

Who counts resilience and whose resilience counts? Reflections on applying the Resilience Assessment Workbook along a contested Amazonian frontier

Quem avalia resiliência e qual resiliência vale? Reflexões sobre a aplicação do Manual de Avaliação da Resiliência em uma fronteira Amazônica contestada

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ABSTRACT

The Brazilian Amazon is a complex social-ecological system that includes diverse groups of social actors whose values, interests, land occupation trajectories, and power relations influence natural resource decision making and management. Effective management requires leaders equipped with approaches and tools to facilitate collaboration among such diverse social actors. This article presents lessons learned from a Specialization course in the state of Mato Grosso that aimed to build capacity among twenty leaders from universities, government agencies, the private sector, and social movement organizations. Course participants applied the Resilience Assessment (RA) methodology to analyze three livelihood sub-systems within the municipality of Cotriguaçu. We describe the constructivist course pedagogy, insights from RA implementation, and reflections on the methodology's utility for collaborative social-ecological management. Our experience reveals the challenges of appropriately engaging local social actors in such analysis and the risks of conducting expert-led RAs in regions dominated by powerful elites, inequalities, and limited governance.

Keywords: Amazon. Brazil. Collaborative Management. Resilience. Stakeholder Engagement.

RESUMO

A Amazônia brasileira é um sistema socioecológico complexo que inclui diversos grupos de atores sociais cujos valores, interesses, trajetórias de ocupação do solo e relações de poder influenciam a tomada de decisão sobre a gestão dos recursos naturais. Uma gestão eficaz exige que os líderes estejam preparados com abordagens e ferramentas para facilitar a colaboração entre esses diversos atores sociais. Este artigo apresenta as lições aprendidas a partir de um curso de especialização no estado de Mato Grosso, que teve como objetivo capacitar 20 líderes de universidades, agências governamentais, setor privado e movimento social. Os participantes do curso aplicaram a metodologia de Avaliação de Resiliência (AR) para analisar os meios de vida de três grupos de atores dentro do município de Cotriguaçu. Nós descrevemos a pedagogia construtivista utilizada no curso, lições aprendidas na aplicação da AR, e reflexões sobre a utilidade da metodologia para gestão colaborativa socioecológica. Nossa experiência revela os desafios de engajar adequadamente os atores sociais locais em tais análises e os riscos de realização de ARs lideradas por especialistas em regiões dominadas por elites poderosas, desigualdades, e lacunas de governança.

Palavras-chave: Amazônia. Brasil. Manejo colaborativo. Resiliência. Engajamento de atores sociais.

INTRODUCTION

Amid growing global pressure to reduce deforestation rates, different social actors who occupy the agricultural frontier of the Brazilian Amazon face the common challenge of sustaining their livelihood systems. Market forces are imposing changes in production systems through global demands for sustainably-produced commodities, such as meat and soy (NEPSTAD *et al.*, 2009). The recent blacklisting of high deforestation municipalities and associated economic sanctions have given rise to the pursuit of “green municipalities” with new production and governance arrangements (BRITTO *et al.*, 2010; BRITO; BARRETO, 2011; GUIMARÃES *et al.*, 2013). Within this context, land occupation strategies, such as predatory colonization, land invasion, and environmental degradation are becoming more and more unfeasible. These rapidly changing social, economic, and ecological conditions intensify the need to negotiate trade-offs among stakeholder interests and to balance conservation and development goals toward productive and sustainable livelihood strategies (ROMERO *et al.*, 2012; HIRSH; BROSIUS, 2013).

Emerging Amazonian governance arrangements, such as public consultation processes, planning councils, participatory methods at different scales and ecological-economic zoning present opportunities for inclusive dialog and action at regional and local scales (ABERS, 2007; FLORISBELO; GUIJT, 2007; VIANA *et al.*, 2013, FOLHES *et al.*, 2015). Professionals who engage in these collaborative spaces may glean insights from adaptive co-management approaches, which are applauded for building shared understandings of problems, rules for management, and systems for feedback that allow for cross-scalar social learning (FOLKE *et al.*, 2002; OLSSON *et al.*, 2004; FROST *et al.*, 2006).

Unlike command-and-control approaches for resource management, adaptive management recognizes that the future is unknowable, non-linear, indeterminant, and complex (HOLLING *et al.*, 1996; GUNDERSON *et al.*, 2002; FOLKE *et al.*, 2002; BERKES *et al.*, 2006; BUSCHBACHER, 2014). Emphasis is placed on understanding system dynamics, identifying patterns of disturbance, thresholds and tipping points. From these insights, managers design adaptive experiments that integrate social, ecological, and economic dimensions to better prepare communities for anticipating future changes (FROST *et al.*, 2006; OLSSON *et al.*, 2004).

