral approach). The same is true for the scientific component of the problem, highly developed systems for monitoring and modeling our resources might be in place (hard science) but we have not developed a systems approach (soft science) for integrating knowledge and understanding its relationship to the big picture.

Once a multi stakeholder process has been organized and scheduled to begin, the first step is strategic planning. This phase embodies an approach to determining and documenting the long term goals of the process and defining the broad direction needed to achieve them. The outcome of this initial step is both an action and monitoring plan. The action plan is essential for implementing and managing the changes needed to attain the defined goals. The monitoring plan, which normally consists of a set of indicators, is fundamental for monitoring and evaluating our efforts and will permit us to learn and adapt to ever changing future situations. The ECDPM (2003) theorizes that monitoring and evaluating are the central engines of learning. We will expand on this idea in the next paragraph. As Figure 1 suggest, more emphasis is put initially in creating the action plan but by the end of the first phase both the action and monitoring plans are of prime importance. Also indicated in the figure is the fact that the action and monitoring plans should be created simultaneously to better integrate with one another. Once we have agreed upon a set of goals, we have to elaborate specific objectives to achieve them as well as define measurement systems to evaluate our progress. If from the beginning we do no set up our monitoring plan it is likely that perverse learning will occur. That is, with out an objective means to evaluate our progress towards our goals we can not be sure what aspects of our action plan were or were not effective. In this case it is likely that we may inadvertently attribute success to an aspect of our action plan that is only spuriously correlated with the desired outcomes. In a systems thinking perspective this refers to a lack of adequate feedback mechanisms.

The second phase consist of implementing and managing the action plan in conjunction with monitor its effects. This phase should be where the vast majority of the resources, time and activity are invested. At the same time evaluating and monitoring are the main inputs that allow us to increase our learning and improve our adaptive management of the environment. Too often the monitoring and evaluating aspects of a project receive far too little attention and as a result often flounder in their application. As previously stated, to be able to learn and adapt we need to have a mechanism that allows us to uncover our successes, our failures, and to understand why each occurred. The most efficient manner of doing this is by having set out from the beginning of the project a monitoring and evaluating plan that is created and owned by the stakeholders.

This then leads us to the next phase of 'Learning and Adapting'. Engel and Carlsson (2002) describe three ways of looking at learning for development purposes. They also portray the methods needed for evaluating and monitoring these different ways of learning. These techniques are the main input for permitting adaptive management and

learning to develop. They also emphasize the importance of learning-by-doing by creating a space for inquiry and reflection that will help us harmonize the divergent opinions in an MSP. The overall objective of the 'Learning and Adapting' phase is to take a critical look at the result of our actions and through analyzing them arrive to conclusions that lead to learning. Through this learning we reach a new understanding of the constantly changing situation we are trying to improve. This new knowledge can be disseminated and used for informing and educating others of our results, or used as feedback into a subsequent phase of strategic planning.

Another way of looking at the cycle is via a temporal perspective. The 'Strategic Planning' that comprises the first three stages is a process of looking forward as we are actively engaged in planning what we want to change in the future. The 'Implementing & Management' and 'Monitoring & Evaluating' are processes that exist in the present. When involved in these processes we need to maintain our commitment to carrying out the plan in order to deal with all the intricacies that arise in its implementation. Finally the 'Learning and Adapting' is a process of looking backward in time. This is a critical aspect of anything we do and should not be something merely tacked on at the end. It is in this part of the process that most of the learning will occur, thereby enabling us to improve our management over time.

