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Acknowledging Consensus and Dissent among and within Stakeholder Groups over Conservation, Production and Urbanization in a Mexican Man and the Biosphere Reserve

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Abstract: In degraded buffer zones surrounding Mexican biosphere reserves, a number of social actors gather with different and sometimes very conflicting views and interests regarding rural livelihoods and natural resource management. Joint development of role-playing games and scenario simulators by local and external actors can aid their collective action and social education for sustainable governance but starting the process has a number of challenges: common resources are sometimes ill defined; it is unclear which issues should first be addressed; consensus can be apparent and issue selection can be easily biased due to power asymmetries. Researcher developed a thorough diagnostic procedure in a MAB buffer zone which allowed members of all actor groups to state in a repeated, specific, organized and individual manner; their priority objectives around production, urbanization and/or conservation, the most important resources they can mobilize toward such ends, the greatest obstacles to achieving their goals and responsibilities in creating and solving local problems. Researcher reveal and analyze the very low initial level of consensus within and among groups of local and external stakeholders around priority objectives and discuss why it should be acknowledged by all stakeholders when starting a companion modeling process in these settings.

Key words: Companion modelling, biosphere reserves, natural resource management, stakeholder consensus, Chiapas, Mexico

INTRODUCTION

In tropical-mountain rural territories, small and mid-scale producers are developing new land uses and rural livelihoods (increasingly linked to urban and industrial networks) in an effort to adapt themselves to the growing restrictions and changing opportunities of globalized market economies. The resulting degradation of local natural resources undermines their livelihoods and reduces their negotiation capacity in such markets. In addition, the local population's assets are not homogeneously distributed and their livelihood strategies sometimes cause conflict among them. Poverty and environmental degradation in these territories was of little interest to other social actors until the past few decades; today, governments, NGO's researchers and urbanites (UN, 2007) look upon them for a variety of reasons (Grau and Aide, 2008; Carpenter *et al*., 2006; Perfecto and Vandermeer, 2010).

All these external social actors believe they should intervene and have expectations with respect to the actions of local populations. External actors operate a variety of uncoordinated and sometimes antagonistic policies and programs which allow little actual participation of the rural population (Few, 2003). The social tension among actors becomes even more acute in tropical mountain small-holder areas where biosphere reserves have been recently created.

Populated areas of UNESCO's Man and the Biosphere (MAB) reserves have been defined as Buffer Zones (BZ) where this program calls for low environmental impact activities and active government engagement in social development (DeFries *et al*., 2007). In practice, very little has been achieved toward this goal in Mexico (Figueroa and Sanchez-Cordero, 2008). External actors sometimes habe little understanding and empathy towards local needs conditions and dilemmas (Garcia-Barrios *et al*., 2011); it is necessary to modify authorities' comprehension of social participation toward a process that supports social change by empowering MAB reserve inhabitants and transforming them into political actors (Durand and Vazquez, 2011).

Inequality and tensions exist among local actors and consensus among them to gather social energy for sustainable governance is not warranted; such conditions should also be explicitly acknowledged if they are to be positively transformed. The Upper Tablon River Basin (UTRB) in the Sierra Madre of Chiapas, Mexico comprises

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the most important BZ of the Sepultura MAB Reserve (REBISE), created in 1995 its land use change drivers in (Garcia-Barrios *et al*., 2009b). The following actors gather today in the BZ: small and mid-scale ranchers with diversified economies who have somewhat adapted to restrictions and opportunities arising in the new institutional environment; governmental agencies and salespeople promoting extensive ranching and some high-input maize cultivation; the municipality of Villaflores which devotes a marginal part of its urbanization and public service budget to the Sierra region; NGO's and universities promoting forest management, silvopastoral systems or marketing of environmental services and the Federal Commission for Protected Areas (CONANP) which administers the REBISE. CONANP officers seeks to control hunting, fishing, logging and forest fires by monitoring the area with very little staff and through diffuse commitment from the Ejidos in exchange of modest payments for environmental services. CONANP reluctantly tolerates promotion of cattle raising by other governmental agencies and more recently has supported reforestation and silvopastoral projects with its very modest resources. These actors differ in their priorities regarding family welfare, urbanization, agricultural/livestock production and conservation in the buffer zone.