In contrast to conventional models of governance (also referred to as business as usual) which are characterized by command-and-control approaches, it is assumed that co-management practices strengthen local capacity, promote equitable decisions, and result in legitimate actions (PLUMMER; FITZGIBBON, 2004). Although participatory approaches to co-management may give the appearance of increased inclusion, without a commitment to learning with stakeholders they often fail to engage local actors in the co-production of knowledge, decision making and management plans (COOKE; KOTHARI, 2001; LEITCH *et al.*, 2015). The co-production of knowledge requires an appreciation for the diverse ways in which stakeholders frame problems and attempt to influence management outcomes based on their personal experiences, worldviews, knowledge, interests, and power (ARNOLD; BARTELS, 2014). Leaders are needed who are willing to commit to the frustrating and complex work of implementing the organizational and administrative processes necessary for adaptive co-management (WALTERS, 2007).

This article presents lessons learned from a specialization course that aimed to build capacity among diverse Amazonian leaders. It concludes this special issue of *Sustentabilidade em Debate* and is focused on synthesizing experiences and reflections of applying a resilience assessment tool to understand the Amazon frontier. It complements the first article in this dossiê (BUSCHBACHER *et al.*, 2016), which presents the context of the course, the methodology used for the resilience assessment, and how participants operationalized resilience concepts in dialog with diverse social actors representative of the agricultural frontier of the Amazon in the municipality of Cotriguaçu. The course curriculum combined studies related to resilience concepts and a tool for its application with collaboration skill building (ATHAYDE *et al.* 2013).

This article begins with a presentation of the course structure and innovative pedagogy, which was based on constructivist methodologies that emphasized group activities to promote social learning and deep reflection among participants. We then describe our experience applying the Resilience Assessment (RA) methodology (BUSCHBACHER *et al.*, 2016) and present the key challenges and innovations that emerged over the five steps of implementation. Finally, we present insights about the potential utility of the RA tool for resource management along the Amazon frontier.

Due to the constructivist pedagogy of the course and its modular structure, participants were afforded repeated opportunities to contribute to lesson planning, adapt the curriculum, and critique the RA methodology. At times, the participatory nature of the the course proved incompatible with the prescriptive methodology of the RA. Such contradictions raised questions about how processes of adaptive co-management can accommodate multiple worldviews and perspectives grounded in contrasting epistemologies. Furthermore, our experience implementing the RA cautions that expert-led analyses which fail to effectively engage local stakeholders are unlikely to situate assessments accurately in local contexts or to produce legitimate management strategies. Our work points to the challenges of effectively involving local actors in innovative processes of co-management and suggests a more explicit incorporation of the role of power relations in resilience analyses.

COURSE PEDAGOGY: A COLLABORATIVE APPROACH TO CONSTRUCTING AND NEGOTIATING CONSENSUS

The specialization course “Gestão Colaborativa de Sistemas Socioecológicos Complexos na Amazônia Brasileira” was an outcome of a previous short course held in Alta Floresta, Mato Grosso in 2009, which introduced participants to the participatory pedagogy of the Tropical Conservation and Development Program at the University of Florida (KAINER *et al.*, 2006; DUCHELLE *et al.*, 2009), as well as to collabo-



rative management, complex systems thinking and resilience (ATHAYDE *et al.*, 2013). The specialization course further developed these themes over four field-based modules and online meetings between modules (July 2010 to July 2012).¹

Course participants, who are the authors and co-authors of the articles in this Special Issue, were a mix of 20 academics and conservation professional leaders in the Amazon. Participant selection targeted a diversity of disciplinary, institutional, and epistemological perspectives. For academic participants², the ultimate goal of the course was to incorporate the conceptual and pedagogical approaches into their own teaching and research; and for the professional participants³, to incorporate the concepts and tools into their work influencing regional conservation and development. Four participants were long-term residents of Cotriguaçu, and another eight worked or conducted research in that municipality. The intentional selection of diverse participants positively influenced the discussions and results of the course. Although confronting and integrating these perspectives was challenging, it enriched the analysis of the regional social-ecological system (ATHAYDE *et al.*, 2013), and created a space for exploring collaborative approaches.

Creating a safe space for appreciating divergent worldviews was facilitated by the critical pedagogy of the course based on Paulo Freire (1967, 1985), a teaching philosophy that embraces multiple ways of knowing and seeing the world, emphasizing the co-construction of understanding as it relates to personal experience. Freirean methods were complimented with the approach from adult learning theory of Kolb (1984). Course activities were designed using Kolb's Experiential Learning Cycle that builds on what is known, harnesses expertise within the group, and creates spaces for listening, deep reflection and dialog. Each module engaged participants in group-based exercises, games, role plays and collective reflection. Course coordinators encouraged participants to take ownership of the learning process, to actively plan modules through online meetings, and to share leadership of course activities. Capacity building in collaboration skills was based on curricula drawn from the Florida Natural Resources Leadership Institute (NRLI)⁴. NRLI creates a learning environment through field visits and opportunities in which participants hear perspectives directly from diverse local actors. These shared experiences and collective reflections result in a deep appreciation of how different stakeholder groups build alliances across networks and use other resources to mobilize support, frame issues, negotiate positions, and shape natural resource decision making. Tools and approaches include assessments of stakeholder interests and positions, analyses of conflict, and strategies for facilitating diverse groups.