4.   The Devil is in the Details

We believe that for a process to be participatory and foster collaboration, communication and learning it must be built in such a manner that it permits these characteristics to emerge. It should be noted that the process outlined above can be followed by a semi-authoritarian institution (many governments) and only include the stakeholders as a means to an end. However, if we want true participation to emerge, each phase of the process must be designed in such a manner that it allows meaningful participation to occur. According to Brown (1996), this denotes a fundamental shift in thinking of participation as a means to an end toward seeing participation as and ends unto itself. This is especially true for the first phase, 'Strategic Planning', since this is where the stakeholders construct a collective vision of the critical aspects of their desired future. This next section outlines what we believe to be a process that fosters participation as an end to itself (Figure 2).
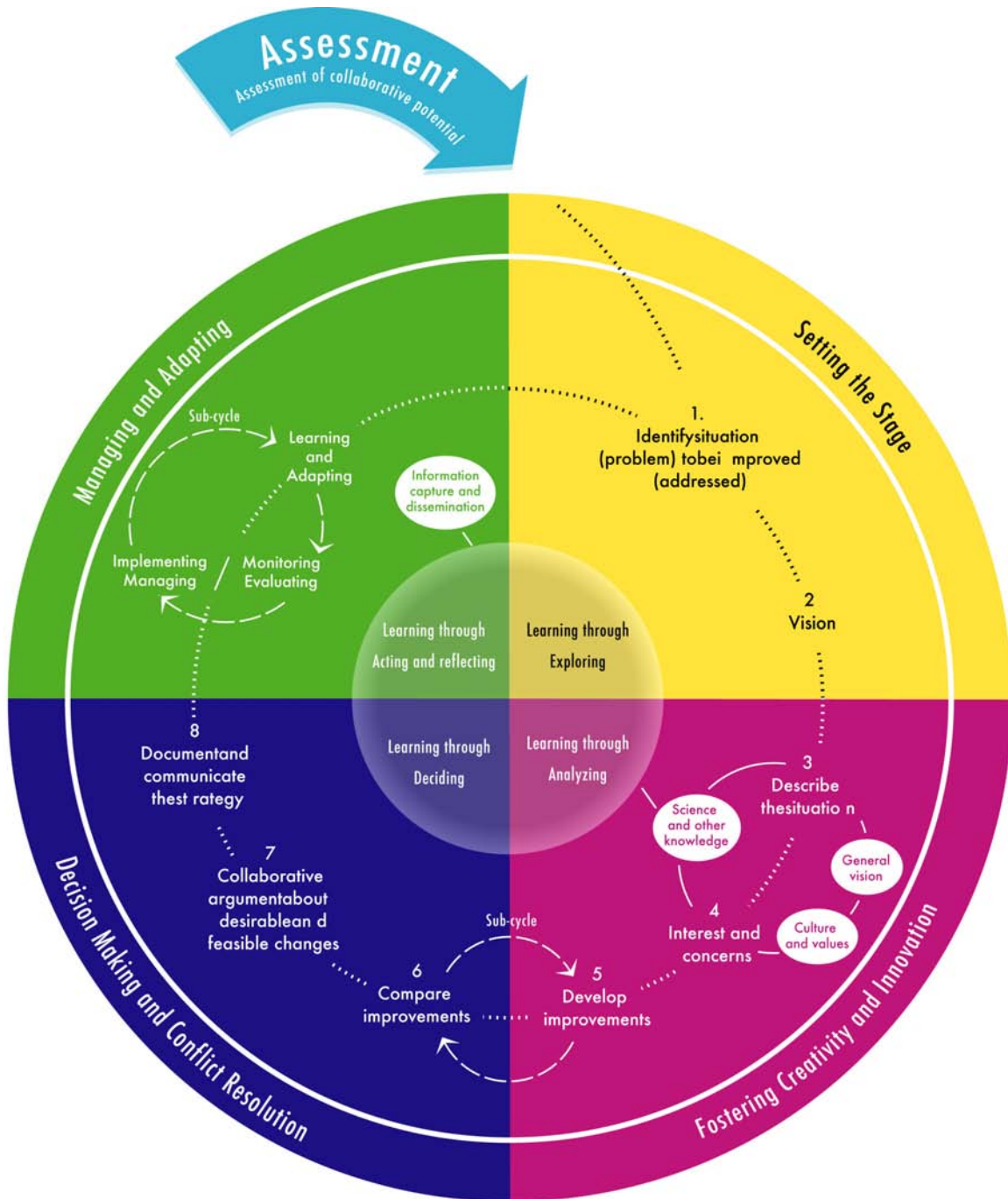
Figure 2: The CCL Framework

Steps 1 through 8 of Figure 2 are a detailed explanation of the first phase, strategic planning described in Figure 1. The steps in the process are an expansion of the soft system approach developed by Checkland (1981) and modified by Wilson and Morren (1990).

