WORKSHOP REPORT

Tools and Strategies for Conservation and Development in the Amazon

Lessons Learned and Future Pathways

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Presentation

Over the past 3 decades, there have been important advances in addressing key drivers of Amazon deforestation. Natural areas have been set aside for protection, and rights to land and resources devolved to local communities. Technologically, powerful new tools monitor land use and land cover change in real time at multiple scales, as well as model and predict ongoing and future change. Cell phones and social media enable Amazonian people to mobilize and share stories of threats and accomplishments with global stakeholders.

Yet the underlying dynamic of Amazon frontier expansion and natural resource degradation continues. Despite several years of declining deforestation rates, progress has been uneven across countries and between years. And ambitious infrastructure projects are driven by economic and political forces that undermine conservation and development advances.

This sobering juxtaposition calls into question the current paradigm of conservation and sustainable development in the Amazon, and motivated the University of Florida's Tropical Conservation and Development program (TCD), in collaboration with the Gordon and Betty Moore Foundation, to convene a distinguished group of researchers and practitioners with deep knowledge of and experience in the Amazon. The workshop on **Tools and Strategies for Conservation and Development in the Amazon: Lessons Learned and Future Pathways** took place in Gainesville, Florida on October 3-5, 2017. In a collective learning process of reflection and dialogue, this group analyzed lessons learned from a wide range of experiences and contexts in order to assess current tools and strategies for addressing Amazonian deforestation and degradation, and to chart promising ways forward for collaborative efforts to address these persistent challenges.

This report seeks to capture key insights from the workshop, and to contribute to an ongoing learning and action agenda. Following presentation of the workshop approach and methodology, we summarize the experiences and analyses that were presented by the workshop participants, and then review key findings, recommendations and possible approaches for moving forward.

We thank our facilitator, Charo Lanao, for helping us to create the learning space for this dialogue; the Gordon and Betty Moore Foundation for making the workshop possible; and the many colleagues and programs at the University of Florida who have supported this effort. We especially thank all of the UF graduate students who participated in the workshop and played a key role in summarizing workshop presentations and discussions, and all of the participants who so generously shared their time and ideas to make this event a success.

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Gainesville, Florida
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Executive Summary

The workshop on **Tools and Strategies for Conservation and Development in the Amazon: Lessons Learned and Future Pathways** was held in Gainesville, Florida on October 3-5, 2017. Sixty-five invited participants from 49 governmental, non-governmental, academic, research and funding organizations joined 28 University of Florida faculty and 19 graduate students. Participants hailed from Brazil, Peru, Ecuador, Bolivia and Colombia. The workshop was a key moment in an ongoing process to learn from experience and promote new directions for conservation strategies.

Prior to the workshop, 12 working groups of participants reviewed the current use and development of conservation tools and strategies, under the broad topic of **Knowledge and Negotiation Strategies for Environmental Governance in the Amazon.** Nine working groups assessed how *knowledge and learning* tools and strategies are currently being applied, and looked at gaps and opportunities for future applications. Three groups developed case studies of *negotiations for governance* that aim for more inclusive and effective management of negative environmental impacts while supporting diversified local economies and conservation mosaics.

It was clear from all of the negotiating governance case studies that the primary determinants of decision-making are not technical criteria but rather the interests of powerful organizations that stand to benefit from intensive use and industrialization of Amazonian ecosystems. The impacted populations, as well as environmental agencies, NGOs, and universities, can potentially serve as a counterpoint to these powerful actors.

An effective conservation strategy must therefore take into account both information and knowledge as key inputs, and power dynamics as a key determinant, while integrating social actors across scales in decision-making that affects conservation outcomes. The Workshop produced actionable recommendations in the areas of **knowledge management, empowerment of local actors to influence infrastructure planning and territorial management, negotiation strategies to address unequal power relations, and learning and adaptation.**

Knowledge management: There was a common understanding among workshop participants that knowledge and information are important inputs to governance, but that scientific results have not been as effectively communicated as they need to be in order to generate appropriate decision-making outcomes. The following opportunities for improvement in the relevance and applicability of scientific information were identified:

Incorporate stakeholders in knowledge generation and application through citizen science and participatory action research.

