Impact of change in land use and traditional knowledge on natural resource management

Fábio Pedro Souza de Ferreira Bandeira[1,2], Jocimara Britto Lobão[1], Isabel Fróes Modercín[2], Thiago Mota Cardoso[1] and Sarah de Siqueira Miranda[2] (1.Universidade Estadual de Feira de Santana; 2.Associação Nacional de Ação Indigenista)

Different cultures represent and manage the environment in their territories in different ways (Morin-Labatut and Akatar 1992; Gadgil et al 1993; Tilley 1994; Berkes 1999; Bang et al. 2007). In particular, indigenous peoples often embrace a multiple ecosystem management approach, which takes full advantage of the spatial and temporal diversity of natural resources. The indigenous management system also defines the spaces and use of natural resources according to the knowledge they have about the flora, fauna and the physical environment, but especially according to the indigenous conception of nature and worldview (Sillitoe 1998; Toledo et al. 2003). Indigenous institutions for accessing and using natural resources are also ruled by sophisticated mechanisms of social regulation (Colding and Folke 2001), which are based on a symbolic mapping of the territory, where both actors of the social world and supernatural or infra-natural worlds have a place (Descola 1996).

Notwithstanding the role of TEK and cultural values in biodiversity and ecosystems management other factors such as public policies, immigration and change in land tenure, creation of protect areas (Rocha 1985; Kohler 2008; Adams and Hutton, 2010), payment for ecosystems services (Rival, 2011), ecotourism (Grunewald 2002) and so on, can influence decision-making process of ecosystem and resources management with socioecological consequences. These can be either reversible or not, and will be reflected in land use and cover changes and impacting biocultural conservation over time.

This paper will discuss conceptual and methodological approaches for analyzing these issues in the Combioserve project ("Assessing the effectiveness of community-based management strategies for biocultural diversity conservation"), a consortium supported by European Commission which has as aims to identify the conditions and principles of successful community-based conservation in selected locations in Mexico, Brazil and Bolivia, working in partnership with local Civil Society Organisations (CSOs) and indigenous communities. Within the broader scope of the project, the foci of the present authors are local landscape classifications (Johnson, 2010), perceptions of land use change, the role of traditional ecological knowledge and cultural values of biodiversity/environment in natural resource and landscape management (Berkes et al. 2000) and socio-environmental conflicts (social cartography) (Moore and Garzón 2010).

Our methodological approach will be based in GIS modeling and collaborative or participatory cultural mapping (ACT Brazil, 2008), drawing on interactive modes of documenting. In this task, we will review the literature on traditional ecological knowledge and cultural studies of indigenous communities involved in the project for each study site. Literature reviewed will include previous ethnographies, NGO reports, and governmental data. Parallel to this, we will evaluate the available documentation regarding the role of traditional ecological knowledge on resource management. We will work on satellite image interpretation for the assessment of change before and after

conservation initiatives and within and in the surrounding landscape through time. Statistical analyses for understanding spatially explicit biophysical and social factors (derived both from digital sources and local researchers) that can explain change trajectories and fragmentation. The research will be based in the application of the methodology of the mapping manual of the land use and coverage utilised in each partner of Latin America.

Technological tools will be used for identification and classification of the main uses and coverage of land, complemented by utilization of spatial representation models. Structured and semi-structured interviews will be carried out to reveal local traditional ecological knowledge (classification of the landscape or management units, of the phases of ecological succession, and of the vegetation types; classification of soil types and microclimates). We will design a survey to investigate people's practices of management of the landscape units, sacred groves, role of taboos and other ethnoecological data, such as the number, surface and location of their management units. We will train local experts to conduct participatory cultural mapping to produce social cartography. Participatory cultural mapping will include 1) the production of oral maps (or the indigenous description of the physical and cultural territory), 2) the production of mental maps on landscape perception and socio-environmental conflicts, 3) the identification of overlaps between thematic maps produced through participatory cultural mapping and findings of satellite image interpretation and 4) the selection of thematic maps that best represent the territory and socio-environmental conflicts.

These techniques of participatory cultural mapping will also be used to produce potential scenarios (in the future) of land use and cover for all project sites highlighting the research findings and contribute to the manual for community-based research. These potential scenarios will be modelling by two different ways: first, computer modelling based on land use and cover changes and, second, by communities' perceptions of changes in social and environmental conditions. In these conclusions we will emphasize the role of TEK and cultural values of biodiversity/environment for community management of biocultural conservation and environmental and social change.

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