4.1. Setting the Stage (Exploring)

Setting the stage contains two steps, identifying the situation and creating a shared vision. The objective of the first step, identifying the situation, is to see a problematic situation in new and different ways by capturing the different perspectives of all the stakeholders involved and creatively analyzing this information. The objective of this stage is to find common ground and explicitly state what the overall MSP mission is, as well as to state the individual stakeholders' expectations about what they hope to achieve through this process.

The essential task in stage one is to identify problems in a given context through the eyes of all the stakeholders. The idea is not to focus on a specific view; on the contrary, this is the time to gather as many opinions on the situation as possible. We want to be aware of the perceived roles of the stakeholders, as well as their understanding of the technical issues of the problem. This stage is characterized by what Kolb (1984) refers to as reflective observation; we are interacting among the stakeholders to elicit multiple world views, but we are not trying to understand or explain the problem. Wilson and Morren (1990) state very clearly, that the objective of this first stage is not to identify *the* problem, but instead to look '*at* problematic situations rather than *for* a problem'. The reason being is that most situations are characterized by a complex mesh of problems: 'A situation is compromised of people as individuals and in groups, themes of concern, a historical context that bears on the present, key human activities, decision-making structures, physical and biological environmental factors, the political-economic and social context, and relational climates'(p.120). This stage should provide us with rich and alternative ways of looking at the issue.

The second stage consists of co-creating a shared vision. Establishing a vision helps to determine the direction in which the actors wish to go and to develop strategies to accomplish a set of goals. Collins and Porras (1996) suggest that enduring success comes from maintaining a core ideology which remains fixed in an ever-changing world, while simultaneously adapting strategies and practices. They propose a vision that consists of defining a 'Core Ideology' and an 'Envisioned Future' that will guide the group's future actions. The core ideology defines what the group stands for and why they exist, while the envisioned future is what the group aspires to achieve.

Collin and Porras clearly make the distinction between a vision and a strategy. The vision of a group does not change with time, while the strategies and practices to achieve the vision endlessly adapt to the new situations. In a changing world, it is vital for the community to understand their core ideology; such knowledge will assist them in creating an O.T. which accurately represents their values and purpose. An essential point to remember about creating a vision is that it is just that, a creation. It is not a prediction. Therefore, there is no right or wrong vision. In the process of implementing the vision, it is vital to keep in mind that failure to achieve the goal does not mean it was an unworthy goal. Additionally, research has shown that visionary companies are often able to achieve their most audacious goals (Collins & Porras, 1996). An envisioned future has its purpose

in inspiring movement, and as Collins and Porras (1996) point out, visionary companies tend to be flexible in their strategies, using a more organic process of examining many approaches to see which works best.

This theory of developing vision integrates well with and is enhanced by some of the new philosophy of systems thinking articulated by Peter Senge (1990) and Margaret Wheatley (1992). Vision, according to Senge, is a vivid, specific goal. Purpose without vision lacks a sense of appropriate scale; vision without purpose lacks passion (Senge, 1990). In the process of creating vision, one can encounter creative tension, which is the difference between current reality and the vision. Often, the applied solution to this tension is to reduce the scale of the vision so it more closely conforms to the existing reality. A degraded vision provides an escape from creative tension, but it insidiously encourages us to abandon what we truly want (Senge, 1990). Senge suggests that the constructive method of managing creative tension is to continuously work toward modifying reality to match the vision. Another solution to nurturing a vision and handling structural conflict is through a process of changing the underlying beliefs which create the tension. Through a commitment to discovering the truth about one's self, a person can broaden their awareness, recognize patterns, and learn new ways to respond (Senge, 1990). Senge's perspective aligns with Wheatley's, in that this process arises from discovering, integrating reason and intuition, and seeing one's connectedness to the whole universe. Following Collins and Porras' outline, the first step in this stage is for the individual groups to build their vision. This has to be done individually and will be shared at a later date