The specialization course used the RA methodology adapted by participants (BUSCHBACHER *et al.*, 2016) from the practitioner workbook produced by the the Resilience Alliance (2007). To further enrich understandings and develop the RA, participants also interacted with a sample of social actors who represented three sub-systems of Cotriguaçu: a) family farmers (settlers and peasant farmers); b) Landowners of medium and large properties (timber sector and ranchers); (BERNASCONI *et al.*, 2016, this volume) and c) indigenous peoples (Rikbaktsa ethnic group, see ALMEIDA *et al.*, 2016, this volume). Participants were divided into teams to evaluate the three subsystems. Interactions included interviews on farms and sawmills, settlements and indigenous communities. Participants also met with key informants from municipal government institutions who serve the three social groups. These data and information were complemented by course participants' backgrounds and experiences as well as their familiarity with land occupation patterns, development trajectories, and governance strategies (including public policies and government activities) in the Amazon. Each team used the RA as a starting point and adapted it based on their perspectives and the specific context of the social groups. The three teams met during the last step of the RA to assess Cotriguaçu as a whole system.

The data used for this article come from the other articles in this special issue, as well as reports and discussions with the group of participants during the four modules, field data, and online meetings.

RESULTS: CHALLENGES AND LESSONS LEARNED APPLYING THE RESILIENCE ASSESSMENT

This section presents the experiences and challenges that the course's three participant teams confronted during each step of the RA. Despite difficulties and conflicts, the experience created opportunities for transformational learning and for broader reflection on the implications of operationalizing resilience from a social science perspective.

STEP 1: DEFINING THE SYSTEM

a) Defining the key issue

The RA begins with the definition of a "key issue," and although the Workbook methodology implies that key issues are readily viewed and that it is possible to define a key issue, our experience indicates this is far more contested than anticipated. Armed with examples from the workbook and following a review of the resilience literature, the course instructors proposed a focus on "the maintenance of ecological landscapes with reduced deforestation and protected biodiversity". However, the fieldwork with social actors revealed a diversity of concerns, few of which were ecological. Even within social groups, the heterogeneity of opinions and ways of life became evident. Due to the pedagogy of the course, which emphasized listening, reflection and dialog, the participants were encouraged to recognize and appreciate the different perspectives across social actors. Therefore, participants objected to conducting a resilience analysis based on ecosystem services and natural resources. Instead, they pushed for the inclusion of social perspectives.

The high level of participation in the course increased the time needed to apply the RA, and it also revealed weaknesses of the methodology. The diversity of perspectives that course participants heard from stakeholder groups reveals the danger of adopting an expert-led RA and the risk of outcomes being dominated by the concerns and agendas of specialists. In contrast to what scholars in the fields of environmental conservation might anticipate, our results illustrate that from the perspective of local communities, ecological questions may not be priorities.

After much negotiation, the group agreed on a key issue, defined for the purposes of the RA exercise as: How to maintain the ecological, economic and social sustainability of the livelihood systems of each major group of social actors in Cotriguaçu? Arriving at this consensus was a struggle despite indications in the RA workbook that defining the key issue is easily accomplished and entails smooth progressions to subsequent steps.

b) System Boundaries and Focal Scale

The focal spatial scale for this study was defined as the municipal level because recent policy changes have decentralized considerable authority and responsibility for environmental management to municipal governments (GUIMARÃES *et al.*, 2013; VIANA *et al.*, 2013). The process of defining the focal scale for our resilience assessment revealed many tensions that do not receive much attention in the RA workbook. In retrospect, we questioned if bounding at this scale was appropriate, considering the characteristics of the sub-sectors and the impacts of external drivers. For example, the Rikbaktsa peoples' current and ancestral territories reach far beyond Cotriguaçu borders (ALMEIDA *et al.*, 2016). In addition, this group has limited interactions with other social groups at the municipal scale and government services are provided primarily through a national institution (Fundação Nacional do Índio - FUNAI). Similarly, many of the colonist settlements of family farmers are located closer to the municipality of Colniza just west of Cotriguaçu and are also supported by a national institution for agrarian reform (Instituto Nacional de Colonização e Reforma Agrária-INCRA).