In this complex context, still with few achievements in territorial co-management, it is helpful to create tools and spaces for dialogue and interaction which would encourage all actors to openly exhibit their interests and share knowledge, seek consensus, modify their objectives, prioritize actions and define responsibilities for collective BZ management. For this purpose, we started in 2007 a participatory process with members of the Los Angeles Ejido and related social actors to collectively develop role play games and scenario simulation models, following the precepts of the Companion Modelling (ComMod) Method.

A key point in initiating the process is identifying in a participatory manner, the interests and interactions of actors involved (Barnaud *et al*., 2008). To this end, some researchers have carried out elsewhere diagnostic studies based on detailed interviews, participatory workshops (Barnaud *et al*., 2008) and text analysis (Dray *et al*., 2006) specifically tailored to the ComMod approach. Others have applied existing multi-stakeholder scoping methods such as: Pro-Active Conciliation Tool (PACT), Institutional Analysis and Development and the 4R method. In most ComMod experiences, the general issue to address has revolved around a single common pool resource and has already been identified by one or more stakeholder before beginning the process. This is not the case for buffer zones in general (and for the UTRB) where priorities are ill-defined and contentious. Thus, researcher proposed a diagnostic procedure which allows members of all actor-groups to state in a repeated, concrete, organized, individual manner: their priority objectives; resources which the family, Ejido or institution may contribute toward this end, the greatest obstacles to achieving these goals and responsibilities of the different groups of actors in creating and solving the problems mentioned. For a ComMod process, researcher believe individual and subgroup consultations are crucial before prioritizing issues in a multi-stakeholder meeting because actors within and among stakeholder groups have unequal information and decision-making power and an apparent consensus may be deceiving. This study addresses the results of a thorough diagnostic study of agreements, disagreements and consensus levels within and among groups of social actors (hereby actor-groups) in the UTRB:

- It compares social actors' interests and visions regarding the limits and opportunities to reconciling production, urbanization and conservation goals which to a great extent repeat themselves in the entire watershed and REBISE
- It determines the levels of consensus among local and external actors and within each group
- It analyzes the causes of convergences, divergences and their possible consequences for territorial co-management
- It discusses results of the diagnostic study in the light of other studies of social management of watersheds in Mexico and countries with similar conditions, particularly in buffer zones

MATERIALS AND METHODS

The Upper Tablon River Basin (UTRB) covers 407 km^2 of the Sierra Madre of Chiapas and drains toward the central valleys of Chiapas. The BZ within the UTRB (800-2550 m.a.s.l.) includes temperate subhumid and semi-calid sub-humid climates with an annual average temperature above 22°C and summer rains. It is an important area for water capture and provisioning for the Frailesca and central regions of Chiapas.

The BZ of the UTRB is the most densely populated area of the REBISE with the highest level of transformation of natural conditions and the greatest current and potential deforestation and erosion levels (Garcia-Barrios *et al*., 2007). Researcher have currently focused on Los Angeles one of the 8 villages within this territory. This town (the oldest and with the largest

population) was founded in 1960 by 44 agricultural laborers from villages of nearby valleys who solicited land to the government; today it has 800 inhabitants. It is a zone of great natural biodiversity, originally covered by an intricate mosaic of ecosystems and their ecotones (pine forest, low deciduous tropical dry forest, tropical sub-perennial riparian forest, pine-oak forest and cloud forest). All these ecosystems have been replaced to a greater or lesser extent by secondary vegetation, grasslands and agricultural plots. Within the Ejido, 89 male heads of households are registered as basic edijatarios, 81 as pobladores (individuals not endowed land under land reform most commonly children of ejidatarios who have inherited or bought land from them) and 35 as avecindados (without land-typically newcomers from other villages) including widows and female heads of households. The 4,740 ha are divided unequally on a family basis.