The next part of stage two is to find a common ground between the stakeholders with the objective of collectively building a mission for the MSP process that they are undertaking together. Each group will share their vision with the other stakeholder groups which help to create a transparent multi-stakeholder process. As Figure 3 illustrates, the stakeholders will need to discuss the similarities and differences of their institutions' values and purpose. This discussion process will help negotiate collectively the projects' or MSP's vision and how each stakeholder fits in to this process. We have to understand that the objective here is not to influence and change other stakeholders' visions, on the contrary, the soft system approach that we are following recognizes that the goals or desired end states of the different stakeholders are going to be different and often ambiguous, shifting and conflicting. We are trying to acknowledge these different views and understand what the objectives of each group are. This transparency will help build a relationship of trust between the groups, which is one of the fundamental characteristics needed for building social capital in the region (Pretty, 2003). At the same time this might lead to a withdrawal of a stakeholder since the vision they hold is very different from the one the MSP is seeking to build. This could be avoided if the first step, assessment of collaborative potential, was carried out in a detailed and rigorous manner.
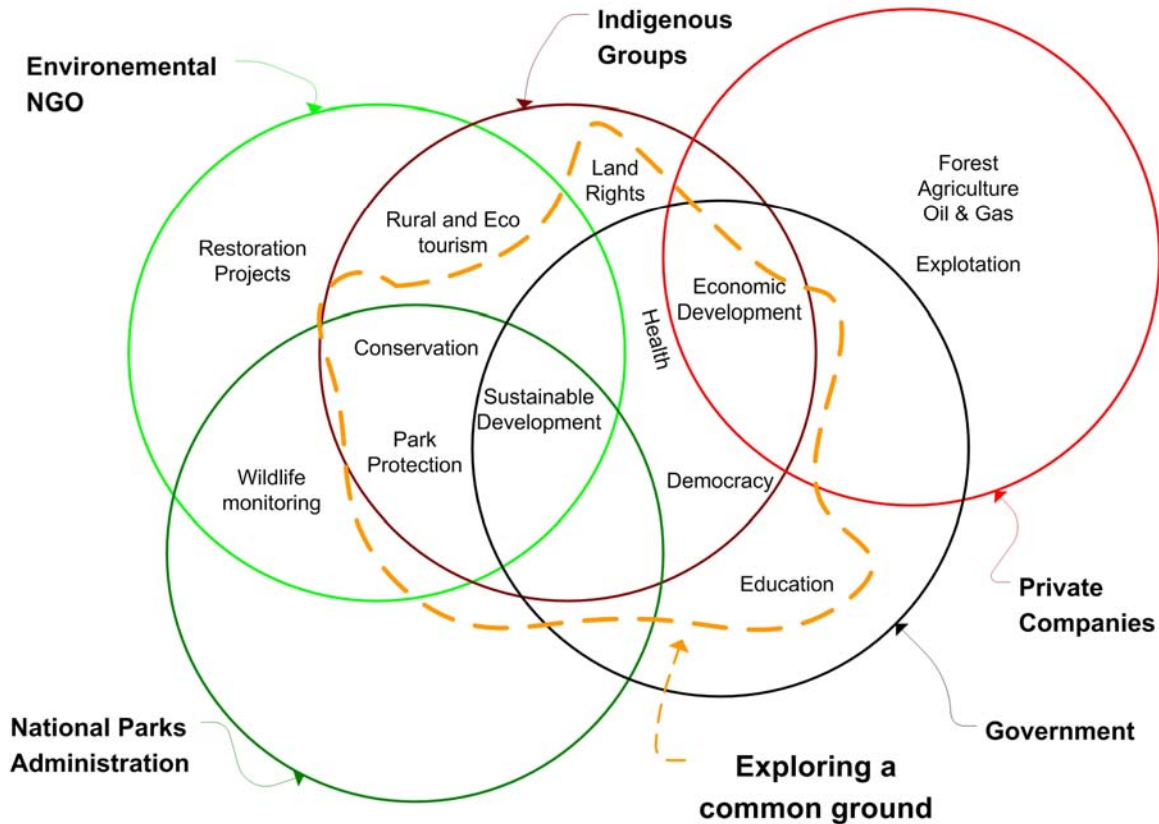
Figure 3: Finding a common ground