Use data from new biophysical monitoring tools to promote transparency and make decision-makers more accountable.

Develop new tools to address gaps in monitoring and transparency of government planning, decision-making, budgets, licensing and law enforcement.

Use a systemic approach to understand current and projected dynamics of Amazonian landscapes, including the interaction of drivers from multiple levels and cumulative and indirect impacts.

Empowerment of local actors to influence infrastructure planning and territorial management: A recurring theme that emerged from all of the negotiating governance case studies was the insufficiency of opportunities for participation by the affected stakeholders in planning processes. Especially conspicuous has been the absence of stakeholder participation in the initial stages of decision-making about infrastructure projects and economic policies that affect natural resource exploitation. Approaches to planning and governance such as scenario planning, citizen science, integration of indigenous and scientific knowledge, and collaborative networks can all empower stakeholders to share their knowledge, learn from each other, jointly make decisions on the basis of more information, and adapt their strategies based on initial outcomes. Specific recommendations:

Build social capital and empower local stakeholders to participate in decision-making through participatory processes for visioning and social learning. Link modeling, scenario building, and monitoring in ongoing, participatory, social learning processes that feed into planning and territorial management decisions.

Recognize the key role of indigenous people and local communities in Amazon conservation, and invest in territorial management and empowerment of indigenous people and local communities as land stewards.

Negotiation strategies to address unequal power relations: A key challenge is to identify political strategies for stakeholders, such as impacted populations, environmental agencies, NGOs, and universities, to engage hegemonic actors in order to negotiate better environmental governance. Promising approaches that were explored during the workshop include: a knowledge-based strategy of disseminating information on costs and benefits from development initiatives; communication strategies to build broader political and economic constituencies, especially in urban areas where the majority of citizens live; building capacity among less powerful stakeholders to afford them stronger terms of engagement in negotiations; legal strategies; and political mobilization. Specific recommendations:

Build civil society capacity to engage with legal systems. Engage public prosecutors, judges, and other legal authorities.

Bring together coalitions of networks, groups and institutions at different scales, including grassroots organizations and faith communities. Strengthen these coalitions through capacity-building and information.

Strengthen urban – rural connections to build political and economic constituencies that can pressure elected officials and corporations for conservation and development.

Learning and adaptation: Conservation advocates and change agents (NGOs, social movements, academia) need to continuously learn and adapt. Successful programs and strategies require flexibility and a long-term perspective.

Improve monitoring and evaluation as a tool to strengthen conservation and development initiatives through social learning and adaptation.

Promote policy experimentation and local action to develop and test innovative approaches. Adapt strategies continuously as contexts change and learning occurs.

At the conclusion of the workshop, **participants also formed six working groups for follow-up activities** on the topics of:

1. Macro-coordination to confront infrastructure threats to the Amazon;
2. Technological innovation to link monitoring with on-the-ground actions;
3. Strategies to empower indigenous peoples and traditional populations to participate in decision making;
4. Research to support action for change;
5. Responding to threats and opportunities from the Colombian peace process; and
6. Linking rural Amazonia to cities through communication.

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1. Rationale and Learning Process

Given the juxtaposition between accomplishments and persistent threats, we began with the premise that "more of the same" and continuous gradual refinement of our tools and strategies are not effectively addressing the Amazon's conservation and development challenges, and that there is a need for new ways of working, and new ways of working together. Specifically, while there is great potential to create sustainable local approaches to conservation and development, the driving forces that influence these systems come from larger scales. How can local communities be empowered to address these large-scale forces? Can we engage local populations to create a framework for continuous monitoring of the social, economic and environmental impacts of so-called development initiatives? How can we take a systemic approach to the Amazon as a multi-scalar social-ecological system, building connections and synergies between efforts at the local and macro scales?

To address this challenge, the workshop on **Tools and Strategies for Conservation and Development in the Amazon: Lessons Learned and Future Pathways** was organized as the centerpiece of a three-phase process that also includes pre- and post-workshop collaborative activities (Figure 1).