Of 52 individuals interviewed in the community of Los Angeles, 73% were men and 27% women. About 42% were ejidatarios, 31% pobladores and 11% avecindados or dependents. Since 2007, the research group has assisted with participatory design and establishment of experimental silvopastoral plots (Garcia-Barrios *et al*., 2007) in which 68 producers have voluntarily participated. A portion of the interviewees were of this group. Also, 30 external actors from 16 institutions with different levels of responsibility-carrying out conservation production and municipal development projects in the UTRB and in the Ejido were interviewed. About 7 of these represent municipal, state and federal governmental institutions, five represent NGO's one a cooperative and three represent research and postgraduate educational centers. Researcher focused on institutional actors that actually work in the study zone and in there interests, actions and views rather than on the formal objectives and official statements made in documents by their institutions. Actors were consulted in 2008 and 2009. The surveys and analysis process included 6 stages:

Participatory topic selection: Each of a group of 11 local pesons (men, women and teenagers) and 7 external persons was asked to take a minimum of 10 photos of different elements in the territory which they consider to be important. These photos were to emphasize two themes: things I see today which I would like to continue to see in 20 years and things I see today which I would like to see modified within the next 20 years. All together, the actors took 250 photos. Several external actors did not go back to the Ejido, specifically for this purpose but rather selected material from their extensive photo archives of the area.

Individualized SWOT analysis: After eliminating clearly redundant images, a packet of 57 photos was offered to each of a larger second group of participants. Each person, interviewed separately was asked to select one photo or write one word which represented their most important current objective (e.g., cattle, forest, school) and relate the remaining photos to this central photo. The selected topic was placed in the center of a large sheet of paper and the remaining topics spread among four quadrants entitled: local strengths, external opportunities, local weaknesses, external threats (reseaercher refer to this as a graphic SWOT, an individualized and image based variant of the SWOT method used in group workshops by Geilfus in 2002.

SWOT synthesis and comparison among groups: Researcher grouped the 57 photos given to each person into four general topics: Extensive Cattle Raising and maize (ECRA); Urbanization and other services (US); Silvopastoral and Agroforestry Systems (SPAF) and Forest and River (FR). General topics 1 and 2 largely relate to environmental transformation and 3 and 4 to environmental restoration and conservation. For each interviewee researcher analyzed the Net Perception (NP) of each of these four topics in the graphical SWOT display. Researcher calculated this Net Perception (NP) for each person and general topic (j) as:

$$C(i,j) = \frac{(\text{Photos}(i,j)\text{in S quadrant} + \text{Photos}(i,j)\text{in T quadrant})}{\text{The total of 57 photos offered}}$$

Which can be expressed in formal mathematical notation as:

$$NP(i,j) = \frac{\left(p_{i,j}^{S} + p_{i,j}^{O}\right) - \left(p_{i,j}^{W} + p_{i,j}^{T}\right)}{\sum p_{i,j}}$$

Where P is the number of photos. For example, if NP(i, ECRA) = -1, then all ECRA photos were used and placed by person i in the negative W and T quadrants. If NP(i, ECRA) = +1, then all ECRA photos were used and placed by person i in the positive S and O quadrants. If NP(i, ECRA) = 0, then the same number of ECRA photos were placed by person i in the negative quadrants (W and T) as in the positive (S and O) quadrants.

Researcher analyzed the distribution and correlation of NP(i, j) values within each actor-group and compared them among groups.

Individualized priority survey: A larger group of people (37 locals and 21 externals) were exposed individually to a list of the 29 topics most commonly selected in the graphic SWOTs. Every topic had a name and a local image for clarity. Each person was asked to select from this list the three resources and the three problems most important in the Los Angeles Ejido and to define who makes decisions to use these resources and resolve these problems.