By the end of the 'Setting the Stage' phase a mission for the MSP must be established, this helps everyone to understand what is at stake. This should be done through a brief report that synthesis the visions of the stakeholders and clearly states the mission of the MSP. This report should be distributed between the stakeholders and agreed upon before continuing.

4.2. Fostering Creativity and Innovation (Analyzing)

This phase of the process begins with a description (conceptual model) of the current system we are trying to improve. The stakeholders then identify their main interests and concerns, which leads to various proposals for improvements. Finally we fully develop and analyze these proposed improvements to establish their feasibility and possible impacts. At this stage the diversity of worldviews of the stakeholders that we have tried so hard to preserve thus far in the process might lead to conflict. This process seeks to minimize the detrimental effects of this conflict by recognizing that multiple worldviews exist and by allowing these multiple perspectives on the situation to co-exist within the process for as long as possible without attempting to prematurely synthesis these views. These differences will be addressed in the next phases of the process, 'Decision making and Conflict resolution'.

Stage three, 'Describe the situation', is a follow up of the identifying the situation stage. Following Wilson and Morren's (1990) description of the soft system framework we first want to clearly display the situation so as to reveal a range of possible and relevant choices for improvements. A good way of addressing the first step is to build a conceptual model that reflects the current local conditions and addresses the issues identified in the mission. A powerful technique to start out this stage is the construction of 'mind maps', which are a graphical representation of all the components affecting the issue being analyzed. It is a good technique to make sure that all aspects of the situation have been considered and it also allows us to identify relationships and links between the natural and human structures of the issue.

The next step would be to fully describe the quantitative and qualitative aspects of the structure, process and climate of the situation (Wilson & Morren, 1990). The *structure* of a situation is made up by the slow to change components in the physical, biological and social aspects of the issue. The *process* describes how are things done and by whom within the structure. The *climate* is the quality of the relationship resulting from the interactions between the structure and process, how well things work together, and the resulting emotional response (Wilson & Morren, 1990). The overall objective of stage three is to continue building a shared view of the issue by creating a single representation of the situation that accurately conveys the multiple worldviews of the stakeholders.

Stage four allows the stakeholders to voice their specific interests and concerns about the situation describe in stage 3. Another way of looking at it is: stage 3 is a picture, a vivid description, of what is currently going on in the system. In stage 3 we are also trying to understand how the system works, what areas are easy to change and which are not, what affects what. When we move on to stage 4, the stakeholders voice what particular structures, process and climates they are interested in changing or are concerned that the future changes in the system will affect.
The understanding of the system we gained in stage 3 should help us better analyze the likelihood of implementing the expressed interest or if the concerns of the stakeholders have a rational background. *Describe how we do this...*

Each of the interests expressed in stage 4 should be further developed into stage five, 'Develop improvements', so that the following features of the improved state are described:
1. What is the central element being changed?
2. Who will be managing and responsible for the changes?
3. Who will benefit from this change? Who might be negatively affected if such change occurs?
4. Who has or could have the power to alter or block the desired changes?
5. What environmental factors might constrain and assist the desired changes? What are the internal or organizational constraints?
6. What makes this change meaningful? What values and assumptions are explicit or implicit in the desired changes? (Wilson & Morren, 1990)

During the development of the improvements a number of different kinds of modeling activities could be incorporated to help in the analysis of the possible changes. Wilson and Morren (1990) suggest using the HAS (Human Activity System) model developed by Checkland (1981). Many other tools that examine the economic, ecological and social aspect of the future situation could also be used to asses the trade offs associated with the different possible improvements. Some possible tools are decision support systems, suitability/capability models, cost-benefit analysis and geographical information systems.