As we progressed through the RA, our selection of the same scale for all three sub-systems seemed to make less and less sense, especially when we began considering management interventions. The three sub-systems appear to function relatively independently, affected by socioeconomic factors and governance at higher scales (e.g. regional, federal, and even global, as in the case of the impact of the



exchange rate on the price of soy BERNASCONI *et al.*, 2016; ALMEIDA *et al.*, 2016). These differences became especially relevant when we began discussing hypothetical co-management actions. In particular, during the scenarios activity in step five, teams had difficulty integrating the three analyses into a singular evaluation of resilience at the municipal scale.

Questions also emerged about how to divide the social actors into groups. Participants questioned the categorizations of rural producers according to property size, suggesting that they be divided, instead, according to herd size. Participants also debated whether the medium and large landowners should be combined into one category, maintaining that the heterogeneity within this group would render generalizations inaccurate. In the case of the Rikbaktsa people, the situation was even more complex. According to Arruda (1992, 1996), the Rikbaktsa self-designation encompasses different clans, generational and habitation groups, as well as internal divisions. It thus includes a multiplicity of groups which, in the past, were politically autonomous and eventually could establish either friendly alliances, or conflictive relationships.

The RA approach of choosing one focal scale and categorizing sub-systems led to discomfort and tension within the group. Our experience illustrates that the act of categorizing people and livelihoods may fail to capture the nuances and heterogeneity within these social groups. Such choices appeared arbitrary to course participants. In a real management situation, who defines these categories? Within these categories, how are the key issues defined for socio-ecological sustainability? And what are the practical consequences of these choices for the management of natural resources?

Reaching consensus among diverse groups of stakeholders about the most appropriate boundaries of the focal system may prove highly problematic. Although aspects related to diversity within sub-systems are referred to in the RA workbook (looking at different categories of user groups), we contend that grappling with these issues in practice is complicated, and thus a re-examination is needed of how resilience-oriented research incorporates multiple stakeholder groups.

STEP 2: HISTORY

a) Timelines and learning from stakeholders

Following these definitional steps, analyses began with the creation of timelines describing the history of each social group since its arrival in Cotriguaçu. The adaptive cycle (GUNDERSON; HOLLING, 2002) was used as a heuristic and organizing concept to highlight key moments at which the system underwent major changes (conceived as collapses and reorganizations). In addition to documenting changes in the social-ecological system over time, this step of the assessment was important for understanding how local stakeholders were affected by and responded to disturbances. In contrast to the RA workbook (RESLIENCE ALLIANCE 2007), these historical timelines were developed before identifying system attributes because beginning with the latter discussion was too abstract. Furthermore, changing the steps in the RA methodology was driven by the philosophy of the course that sought to identify attributes which emerged from history and stakeholder stories rather than expert knowledge, biases or worldviews. The historical analysis helped define the key attributes that characterize the system (step 3) and the desirable future regimes for the scenarios exercise (step 4).

Interactions with stakeholders and the process of studying the history of social groups was an important entry point for understanding local interests, challenges, values and perspectives. Despite interactions with local stakeholders, the team who interviewed indigenous peoples (ALMEIDA *et al.*, 2016) experienced difficulties building a historical account that could express the Rikbaktsa's own concepts of time, space and territoriality (ARRUDA, 1996). The history of the Rikbaksta peoples reaches much further back than colonization and the formation of the municipality. Historically important events to the Rikbaksta are linked with times during which their people lost previously-occupied lands and suffered significant losses and oppression, thus painful and sensitive to recall. Course participants cautioned that the representation of historical facts in a linear fashion fails to provide an adequate lens of the significance of these moments in marking time. In response to the generative question "when does history start?" we learned that in the case of the Rikbaktsa, history begins in mythical or immemorial times, which cannot be counted in occidental numbers, days, weeks, months and years.

Crossing the line between western science and societal or indigenous knowledge might be much more difficult than thought, with political, epistemological and disciplinary boundaries to be transgressed (SANTOS, 2009). Instead of representing history in a linear fashion, the team illustrated the past in the form of a spiral, which was a creative alternative to the western conceptualization of time as a simple linear progression of events (ALMEIDA *et al.*, 2016). This team catalyzed in-depth discussions and reflections among course participants raising awareness across the group about the dangers of certain groups speaking on behalf of others or attempting to represent their reality. Following heated discussions, it became clear that in addition to the spatial boundaries of the system, temporal frontiers are also delicate to define using participatory processes. The different ways in which stakeholder groups conceive of time, space and boundaries has implications for how problems are framed as well as for how potential solutions or management interventions are pursued and applied.