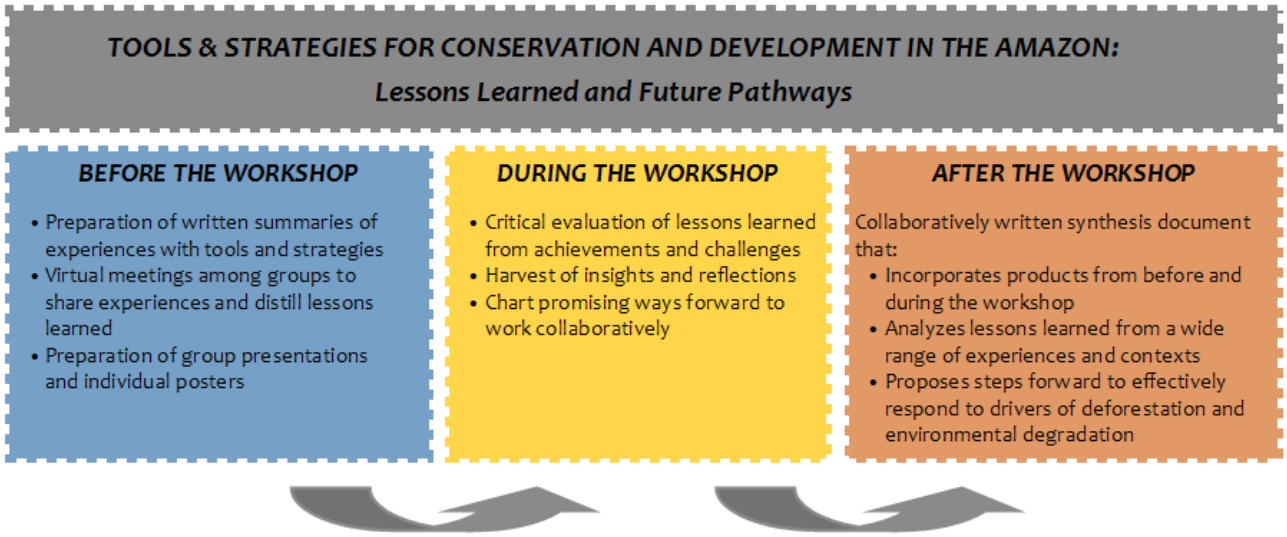

Figure 1. UF Amazon Workshop within a continuous learning process.

The process began by reviewing the ongoing use and development of conservation tools and strategies. Prior to the workshop, twelve working groups of participants met (virtually) to share experiences and synthesize lessons learned and opportunities for future work. The working groups were organized around specific conservation tools, strategies and case studies, under the broad topic of **Knowledge and Negotiation Strategies for Environmental Governance in the Amazon.** The twelve working groups were clustered around two questions: How can we use different kinds of knowledge as tools for governance? What kinds of negotiating strategies can we use to address the conflicting visions and underlying power imbalances among stakeholders?

The current context of conservation and development in the Amazon is such that great advances have been made in creating protected areas, but drivers such as infrastructure development and extractive activities threaten the integrity of regional landscapes in which those protected areas are embedded. In thinking about managing ecosystems and landscapes at a regional scale, governance offers a framework that can accommodate many tools and strategies for conservation and development. Environmental governance should involve intentional, collective action for sustainable management of natural resources. Structurally, governance involves participation by multiple stakeholders, who may operate on different scales and have complicated relationships. In terms of process, governance involves a cycle of activities, from convening stakeholders to planning of joint actions, implementation, monitoring, learning, and adaptation.

Governance requires knowledge as a key input. If knowledge is power, then sharing knowledge builds trust and permits collective action in order to yield outcomes that would not be possible without collaboration. There are numerous tools and strategies for knowledge management for effective governance, and nine of the twelve working groups focused on specific knowledge and learning tools and strategies. Knowledge management can be divided into the production of knowledge ("knowledge of") and dissemination and applications ("knowledge for"). Both deserve further investments for Amazon conservation: we do not know enough, and we need to make more effective use of what we know. How can knowledge management be improved to support governance to address current drivers of deforestation and yield better conservation and development outcomes in the Amazon?