The end result of this phase is a synthesized report documenting stages 3, 4 and 5 in written and graphical form. It should contain an overview of the situation with its current structures, process and climate. It should document the final interest and concerns of all stakeholders as well as the various proposals for improvements that the stakeholders have suggested. Before continuing onto stage 6 the report should be approved by all the stakeholders. If during the process there were major differences in worldviews expressed, then all of them should be included in the report. More than likely, these differences in worldviews have lead to various and different proposals for improvements, which should also be documented. At this stage we are not trying to decide which of the proposals for improvement we are going to follow, but instead we are trying to think creatively about all the possible future improvements that could be realized within the system. Allowing multiple worldviews and the exploration of various improvements is the most tangible expression of soft system's willingness to explore multiple definitions of the situation.

4.3.   Decision making and Conflict resolution (Deciding)

Eventually in all processes we must ultimately decide what course of action (or inaction) to pursue and in this phase we transition away from the learning style of assimilating more prominent in the previous stage and move on to a convergent learning style. This style is characterized by an analytical and conceptual approach that relies heavily on logical thinking and rational evaluation. The aim of stages 6 and 7 is to assure that the models presented in stage 5 are anchored in the reality of the situation as seen by the people involved. Stage 6 looks back and makes sure the improvements are inline with the initial vision and situation described, while stage 7 looks forward and debates which improvements are feasible and more desirable. Finally stage 8 is the creation of the management and monitoring plans that enable the vision of the MSP to be carried through.

The outputs of the previous stage 5 are a number of possible improvements to the current situation. Each improvement will reflect the interest and concerns of the stakeholders within a given worldview. The objective of stage 6 is to look back at stage 2 and 3, and analyze if the suggested improvements are in accord with the mission agreed upon on stage 2 and determine the relevance of the improvements to the actual situation described in stage 3. The insights derived by these comparisons of the improvements against the actual situation will probably yield more specific proposals for change that are more relevant to the situation. For these proposals to be inclusive and orientated to 'win-win' outcomes it is advisable to utilize contingence techniques such as 'what-if' and 'if-then'

statements that allow all stakeholders perspectives about the future to be integrated into the proposals (Wilson & Morren, 1990).

Stage seven is the moment to debate about the desirability and feasibility of the improvements. Desirability refers to a group's interpretation based in a particular worldviews in relationship to the desired changes they are trying to achieve in the future. At the same time the participants should apply a test of feasibility to the improvements; this implies both the natural and social aspects of the situation. Wilson and Morren (1990) define feasibility as two specific things:

1. A change can only be implemented with the resources, staff, accessible technology, structures, capabilities, and so on at hand.
2. A change is feasible only when it is environmentally appropriate, in terms of avoiding unacceptable, especially irreversible, costs and in terms of involving factors over which people have control. (1990:238)

So we are trying to answer the following questions 'Is this what we actually want to do?' and 'Can we really implement the specific changes necessary to get there' (Wilson & Morren, 1990).

This stage is critical to the whole process and is the breaking point towards evolving and emerging into a functional working group that communicates, acts collaboratively and learns together. If we fail then we fall back to the old interactions defined by persistent conflicts and a distinct lack of co-operation. Vital to success of this stage is the skill of the facilitator who has to skillfully manage the social environment to promote the emergence of CCL. Good references related to facilitation skill can be found in, Pretty *et al.* (1995), and Fisher and Ury (1991).

If we have successfully as a group moved on from stage seven, we then have the information needed to create the mission statement for our detailed plan of action. The task of stage eight is to create both a management and monitoring plan. Wilson & Morren draw on some of this literature and recommend including as a minimum the following eight activities and elements in the management plan: benchmark activities, performance measures, responsible actors, timetables, needed resources, budget, overall leadership, and communication. The monitoring and evaluation plan will also be designed in this step. A good resource for developing this plan is Woodhill's and Robin's (1998) guide to 'Participatory evaluation for landcare and catchment groups: A guide for facilitators'. They describe three main sections that the evaluation plan should have: establishing the purpose and scope of the evaluation, identifying evaluation questions and indicators and planning evaluation activities.