b) Drivers and Cross-scale Interactions

The historical analysis led to the identification of key internal and external factors that caused system change (drivers), and revealed the interactions between the focal system and other hierarchical scales in which it is embedded. Course participants discussed potential drivers of future change during the scenarios activity. These discussions were complemented by discussions with stakeholders about their concerns and expectations for the future (step 4). A general observation that was consistent across all the social groups was that the main drivers of change in the focal system of Cotriguaçu came from a higher scale. For example, the collapse of the cooperative was due to a shift in macroeconomic policies and the collapse of the timber industry was due to police actions that responded to Amazon-wide deforestation levels and international pressures. In addition, the colonization of Cotriguaçu (reflected in its very name) has origins in displacement from Paraná (southern Brazil) due to expansion of soybean cultivation there and the development of Iguazu hydrodam. Major perturbations affecting the Rikbaktsa people always came from outside their system and reflected broader national and global processes: arrival of the Jesuits and catechization (associated with national colonization), conflicts with rubber tappers (part of global markets), the recent colonization and expansion of agroindustry, and the current national plan for massive expansion of hydroelectricity generation. (BUSCHBACHER *et al.*, 2016).

STEP 3: RESILIENCE OF WHAT TO WHAT?

a) Attributes and Variables

Attributes are key characteristics that could either describe a desirable state for the system or serve as indicators, were the level of the attributes to change, of an alteration to an undesirable system state. Our key issue revolved around maintaining each social group and its livelihood strategy. Therefore, attributes were intricately linked to questions of identity which emerged as principle indicators of persistence of these stakeholder groups. Defining attributes turned out to be one of the most critical steps in the resilience assessment because they consolidate goals and key issues, giving meaning to the question of “resilience of what to what?” The RA methodology does not present detailed methods for how to conduct this step and our group spent over half of the course wrestling with this task.

The process that the medium and large landowner team used to develop attributes illustrates the ease with which experts might characterize environmental attributes of a system. During the first module of the course, the team created quantitative measures to assess forest cover, degree of connectivity, and water quality. However, upon engagement with community stakeholders, these attributes seemed disconnected from how local actors characterized their system, especially in terms of what they conceived as important. Stakeholder interviews revealed the importance of economics and law enforcement. For example, respondents described their disenfranchisement following criminalization via the state for deforestation and associated demonization they suffered in the media. For this stakeholder group, their public profile emerged as an important aspect of identity that characterizes their livelihood system.

The team that evaluated family farming systems struggled to identify attributes because they realized that selection would be driven by their worldviews. Olival (2012, 2016) contrasts family farmers along



a spectrum from subsistence peasants to “fazendeirinhos” (small ranchers), according to their degree of market engagement and use of labour, drawing on neo-Marxist theory. Team participants are rural development experts, familiar with scholarly literature and engaged in providing agricultural assistance to smallholder farming communities through government agencies or NGOs. The resulting attributes reflect their cumulative and nuanced understandings of family farming along the Amazonian frontier. The characterization of attributes has implications for the resilience assessment because they direct the selection of management interventions. The attributes define what should be maintained in the system. The conflict of attribute selection can amplify when setting management goals and designing management plans.

During the definition of attributes, the indigenous team once again contributed to the RA process through various constructive criticisms that helped other participants and the course instructors reflect on their assumptions. The team was uncomfortable having to “represent” the Rikbaktsa in course discussions, documents or other products due to their concern about exposing local communities without adequate legitimacy. In general, interactions between the team and the Rikbaktsa were open-ended and unstructured, allowing themes, problems and issues to emerge from conversations (ALMEIDA *et al.*, 2016). The definition of attributes for the Rikbaktsa was viewed as a questionable task, one that could not be achieved during the limited time for fieldwork, which comprised of brief interactions with few indigenous representatives, mostly men. The team resisted offering quick responses to complete the RA according to course deadlines. Instead, they invested their time interacting more closely with representative Rikbaktsa residents from the Terra Indígena Escondido, offering their analysis only during the final course module.

Considering the challenges of representation and legitimacy, it becomes essential to reflect on who counts resilience and whose resilience counts? Course participants deeply contemplated the quality of the attributes and the potential consequences of erroneous or arbitrary definition. Powerful discussions ensued about how one could reach consensus or ensure stakeholder representation in community discussions about attributes. Once again, at this step of the RA, we notice the potential introduction of expert bias during the selection of attributes, and highlight the need for processes for validating attributes through stakeholder engagement. We observe, however, that in the RA methodology, little attention is given to the way in which attributes are chosen.

STEP 4: SCENARIOS

Scenarios are forward looking tools to generate hypotheses about how systems might change in the future (BIGGS *et al.*, 2007). We developed scenarios through facilitated exercises during the last two modules of the course. The analysis of the initial scenarios were done separately for each of the three groups, but in the last step (step 5b) the scenarios were constructed considering the interactions among groups.