Knowledge is necessary but not sufficient for governance. Power also plays a key role in deforestation in the Amazon, which makes various kinds of negotiation strategies important for conservation and development. Whether they involve multi-stakeholder policy negotiation, planning processes, legal contestation, or political resistance, negotiation strategies are also requisites for effective governance. Three of the twelve working groups focused on strategies for negotiating governance in the context of three deforestation drivers: hydroelectric dams in the Brazilian Amazon, alluvial gold mining in the Peruvian Amazon, and large-scale infrastructure in the western Amazon. How can new strategic approaches encourage more inclusive and effective governance to manage negative environmental impacts and support diversified local economies and conservation mosaics?

During the Workshop, each of the twelve working groups made oral presentations. The next section of this report summarizes key points from each presentation. Links are also provided to videos of each presentation. The participant list on page 44 provides institutional and contact information.

Oral presentations at the workshop were complemented by plenary and keynote lectures, discussion panels, and group discussions. Following the Workshop, the team of UF graduate students transcribed all of the notes, flip charts and index cards with participant contributions. The students then worked for several weeks to prepare a synthesis of the discussions and an analysis of key insights and recommendations. Their reports were presented to a group of UF faculty in multiple formats for discussion and review, and a preliminary version of this report was then circulated to a group of workshop participants who provided a final set of contributions. Section 3 of this report (page 18) summarizes main findings and includes recommendations for action points that would strengthen future conservation and development strategies.

At the end of the workshop, participants self-organized into groups that were interested in working together on key challenges and opportunities that emerged during the previous discussions. Section 4 (page 25) of the report provides a summary of follow-up actions and strategies suggested by these groups.