Consensus about main resources and issues within and among the two actor-groups: Within each actor-group, topics selected as a resource by 50% or less of the interviewees were considered to denote clear lack of consensus over its importance. Researcher placed the frequency of each topic in a (positive number) Cartesian plane (X = Local actor frequencies; Y = External actor frequencies) and divided it in four qualitatively distinct quadrants: Only local consensus; only external consensus; consensus in both groups and Lack of consensus in both groups. Additionally, the diagonal X = Y was used as a reference to visualize for each topic the level of consensus similarity among groups. Topics selected as main issues were treated in the same way.

Local views about decisions over resources and issues: For each selected resource/issue, every local interviewee defined what entity (ies) currently decides over its use/solution. Options offered in the survey were the family the community assembly, government officers NGO officers and researchers. Response frequencies were calculated.

RESULTS

Participatory topic selection: Local actors took a total of 250 photos. A great diversity of themes were photographed in both rural and urban settings. Natural resources, productive activities and urbanization/services were equally represented in this pool (33% each). The six territorial elements most often photographed by local actors (from greater to lesser frequency were: river and forest (with the same frequency); pastures; silvopastoral and agroforestry projects introduced by external actors, other crops and the badly managed garbage dump. Photos representing things I see today that I would like to continue seeing in 20 years were marked F+ and those representing things I see today that I would like to see modified within the next 20 years were marked F-. About 54% of F+ were associated with productive activities (principally cattle raising), 30% with natural resources and 16% with urban infrastructure. About 61% of F- showed the lack or deficiency of urban infrastructure and 39% the degradation of natural resources (i.e., forest, soil and water). Women emphasized urbanization/services deficiencies more often than men (66% of women's photos vs. 25% of men's). There was notable local interest in improving communication infrastructure (introducing telephones in order to communicate with migrants, paving the road, building better bridges) as well as in improving education and health services, building better homes and planting gardens in the central park. For the majority of these latter goals, people said they depend on municipal and state governments. The six territorial elements most often photographed by external actors (from greater to lesser frequency) were: their own silvopastoral and agroforestry projects, forest, river, other crops, pastures and the badly managed garbage dump (Fig. 1). About 43% of F+ photos were associated with silvopastoral and agroforestry projects. These were followed by the forest, river and agricultural production, each with 12% of F+. Within F- deforested hillsides predominated with 31% of the photos, followed by badly executed external projects and the river clogged by uphill sediments (15% for each) and the garbage dump (12%). About 51% of F- related to natural resources, 27% to productive activities and 23% to urban infrastructure.

SWOT individual and aggregate Analysis: About 395 of local participants selected a very specific economic activity as the central theme of their SWOT analysis (the great majority selected my cattle) 54% selected goals relating to general family well-being (my family, education, health) and 7% selected forest conservation. About 41% of external actors focused on educating local actors on productive and environmental topics to improve their livelihoods; 16% focused on reconciling production and conservation; 17% chose conservation and 25% selected personal goals (e.g., develop myself professionally be a better person). Figure 1 shows how each group of actors distributed (on average) the available photos of each general theme into the four quadrants of the graphic SWOT board. It shows that:

- Both groups placed many more photos in the positive SO quadrants (745) than in the negative WT quadrants (343)
- For ECRA, local actors saw much more internal strength, less external opportunity, much less internal weakness and much less external risk than external actors
- For US, local actors saw more internal strength, the same level of external opportunity, less internal weakness and much less external risk than the external actors