The interactive scenarios exercise was a rich experience. The process of looking forward helped to look back and then to reflect on potential risks to the current state. Although participants did not define thresholds or assess resilience as defined in the Resilience Alliance (2007) workbook, the group examined possible different futures using such concepts as background. We found scenarios to be an effective tool to examine the dynamics of the system and to identify current threats. However, participants struggled to come up with radically different futures that were “out-of-the-box.” In general, results were pedestrian, extrapolating current trends without huge innovations. Such results indicate the difficulty of anticipating surprises and may also reflect the linear approach inherent in previous steps. Nevertheless, scenarios present a valuable tool for fostering participation and reflection within a resilience assessment and provide a platform for beginning to think about system management.

STEP 5: MANAGEMENT AND INTEGRATION CONSIDERATIONS

The final step of the scenario exercise was used to catalyze reflection and discussion among group members about how findings could be used to promote desirable scenarios. During this step, interactions were encouraged between the teams, to understand how the different social groups connected with each other. Specifically, discussions assessed how the desirable scenario of one social group would affect others. Each team was encouraged to either a) modify its desirable scenario in order to promote more positive connections with the other social group or b) opt for conflict and competition, elevating the interests of their group above others. Based on the awareness of possible future regimes from the scenario analysis, and taking into consideration the possible negative or positive connections with other social groups, it was possible to indicate steps to prepare for multiple possible futures and to identify strategies for affecting change.

Two main findings emerged from the scenarios exercise. The first was that most of the propositions were directed to increase resilience based on local actions such as social organization. This strategy appeared in all social groups in response to the main threatening system drivers, which included limited access to credit and problematic land distribution policies. It was during this moment of the course that participants were able to discuss the difficulty of implementing local level management in an Amazon frontier region. With weak local governance, capacity to counteract national and global drivers (such as commodity demand and hydropower investments) in addition to dealing with risks and uncertainties is limited.

The second main finding came when contrasting the scenarios of the three different groups, which indicated competing interests and no likely win-win solution. For example, indigenous peoples were concerned for their territory but this land was deemed by participants in the medium and large landholder group as “unproductive” and wasteful of resources, creating little value for the municipality. From the perspectives of this stakeholder group, an ideal scenario would be to abolish the indigenous reserve. In considering whether maintenance of the current system is desirable, one must ask: for whom? The exercise showed that conflicts over land, weak social organization, and uneven participation in decision-making limit the opportunity for using the RA as a tool for equitable municipal governance. Along frontier locations, such as this, where land and rights are contested, the implementation of an RA could easily fall into the hands of elites with vested interests in constructing their desirable future for the municipality.

DISCUSSION: THE UTILITY OF RESILIENCE CONCEPTS AND THE RA METHODOLOGY

In this section, we reflect on key insights from our experience in the course and implications of applying the RA methodology for management in areas of intense conflict over use of land and natural resources, characteristic of the agricultural frontier of the Amazon.

Course participants produced RA results that contributed to our understanding of the socioecological complexity of this frontier region (BUSCHBACHER *et al.*, 2016). Resilience concepts, the RA methodology, and a systematic analysis of past and future states stimulated learning about how social-ecological systems change. The adaptive cycles and historical timelines were useful tools for revealing the role of history in shaping possible future scenarios, as well as the trade-offs among diverse social groups. Participants considered the importance of scales and defining boundaries of systems. Debates around key attributes provided unique, valuable and unexpected perspectives. Indeed, the RA provided a rich platform for dialog and learning among course participants and instructors. Discussions catalyzed recognition and appreciation of the difficulties associated with overcoming competing issues among stakeholder groups, the importance of feedbacks across scales in the social-ecological system, and how the decisions of one group of stakeholders affects others.

Due to the participatory and constructivist pedagogy of the course, participants extensively debated and innovated within the RA process. They were exposed to the frustrations and complexities of im-



plementing adaptive co-management. Our experience in a classroom or practice setting demonstrated difficulties that might be confronted if attempting to use the tool in an actual management case with stakeholders. Our most valuable lessons are shaped by how the critical pedagogy of the course influenced an adaptive implementation of the RA.

DIVERSE EPISTEMOLOGIES AND THE CHALLENGE OF INTEGRATING CONFLICTING VISIONS.

Although the teams each presented analyses of resilience for the subsystems, the intense discussions that were fostered through the course's participatory co-constructivist approach revealed that none of our results were objective. A key insight emerged: the "correct" RA analysis does not exist. Moreover, the entire process is based on interpretation and manifests the biases of those engaged in the analysis. Values and worldviews are embedded in the choices of system boundaries, categorization of social actors, definition of attributes, and selection of desirable scenarios. Therefore, it becomes essential to recognize and articulate these biases and worldviews as well as to assess how they shape RA results. In our review of the Workbooks and publications of the Resilience Alliance group that present the RA methodology (BUSCHBACHER *et al.*, 2016), we did not encounter assessments of how divergent epistemologies might impact results, or the potential dangers that a lack of awareness about underlying biases might have on management choices that could favor certain stakeholder groups above others.