2. Summary of Workshop Presentations

2a. Workshop Opening and Plenary Lectures

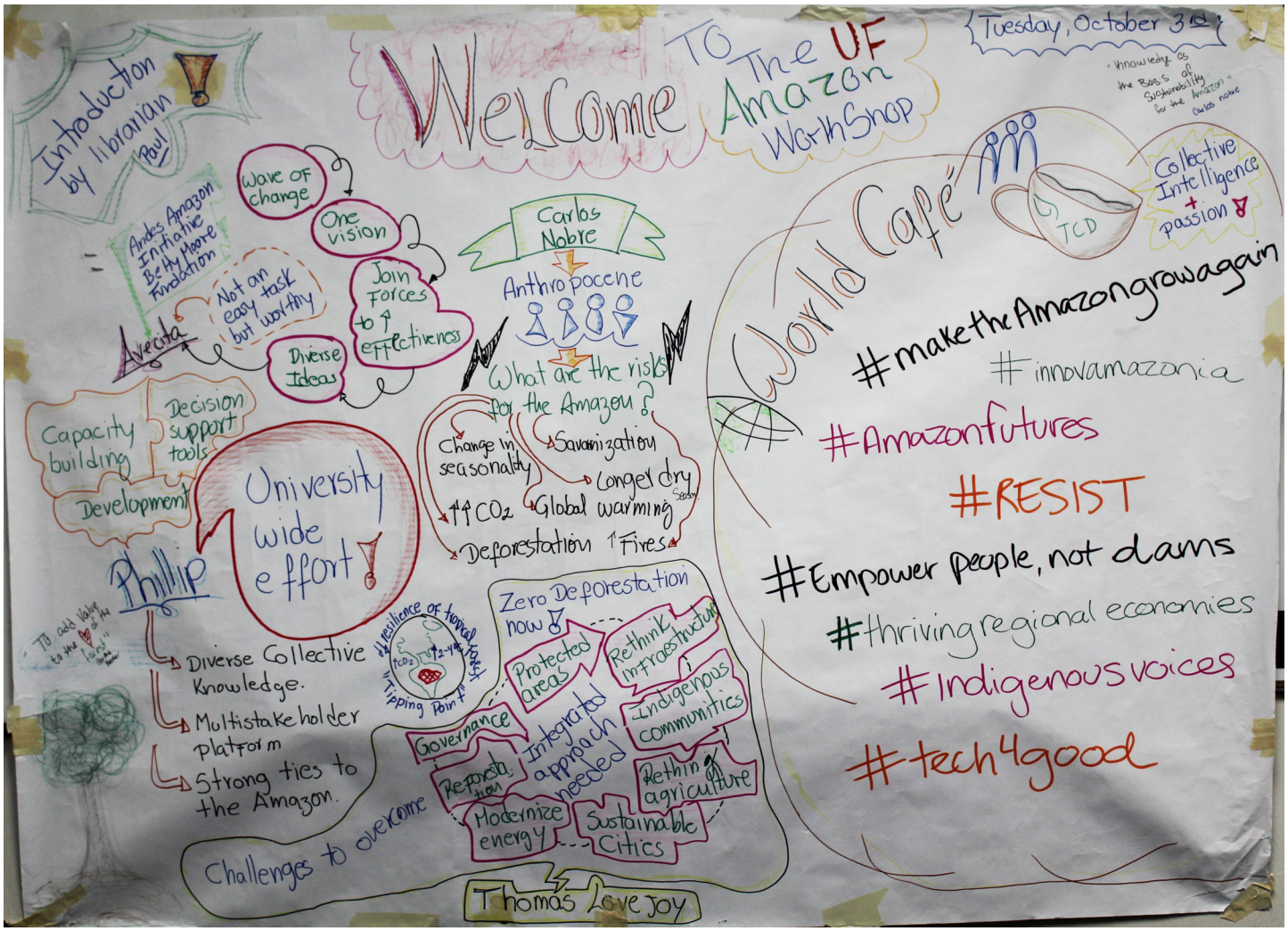

Figure 2. Graphic memory of workshop opening session

Carlos Nobre (National Institute of Science and Technology for Climate Change & World Resources Institute - Brazil) and Thomas Lovejoy (George Mason University & United Nations Foundation) provided plenary lectures to frame the workshop: what are the risks to the Amazon and what are some broad strategies to move forward?

Dr. Nobre's lecture on land use and climate change risks (pdf) (video) characterized the Amazon as a key regional component of the Earth system in terms of carbon, hydrology, biodiversity, climate, and cultural and ethnic diversity. A "Great Amazon Acceleration" began in the 1970s with expansion of roads, cattle herds, human population, deforestation -- but also indigenous territories and conservation areas.

Over the past fourteen years, the Amazon climate system has been oscillating: three years of record-breaking droughts and three years of record-breaking floods. The Amazon forest is a key carbon sink, but changes in rainfall seasonality due to climate change and/or deforestation can convert tropical rainforest to savanna, especially in eastern and southeastern Amazonia.

Tipping point analysis reveals two independent thresholds of irreversibility not to be transgressed: global warming of 4°C or regional deforestation exceeding 40%[1]. Preventing the threshold of global warming will require global action, including successful implementation of the Paris agreement. To address deforestation, a new sustainable economic paradigm for tropical forests is needed. Science and technology should offer solutions for an innovative, knowledge-based economy based on standing forest and local bioindustries, along with empowerment and quality education for forest people.

Dr. Lovejoy (audio) emphasized that the Amazon should be seen as a system, and that this calls for integrated management. He started by remarking on the progress that has been made, in particular in the creation of an extensive protected area system. Indigenous territories cover one-fourth of the region. But consolidation of these areas is an ongoing challenge, including respect for indigenous peoples' rights of self-determination. More broadly, the time is right to proclaim no net deforestation as a key objective.

It is time to rethink infrastructure, with elevated roadways, alternatives to road transportation, and decommissioning mines after they are exploited. He mentioned Alcoa's Juruti mine as a positive example, and cited a recent conference where the Inter-American Development Bank (IDB) and the Brazilian Development Bank (BNDES) took up the concept of sustainable infrastructure development.

Economic solutions can include sustainable cities, use of biotechnology and biodiversity, and ecotourism, which has huge unrealized potential. Agriculture is a large challenge; alternative approaches to aquaculture should be looked at more closely.

Governance is another major focus. For example, the problem of illegal mining in Peru will require a cabinet level approach. Colombia will be an important focus for the next two to three years. Many governors have taken promising approaches, and this should be encouraged. The Amazon Cooperation Treaty is a mechanism that has more potential than it has yet been able to achieve.

Finally, the Amazon region is a remote part of most Amazonian countries, and it is important to engage with urban and non-Amazonian populations through communication and education.

Interlude - World Café Conversation

Following the plenary lectures, participants engaged in an initial discussion, using a World Café format, to reflect on: What do we know so far? What do we still need to learn? What are the dilemmas and opportunities? At the end of the session, groups were asked to summarize key messages in the format of hashtags and tweets. The themes that emerged from this opening session are illustrated by the list of hashtags presented below.