4.4.   Managing and Adapting (Acting)

As we move out of the process of Decision making and conflict resolution we should have in our hands a complete project plan that consists of both management and monitoring plans. From here we move into the action part of the cycle and hence implementing our project. Implementing the management plan is probably the single most import step in the entire cycle and certainly requires the most resources to be

successful. At this point it is not uncommon to become overwhelmed by the task of implementing the management plan, and as a result may postpone the monitoring plan due to time or financial constraints. We need to remember that the only way to improve future actions is by learning from both our successes and our failures, and monitoring our activities is the only way we can ascertain which is which.

This leads us naturally to the 'Learning and Adapting' phase. This phase can be divided into two parts, one of flexibility and instincts, the other consisting of more formal methods of evaluation. Flexibility and instinct are needed as we carry out our project plan, because these plans are never perfect and we will need to learn and adapt as we implement them. Formal evaluation, derived from analyzing the results of the management plans, generates useful empirical evidence that can be used for improving future actions. A suite of techniques for analyzing qualitative and quantitative data will certainly be needed as a great diversity of outcome measures are typically produced by the multitude of methods available for these purposes. These results will be used to adapt the project according to insights gained and should also be used for informing the general public. Through constant action in this iterative cycle and by paying attention to learning it follows that we should move closer and closer to the mission we have established at the beginning of the process.

This final phase completes Kolb's learning cycle. Kolb's (1984) experiential learning theory helps us understand how people learn. It is the capacity of learning from experience that gives individuals or organizations the ability to solve real-world problems. We believe that only through building a method that is based on effective learning techniques will there be any potential for improving our management of natural resources.

Kolb's cycle is briefly summarized as four steps: explore, analyze, decide and act. Not all forms of skill and knowledge emphasize all the stages of the cycle to the same extent and being explicit about what part of the learning cycle we are in can be very useful in problem solving and project management. 'Setting the stage' begins the cycle, where we are exploring individual or group experiences of the situation. The individuals go through a process of apprehension by sharing their practical experiences. We reflect on these and co-create a multi-dimensional picture of what is occurring in the region. As we move on to 'Fostering creativity and innovation' the task of learning switches to analyzing, as individuals distance themselves from their own personal experiences and begin to logically analyzing the experiences they shared in the first stage. The end product of this stage is an analytically derived conceptualization of experiences and it is from this emerging view of the issues that innovative ideas, lateral thinking and solution to problems will emerge. In 'Decision making and conflict resolution', we move on to the third stage of learning, decision. This stage focuses on bringing to bear a number of facts or principles on a single topic and deciding which actions better address the mission we previously outlined. It is a process of converging; coming together from different directions and meeting somewhere in the middle to determine our path forward. Finally the last stage 'Managing and adapting' is putting these ideas and solutions into practice. From this action, new experiences will emerge and hence, the cycle begins anew.

"The expression for learning in Chinese is made up of two symbols: One stands for studying, the other for practicing constantly. In China, you can't think of learning without thinking of practicing constantly" (Senge, 2004).

