

# Building a shared representation of the landscape as a socio-ecological system and visualizing the challenges of climate-smart agriculture

Abigail Fallot<sup>1,4</sup>, Jean-François Le Coq<sup>1,5</sup>, Julio Cesar Salinas<sup>2</sup>, Teresa Aguilar<sup>1</sup>, Romy Cronenbold<sup>2</sup>, Roberto Vides-Almonacid<sup>2</sup>, Tahia Devisscher<sup>3</sup>

<sup>1</sup>Centre International de Recherche Agronomique pour le Développement (CIRAD), France <sup>2</sup>Fundación para la Conservación del Bosque Chiquitano (FCBC), Bolivia <sup>3</sup>Stockholm Environment Institute (SEI)- Oxford, U-K <sup>4</sup>Centro Agronómico Tropical de Investigación y Enseñanza (CATIE), Costa Rica <sup>5</sup>Universidad Nacional (UNA), Costa Rica

## 1. Introduction

- Climate Smart Agriculture (CSA) refers to a still little delineated set of proposals for improving rural land use practices and disseminating solutions to food insecurity, low climatic resilience, and high greenhouse gas emissions. CSA addresses these sustainability issues principally at the landscape scale.
- As previously observed in many development and innovation projects of the last decades, such proposals are not always accepted, solutions sometimes fail to be sustainable over time or to address local priorities. These difficulties often highlight the lack of a shared vision by the actors of their landscape, where an intervention is considered to improve natural resource management practices.
- We assume that the applicability of knowledge on climate vulnerability and CSA options, depends on its integration within a representation of the socio-ecological system (SES) of the landscape.

## 2. Objective

To account for the diversity of viewpoints in the SES and promote a shared understanding of how the landscape functions around a problem faced by all.