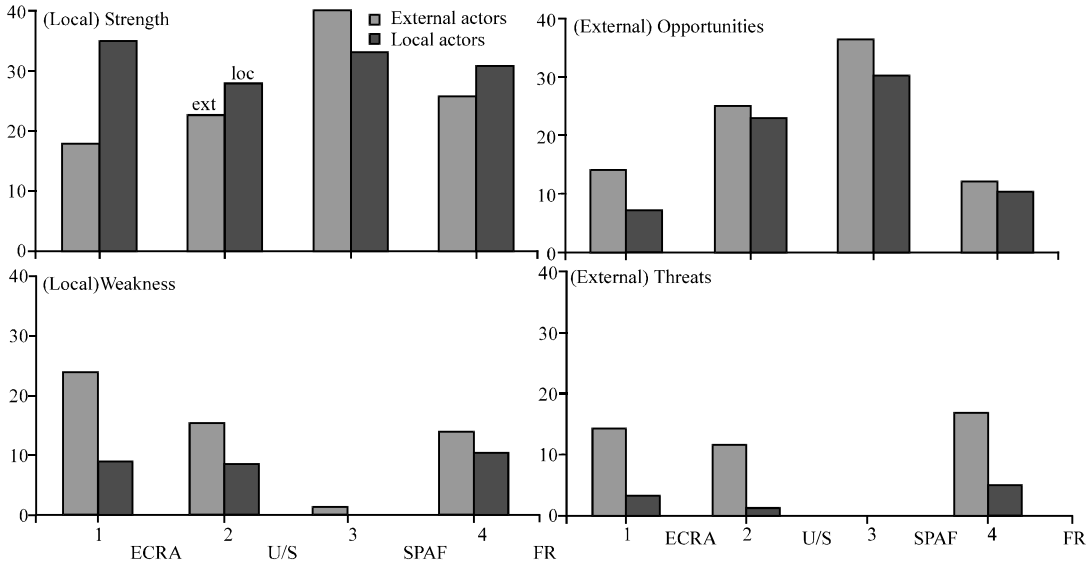

Fig. 1: Average % distribution of photos per SWOT quadrant according to type of actor and general topics (ECRA= Extensive Cattle Raising and Agriculture; U/S = Urbanization and other public Services; SPAF = SilvoPastoral and AgroForestry ; FR= Forest and River)

- Local actors saw less internal strength and fewer external opportunities in SPAF than external actors. Neither group saw them as weaknesses or threats
- Local actors saw more internal strength, fewer weaknesses and much more external risk for FR than external actors

Figure 2a shows the correlation between local actors net perception of ECRA and their net perception of US, SPAF and FR. Figure 2b shows the same for the external actors. Local actors had a much more positive and less dispersed net perception of ECRA than external actors. The same was true, though to a lesser extent, for the net perception of US, SPAF and FR. Those local actors who were most optimistic with respect to ECRA tended to also be so for the other three elements.

Those external actors who were most optimistic with respect to ECRA tended also to be so for FR but not for US and SPAF. As a whole, local actors had a more positive, less disperse and more consistent net perception than the external actors regarding the four elements of the territory considered.

Consensus about priorities within and among the two actor-groups. Figure 3a shows the relative selection frecuency of each territorial elements as one of the Ejido's three most important resources:

- Only the forest commands consensus between groups and within each group; greater consensus exists among externals than among locals

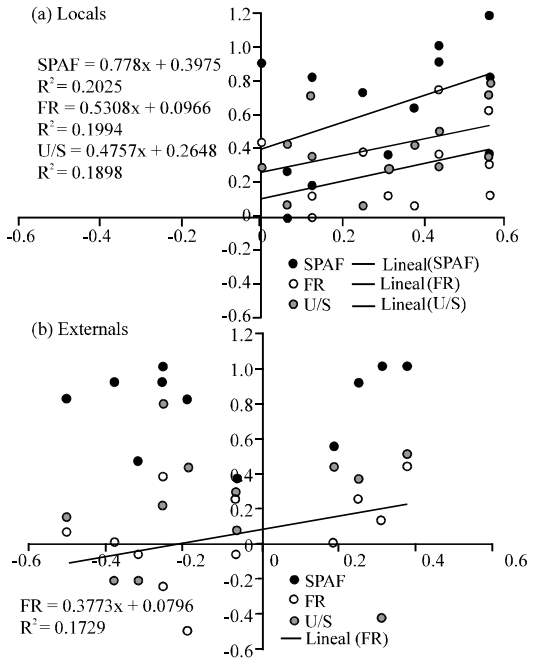

Fig. 2: Correlation between net perception of Extensive Cattle and Agriculture (ECRA; X axis) and net perception of the other topics (Y axis: Forest and River FR; Silvopastoral and Agroforestry (SPAF), Urbanization/Services U/S) (a) Local actors (b) External actors. Lineal regression models are presented for topics with significant linear correlations ($p<05$). Each point represents the paired net perceptions of a single interviewee