1a. Integrating expert/outsider and local stakeholder perspectives

"Who defines what states or thresholds are desirable and for whom"
(COTE; NIGHTINGALE, 2012 p.483)

The RA Workbook suggests that resilience assessments can be implemented in three days (RESILIENCE ALLIANCE 2007). However, course discussions revealed reflections about the dangers of rapid assessments that produce superficial results with minimal input from local communities. Many participants cautioned that the course products represented simplified analyses through the lens of specialists. Our experience points to the risks of external experts imposing issues on communities that fail to reflect their priorities or concerns.

Bene *et al.* (2011) recognize the importance of interactions among specialists and local actors to construct trust for more deliberative processes. In situations where knowledge is contested, this raises questions of legitimacy and researcher positionality (VOGEL *et al.*, 2007). We are in agreement with Larson *et al.* (2011), who warn that attention must be devoted toward how legitimate visions of resilience are generated and especially to the role of stakeholder agency. Developing methods for iterative engagement and feedback could strengthen resilience assessments and transform them into community-driven processes in which social groups are not objects under study, but the proponents of such analyses.

We identify a need for more explicit discussion in the RA about how data is collected and how results are validated and used. The Workbook could benefit from profound consideration of the importance of stakeholder engagement processes that allow inclusive representation of different perspectives and priorities. Considering that knowledge is contextualized by different worldviews, culture and social differentiation, the Workbook could add a discussion about how different epistemologies might be accommodated. The addition of a "preparatory phase" prior to the RA would be a valuable addition to determine who should be involved in such analyses and how conflicts might be managed to develop trust and ownership of results. Course participants experienced the value of presenting results to the local community through a series of interactive events. We suggest the addition of methodologies for a "dissemination phase" with systematic efforts to collaboratively interpret and validate results.

1b. Connecting social and ecological systems

Course participants offered various ideas to adapt the RA. They criticized the emphasis on ecological services and natural resources above social aspects in the literature and in examples presented in the

RA Workbook (GUNDERSON; HOLLING, 2002; ANDERIES *et al.*, 2006, WALTERS, 2007; CINNER *et al.*, 2009; WALKER *et al.*, 2009). Based on interactions with local stakeholders, teams chose to use a series of social frameworks to analyse the Cotriguaçu system. They focussed analyses on social organization and concepts of territoriality, values and identity, etc. These analyses demonstrate actor-oriented frameworks that deepen understandings of disturbance and change as illustrated in vulnerability studies (LARSON *et al.*, 2011), perspectives from political ecology and social anthropology (FABINYI *et al.* 2014), as well as integrative or hybrid social theories (STONE-JOVICICH, 2015).

Our experience hints at the epistemological diversity underpinning scholarships in resilience, vulnerability, conservation and development. Proponents of epistemological pluralism (MILLER *et al.*, 2008) argue that more complex understandings of situations can be reached if multiple disciplines, insights, knowledges and epistemologies are integrated. We learned that initiatives that aim to integrate socioecological perspectives require flexible processes that permit an examination of multiple perspectives and strategies for reconciling differences. The course's critical pedagogy created a deliberative space to reveal, recognize and address emerging tensions during the RA exercise. Activities, such as games and role plays, explored the diversity of worldviews that underpin different visions for conservation, development and a sustainable Amazonian future. We conclude that the RA workbook could benefit from incorporating methods that allow for such reflections and raise awareness about inherent epistemological biases and pre-conceived assumptions that are inherent in all people.

APPLYING THE RESULTS TO DECISION-MAKING AND MANAGEMENT PROCESSES

The RA as conceived in the Resilience Alliance Workbook is a series of steps that culminate in management interventions. However, in our opinion, waiting until the final step of the analysis to consider management and governance is too late. Course participants did not apply the RA in a real management situation, but used the exercise to learn about the socioecological system of Cotriguaçu and to understand the methodology of assessing resilience. Over two years, the course created a safe space for participants to hold conflicting positions and express views like "I think the timber industry should be eliminated" or "I think the Rikbaksta group should give up some of their territory to the state or rural producers." However, despite extensive dialog and reflection, it was difficult to reach agreement on key issues, attributes, and trade-offs during the scenarios activity.

In a management context, a consensus building processes would be needed in addition to a careful selection of stakeholders able to represent the concerns of their communities. We did not find strategies in the RA Workbook of how to facilitate a consensus building process. It may be unrealistic to define one key issue for such diverse stakeholders, especially when the results of such assessment could potentially impact livelihood strategies. Our experience also illustrates how decisions made early in the process about system boundaries and key issues can have cascading repercussions that might be difficult to reconcile.