Micro dam (atajado)  
T.Aguilar

Carrying water home  
T.Aguilar

Discussing urban water quality  
N.Pacheco

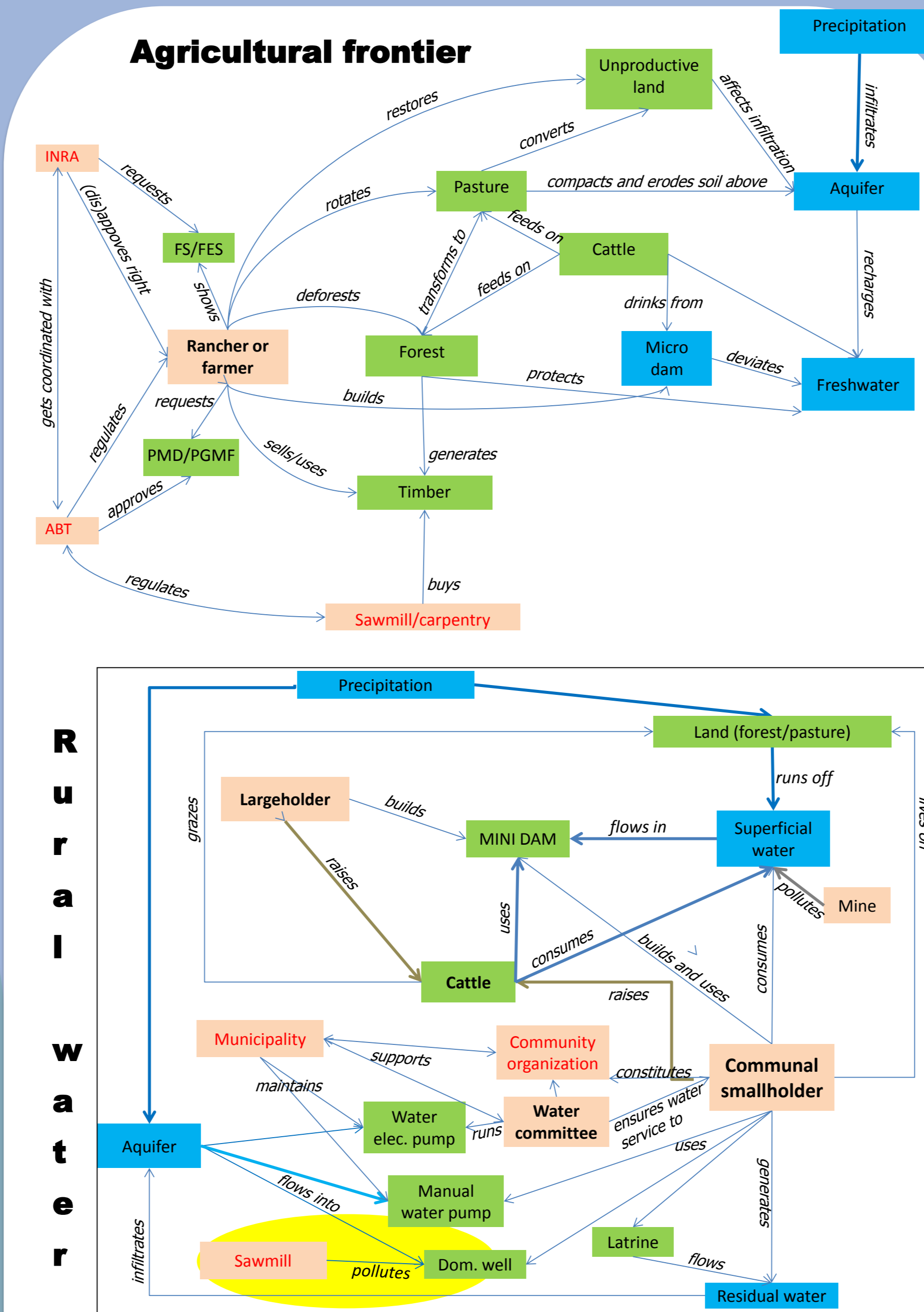
## 3. Material and Methods

Three tools for participatory conceptual modelling were articulated:

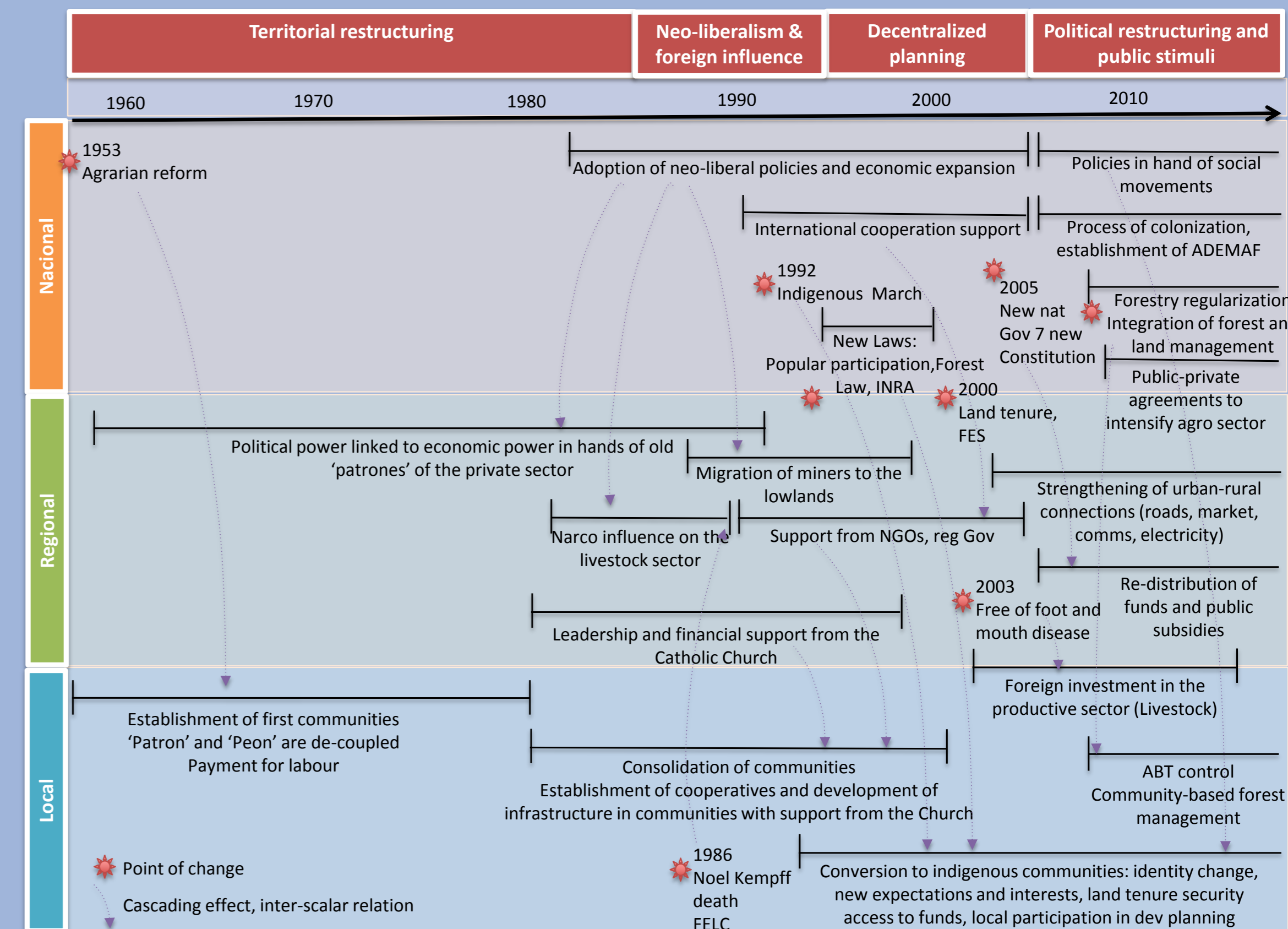
- initial conceptualization with Open Standards for the Practice of Conservation (OSPC), from the Conservation Measures Partnership (CMP 2007, Salinas et al 2013)
- PARDI modelling (Problem, Actors, Resources, Dynamics, Interactions), an adaptation of ARDI (Etienne et al. 2011) from the Companion Modelling approach
- historical profile of the Resilience assessment workbook (RA 2010)