- ECRA elements were selected more frequently by locals than by externals. The opposite occurred with FR elements, except for the river. Both groups selected US elements with similar low frequency
- SPAF elements were rarely selected. Local actors preferred the coffee crop, currently cultivated in a small area of the Ejido as well as projects in general offered by external institutions

Figure 3b refers in a similar way to the three most important issues: no specific problem generates consensus or shows high frequency similarity among groups. The garbage problem is very important to more than half the local actors but not for the external actors. A more detailed analysis also shows a lack of consensus among subgroups of locals (e.g., men and women) and among subgroups of externals (e.g., government, NGO's, academics). The scarcity of forest and soil erosion caused by over-grazing of pastures due to lack of sufficient during the dry season and by maize cultivation on very steep hillsides are the problems which generated the most intra and inter-group convergence. Local views about decisions over resources and issues. Local actors believed that making use of the most important resources available is largely the responsibility of a single actor (the family who owns it; 63% of responses), less often, the responsability of two actors (27%) and rarely that of three or more (10%). The diversity of actors involved in resolving problems follows a very similar pattern (70, 20 and 10%, respectively). For local actors, the responsibility for making use of resources and resolving problems is mostly attributed to the family (cited in 63% of responses), followed by the community (25%), government (16%) and very marginally other social institutions (3-5%).

The family was more frequently attributed the task of making use of resources than of resolving problems. The opposite was true for the community and government. A more detailed analysis shows that producing maize is clearly a family responsibility while cattle production is a family responsibility but is also shared with community and government. Resolving soil erosion problems caused by these two activities is the responsibility of local and external actors.

Making use of the river and resolving its clogging by sediments and contamination is a community responsibility while making use of the forest and resolving deforestation problems is the responsibility of local and external actors. Providing the population with urban infrastructure is a government responsibility while avoiding the spread of garbage in the dump is a community responsibility.