Larson *et al.* (2011) describe how elites use their money, alliances and political shrewdness to mobilize resources and reconstruct patterns of resilience and vulnerability. By reinforcing existing power structures (their own), they further marginalize those members of society who are already excluded. Similarly, Cote and Nightingale (2012) note that political governance networks can be hierarchical and exclusionary, and therefore, analyses need to assess processes and relationships that support particular institutions and the role of power and culture in adaptive capacity. A greater discussion of this sociopolitical process, central to resilience building, is needed to avoid elite capture and dominance (BENE *et al.*, 2011). We discovered that insufficient attention is dedicated in the RA workbook to issues of power. We caution that resilience assessments used as tools for management along the Amazonian frontier may be co-opted by powerful groups. Without special attention to society's marginalized groups and issues of inequality, the implementation of an RA can maintain the status quo of the most powerful groups. No indication is given by the RA workbook for how to navigate the diversity among stakeholders who use their power to manipulate social networks and influence how governance processes develop and which management practices are chosen. Little guidance is offered of how to select participants in a management process or how different worldviews would be incorporated into plans.



We believe that mediating a management process among the stakeholder groups in Cotriguaçu would be complicated. Social groups have different historical trajectories that shape their visions, and interests which are not easily reconciled. The results of the scenario activity show that an imagined future which appears more advantageous for one social group, may have disastrous impacts on others. Although the RA can contribute to holistic understandings of systems, revealing diversity among stakeholders, it is unclear how the results of such an analysis and their application can be translated into management proposals that benefit subsystems and the municipality as a whole equally. Trade-offs are part of this process and perhaps the major lessons learned applying the RA methodology in a course were identifying the limitations, contradictions, losses and gains in management processes of Amazonian socio-ecological systems.

CONCLUSIONS

*“... the key is to enable them (the poor and disempowered groups) to express their reality, to put that reality first, and to make it count.”
(CHAMBERS, 1995, p.204).*

In the mid 90s, Robert Chambers, a British development scholar, argued that those in power (including development professionals) conceptualize problems and solutions in ways that fail to represent the realities of the poor and disempowered groups. The discourse and practice of poverty assessments are dominated by the inherent advantage, privilege, and systematic biases of those professionals responsible for acquiring and systematizing knowledge. As a result, many central issues in development are overlooked. Chambers proposed participatory methods to reverse status and focus on interacting with, learning from, and knowing the poor and disempowered (CHAMBERS, 1995, 1997). Instead of relying on top-down, reductionist objectives, professionals are called to reassess their roles and institutional paradigms in response to a key question “whose reality counts?”

This article offers reflections on the utility of the RA methodology to address governance, conservation and development along a contested frontier of the Brazilian Amazon. From the Resilience Alliance Workbook, we are left with the impression that conducting a resilience assessment is a neutral process that moves through sequential steps and progresses smoothly to a result that can be straightforwardly incorporated into management strategies. However, this neutral characterization depoliticizes the tool. We identify an urgent need to understand how multiple perspectives and agendas are considered and weighed within such analyses. We suggest that a discussion about decision making processes and facilitation guidelines be built into the Workbook.

In our case, the process of conducting and discussing the resilience assessment proved far richer than the results. Although methods for building dialog among social groups are lacking in the Workbook, these were introduced through the course’s constructivist pedagogy and its focus on skill building for collaboration. The contrasting epistemological roots between the course pedagogy and the RA methodology resulted in moments of frustration and tension among participants and instructors. However, the process was strengthening, allowing for shared recognition and thoughtful consideration of the challenges associated with identifying, appreciating and integrating worldviews. The course participants are now more prepared to recognize and prepare for the messiness inherent in adaptive co-management processes.

Due to our innovative and deliberative course pedagogy, we were able to adapt the RA, making it slightly less prescriptive, more focussed on human agency and relevant to course participants. The result was transformational learning. Our experience illustrates that holding too firmly to one particular conceptual framework can limit our ability to accommodate multiple worldviews. Although the diversity within our group, with its mix of scholars, practitioners and local residents gave rise to many tensions and disagreements, we found that when used in thoughtful and flexible ways, a resilience assessment can facilitate systems thinking and allow participants to critically bridge worldviews and epistemological divides.

NOTES

¹ BUSCHBACHER et al., (2016) describes the regional context and methodology of the RA.. ATHAYDE et al., (2013) compare the short course with the longer specialization course and offers details about the theories and methods used to integrate knowledge systems and gaps between academia and society.

² Professors and graduate students from the Universidade do Estado do Mato Grosso (UNEMAT), Universidade Federal de Rondônia (UNIR), Tropical Conservation and Development Program at the University of Florida and the Pontifícia Universidade Católica de São Paulo (PUC-SP)

³ Funcionários do órgãos públicas (Secretaria de Estado de Meio Ambiente do Mato Grosso (SEMA) e do município de Cotriguaçu), e de organizações não governamentais regionais como Instituto Centro Vida (ICV), Instituto Ouro Verde (IOV) e Operação Amazônia Nativa (OPAN).

⁴ <http://nrli.ifas.ufl.edu/>.

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