## 4. Results

### Actors' interventions in the SES (PARDI)



### Cross-scale effects (Resilience Assessment)



## 5. Discussion

Through a learning-by-sharing process, the analysis of SES dynamics around a specific and collectively recognized problem (here on water security), helped to define a shared representation of the landscape and integrate different types of knowledge.

A consensus on solutions is not ensured. But gathering persons that usually don't meet and exchange their viewpoints is already an achievement. Existing participatory process and consolidated local organization (here, the FCBC) facilitate the successful application of the articulated methods.

Though qualitative and relying much on stakeholders' perceptions and their interpretation, they complement an evidence-based approach, allowing to identify knowledge gaps and discuss priority research needs.

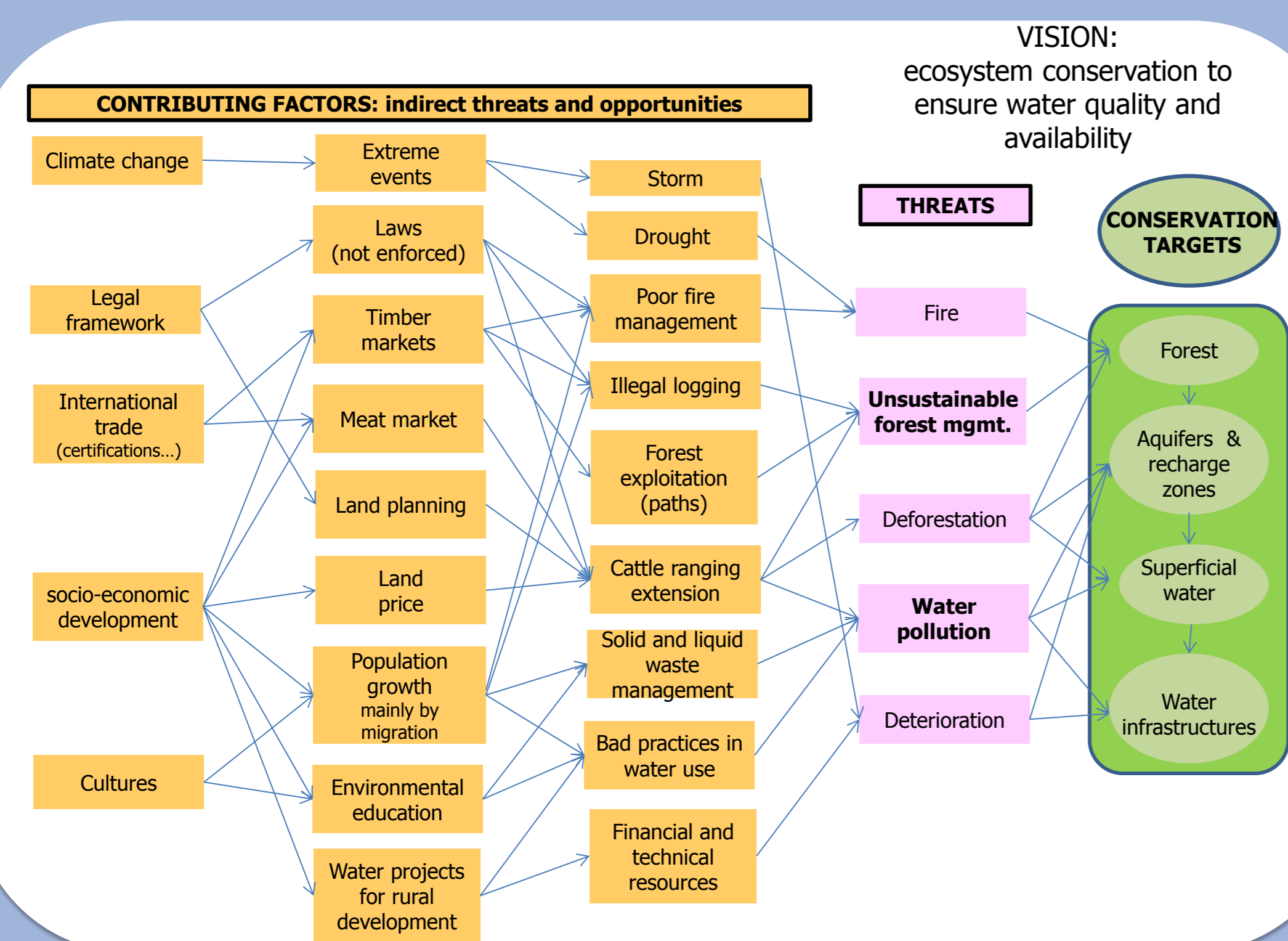
## 6. Conclusion

Participatory conceptual modeling allows to build a shared vision of the Zapocó basin landscape. As a way to strengthen local stakeholders' reflexive and abstraction capacity, it enables innovative solutions and may reduce tensions on resources.

Thus promoting a local stakeholders' learning process contributes to create Climate Smart landscapes.

Possible next steps : implementation of specific identified measures necessary to improve local SES dynamics; further exploration to understand these dynamics in the longer run.

### Situational analysis (OSPC)



With OSPC, the overview of dynamics situates the landscape within the wider national context and facilitates a consensus in the formulation of a shared problem at the landscape level:

HOW TO ENSURE THE QUALITY AND AVAILABILITY OF WATER FOR HUMAN CONSUMPTION AND PRODUCTION ACTIVITIES FOR A SHORT AND LONG-TERM, IN A CONTEXT OF WEAK WATER GOVERNANCE, AGRICULTURAL AND CATTLE RANCHING EXPANSION AND DEMOGRAPHIC GROWTH,

CONSIDERING DRY PERIODS ARE BECOMING MORE PROLONGED & INTENSE? The situational analysis highlights trade-offs on development opportunities and threats on natural resources at different scales of intervention

With PARDI, we get a refined and systemic representation of actors logics and their consequences on resource dynamics within the landscape. It emphasizes the need for better coordination between authorities so as to avoid perverse incentives; and makes explicit the link between deforestation and water quality, and consequently the unsustainability of current practices.

The multiscale historical profile deepens the understanding of the influence of events at regional and national levels on the landscape locally. It namely identifies the role of new laws and national re-distribution processes, on land and water management in the SES.

## 7. References

Aguilar et al. 2014. Análisis participativo de las dinámicas socio-ecológicas de la Cuenca Zapocó en Bolivia. [doi:10.1091/946](https://doi.org/10.1091/946). CMP 2007. Open Standards for the Practice of Conservation, version 2.0. Conservation Measures Partnership. Etienne et al. 2011. ARDI: a co-construction method for participatory modeling in natural resources management. Ecology and Society 16(1):44. Resilience Alliance, 2010. Assessing Resilience in Social-Ecological Systems : Workbook for Practitioners. Salinas, J.C., Vides, R., Justiniano, H., Valdes, A., Sanin, N., Cronenbold, R., Flores, J., Anivarro, R., Pacheco, N., 2013. Aplicación de los Estándares Abiertos para la Práctica de la Conservación en un Bosque Seco Tropical de Bolivia. Poster at IUFROLAT, 2013, San José de Costa Rica.