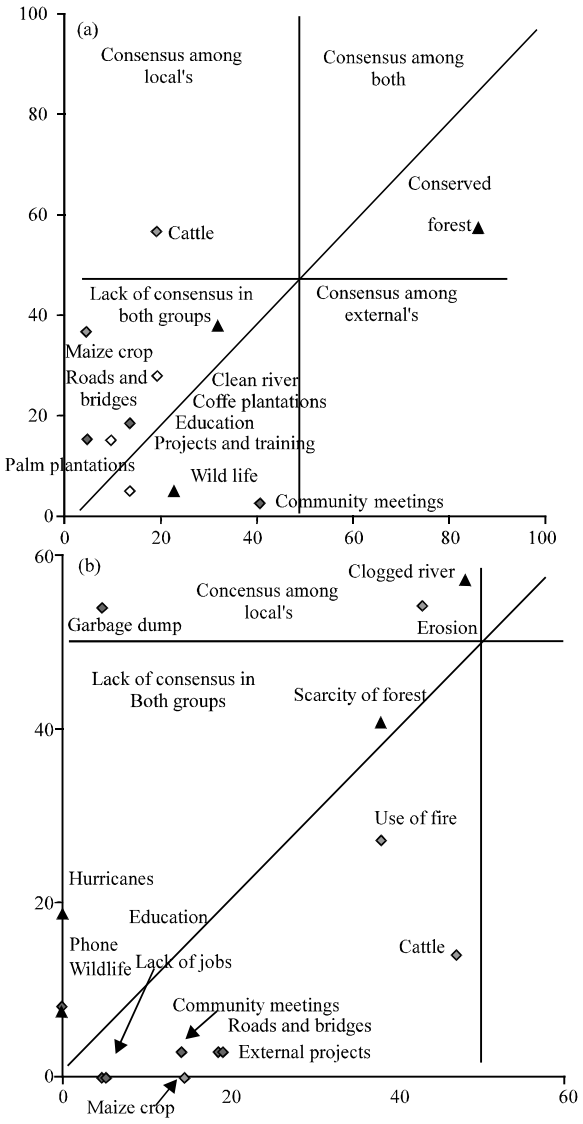

Fig. 3: Frequency (%) with which each item was considered to be one of the 3 most important resources or issues: comparison between external and local actor responses; a) resources; b) issues. Points on the diagonal indicate that the item has the same level of consensus within local and external actors. The different subtopics are labeled according to the four main topics: Cattle and Agriculture (ECRA); Forest and River (FR); Silvopastoral and Agroforestry (SPAF), Urbanization/Services (U/S)

DISCUSSION

The UTRB is a very dynamic buffer zone in which a variety of actors, interests and institutional mandates

come together. It is well-known that in contemporary societies, it is difficult to reconcile market oriented production with rates of reproduction of natural processes. The problem is exacerbated by the growth of the population of producers but above all by that of international agricultural markets for urban consumers (Garcia-Barrios *et al*., 2009b; DeFries *et al*., 2010). Reconciling production with conservation is currently difficult for socially disadvantaged rural producers. It is even more so for those inhabiting buffer zones, subject to new interest groups and new land use regulations. It has been demonstrated that decisions of local actors regarding land use respond to the interaction between their individual will and the influence of external actors (Chowdhury and Turner, 2006). These new interests and regulations are perceived by producers as new pressures. However, in some cases they are also perceived as an opportunity to once again manage their patrimony in a sustainable manner but only if social co-responsibility and adaptive co-management are established (Folke *et al*., 2005; Ostrom, 2009; Garcia-Barrios *et al*., 2011). This requires dialogue among actors, preceded in the opinion by individualized systematization of their objectives, interests, priorities and responsibilities. Although, the vision of the local people should be a priority, external actors must also be taken into account.

Several recent natural resource co-management facilitation processes have demonstrated that governmental actors are frequently reluctant to actively participate in this dialogue (Dray *et al*., 2006; Gurung *et al*., 2006; Worrapimphong *et al*., 2010) but later impose their decisions on other stakeholders. This can be due to contention (Few, 2003) but also to a lack of institutional provision for novel and challanging socioecological situations (Ekstrom and Young, 2009; Durand and Vazquez, 2011). Thus, there is a critical need to involve them more actively. Collecting photos of favorable and unfavorable elements of the landscape was successful. To a certain extent it leveled actors abilities to make their perceptions of the territory explicit and revealed that all actors take interest in a variety of elements of the natural landscape, conventional production, SPAF production and urban infrastructure, though to different extents.

The manner in which actors defined their way of relating to natural elements (+as well as -) was much more homogeneous than for production and urban services. All are concerned about environmental degradation but different actors attribute different immediate causes to these problems. Local actors emphasized that they greatly value cattle raising (especially the men) and that they are worried about public services (especially, the women). External actors emphasized that they greatly value their own projects and that they are mainly worried about environmental degradation. The graphic SWOT confirmed and clarified these results. Local actors selected individualistic objectives linked to their family well-being and cattle raising. Their analysis of the strengths and weaknesses of ECRA, US, SPAF and FR was very varied but always positive. External actors' objectives were more diffuse typically oriented toward training local actors in local development issues.

External actors saw more antagonisms and less correlation among conservation, production and urbanization for local development and agreed less among each other than local actors. Interestingly very few external actors declare production or conservation to be their sole objective, unlike that reported for other Mexican reserves (Garcia-Frapolli *et al*., 2009; Pujadas and Castillo, 2007). The way in which actors selected priority resources and problems confirmed that while all actors agree what remains of the forest is a resource, they differ in how they see the activity which has most degraded the forest, namely, cattle raising. For several external actors, this activity, though currently inevitable is bad and should be transformed through SPAF programs which improve production and reduce pressure on soils and forest. For the local actor, cattle production simultaneously brings benefits (income), challenges (e.g., how to feed cattle during the dry season or in degraded pastures) and some risk of greater environmental degradation. On average, local actors interviewed expressed little knowledge or interest in ongoing SPAF projects. They currently see in them a source of a modest, short-term income (temporary employment, one-time subsidies) rather than strategic opportunities to transform their productive systems and reconcile them with environmental conservation. Local actors believe that making use of resources on their property is above all a private family decision (except in the case of forests which are currently regulated by the governmental agency which administers the REBISE) and that solutions to the problems related to resource use is the responsibility of external as well as local actors. Local actors have individualistic objectives and make a positive, integrated judgment of territorial elements as they constitute an important part of their livelihoods. Their social condition, resources and livelihoods are not homogeneous and therefore nor are their objectives, perceptions of problems and responses to development programs in the BZ. This heterogeneity of local actors and responses coincides with that of detailed regional studies in Asia (Mehta and Kellert, 1998).