5.   Conclusions

We have just outlined a brief description of the CCL approach. All of these stages use known facilitator tools to help elicit needed information for each stage and is beyond the scope of this paper to go through all of these techniques. However, we have added figure 4 as a reference to those tools that are applicable at each of the stages of the process. The CCL approach seeks new forms of implementing institutional and community co-operation, while fostering collaboration and learning. We must remember that what we have laid out is only a map to guide our efforts and not a true representation of reality; as such one must always be vigilant not to rely on one-size-fits-all solutions.
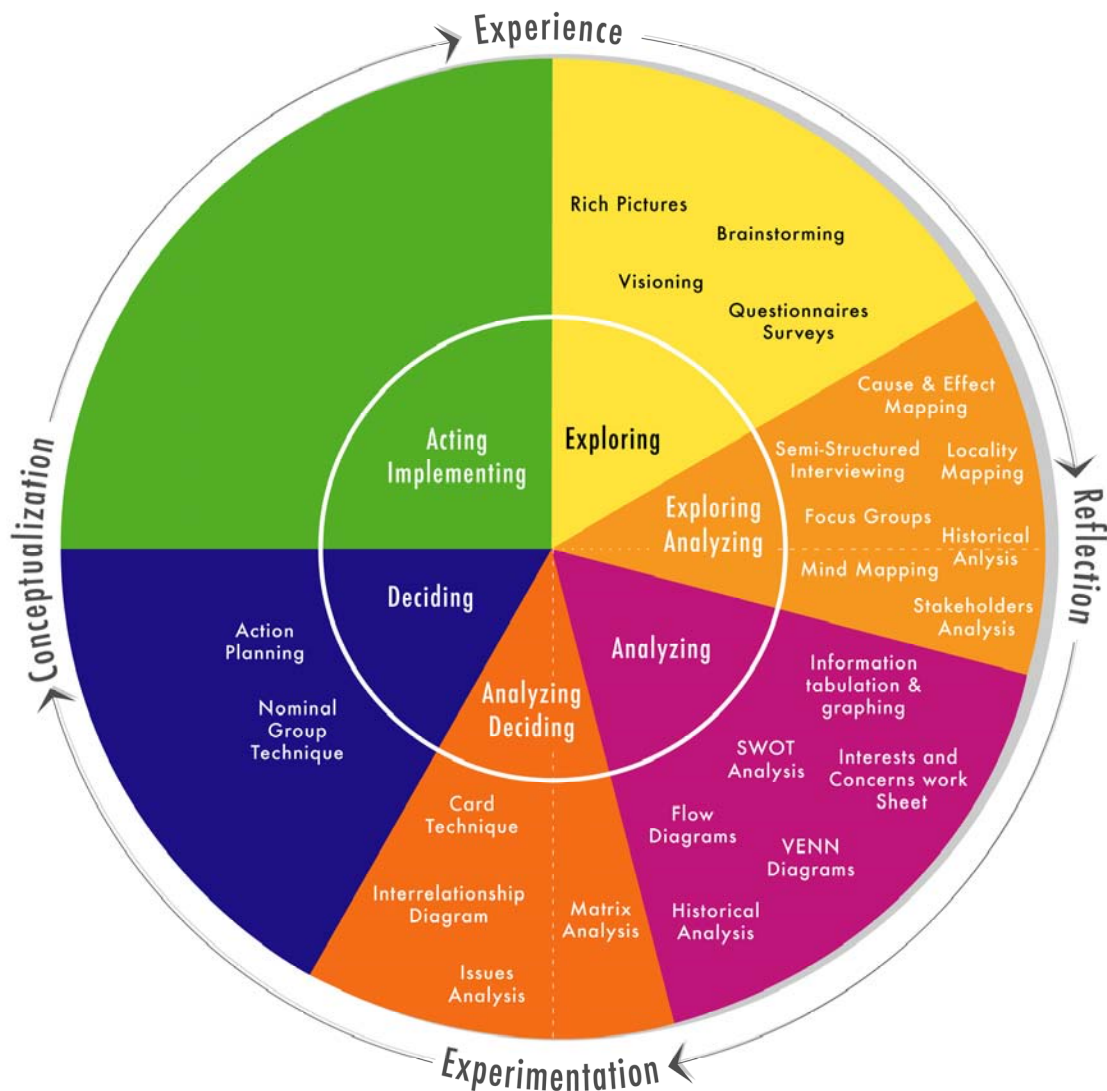

Figure 4: Tools related to stages of the CCL process

In the forthcoming year a case study in a single Yungas Biosphere Reserve watershed will be carried out. We believe that by implementing the outlined approach we will enhance the democratic governance of the region and begin a process of participatory deliberation of the much needed strategies of land use in the reserve. This is a long term strategy that will permit all of the actors to be better prepared for the ever-changing economic, environmental, political, and social pressures that must be adapted to if the region it to thrive. The results of this case study will be used to shape the future planning of the Biosphere Reserve as a whole.

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