In the UTRB, few problems generate sufficient consensus among local actors so as to actively mobilize

their social energy beyond specific contextual situations. They recognize their responsibilities but tend to wait for paternalistic support from external actors. The latter have interests which are less individualistic but more vague, varied and antagonistic than those of local actors which helps explain the low level of long term coordination among them. This phenomenon has been reported for other BZ in Mexico and other parts of the world (Garcia-Frapolli *et al*., 2009; Pujadas and Castillo, 2007). In this context, it is surprising how within each group and among groups, a relatively uniform vision exists of the Ejido's forests as a resource and deforestation as a problem. This is because local actors: extract forest resources on a small scale and receive payment for environmental services in exchange for collectively limiting their exploitation; consider that the forest sustains water sources for cattle and humans; occasionally participate in (and benefit from) short-lived reforestation projects and have assimilated or mimicked conservationist discourse of the external actors who subsidy them as occurs in other BZ (Durand and Lazos, 2008). This does not mean that no pressure or tension exists on the forest. As for other BZ (Durand and Lazos, 2008; Garcia-Frapolli *et al*., 2009), land distribution in the UTRB occurred just a few decades before the creation of the reserve and deforesting was strongly associated with possession or acquisition of land rights. To a great extent, the situation of cattle raising in the Ejido is representative of the manner in which actors interests are intertwined, generating convergences, divergences and little consensus among and within groups. The majority of those who own or use land have or hope to have cattle. They receive support in an uncoordinated manner from some external actors in order to increase their herd from others to avoid grasslands from encroaching into their forests and from still others to cultivate fodder trees in order to require less pasture surface (Garcia-Barrios *et al*., 2009b). All actors agree that the main productive problem of cattle raising is scarcity of fodder during the dry season. To this day, rather than taking the initiative to plant fodder trees, producers prefer to set their cattle to browse in the forest a practice which can prevent sapling recruitment (Sanfiorenzo-Barnhard *et al*., 2009) and which breaks a tacit agreement implied in receiving payment for environmental services. External actors are following different strategies to promote modest silvopastoral projects and the level of commitment of producers within each project varies greatly from self-motivation (Ryan and Deci, 2006) to passive interest for an occasional wage as occurs in other sites (Mehta and Kellert, 1998). Cattle raising in the BZ is a clear example of insufficient communication, understanding, coordination of efforts and definition of responsibilities among all actors. Some researchers have found that in other BZ, local actors increase their commitment to projects introduced by external actors when these projects are better coordinated, more consistent and long lasting and when local people can actually use them to achieve their objectives.

CONCLUSION

It is becoming increasingly clear that reconciling silvo-agricultural production, rural livelihoods and conservation of natural elements and processes is less a task of planned command and control from the centers of power and more a task of construction of local and regional cultures of adaptive territorial co-management (Ostrom, 2009; Poteete *et al*., 2010). Initiatives of this type implemented through companion modeling and other participatory methods should begin by make visible to all actors their challenges and opportunities to act in a coordinated manner in benefit of those who have been most disadvantaged and of society at large (Agrawal and Gibson, 1999; Garcia-Barrios *et al*., 2009a, b). The products of this diagnostic stage are being currently used to further the Commod process in the study site with promising results.

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