[1]In a post-workshop publication, Drs. Lovejoy and Nobre suggested that "negative synergies between deforestation, climate change, and widespread use of fire indicate a tipping point for the Amazon system to flip to non-forest ecosystems in eastern, southern and central Amazonia at 20-25% deforestation." Lovejoy, T. and C. Nobre. 2018. *Amazon Tipping Point.* Science Advances 4 (2): eaat2340

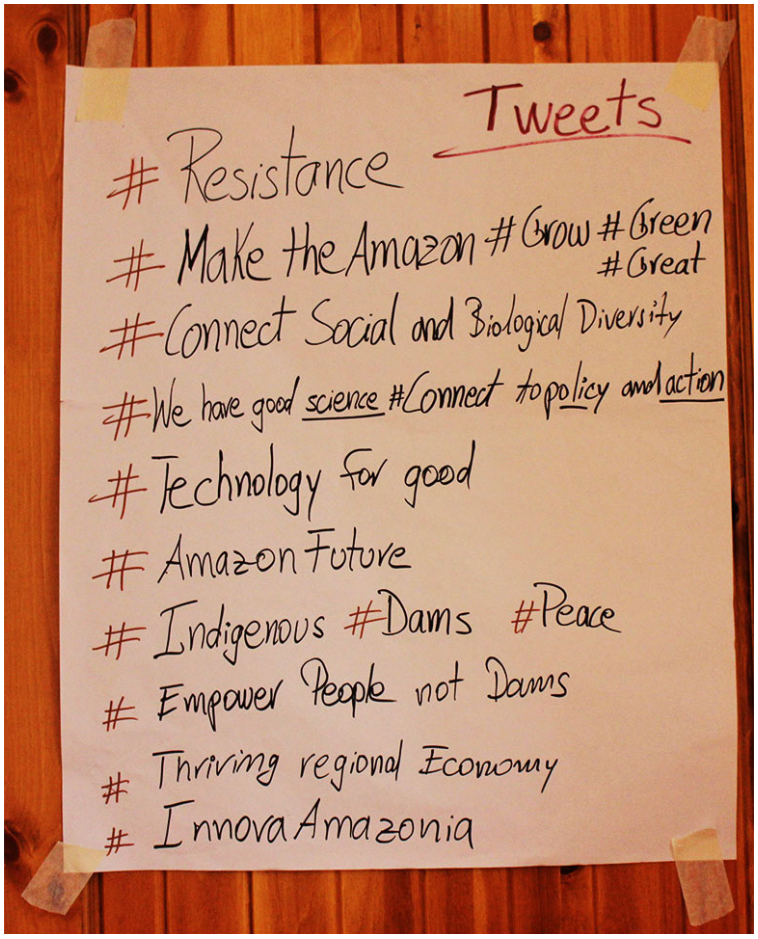

Figure 3. Representative tweets created by workshop participants during World Café conversation

2b. Knowledge and Learning Tools for Planning and Adaptation

Claudio Padua's (Instituto de Pesquisas Ecológicas) keynote speech (pdf) (video) described approaches to consolidating protected areas that include social participation, monitoring, capacity-building, and making protected areas centers for proliferation of economic development. Knowledge should be combined with traditional culture for innovative development, which requires new knowledge institutions, applied science, and new approaches to technical assistance, rural extension, and entrepreneurship. Stephen Perz's (University of Florida) keynote speech (pdf) (video) described the structure and process of governance, and brought our focus to how knowledge management can be improved to support governance to address current drivers of deforestation and yield better conservation and development outcomes.

The nine working groups who worked with knowledge and learning tools and strategies were organized in three parallel sessions (three groups each): decision support tools; monitoring of dynamic processes; and learning for adaptation. Each session included a mix of more technical (modeling, multi-scalar data collection) and more community-based approaches (integrating indigenous knowledge, citizen science, participatory action research). In addition, operational tools (data curation, monitoring and evaluation) and planning and decision-making strategies (scenario planning, collaborative networks) were considered. Having multiple perspectives and experiences provided a comprehensive assessment of how the tools are currently being applied, plus gaps and opportunities for future application. Presentations are summarized below by session.

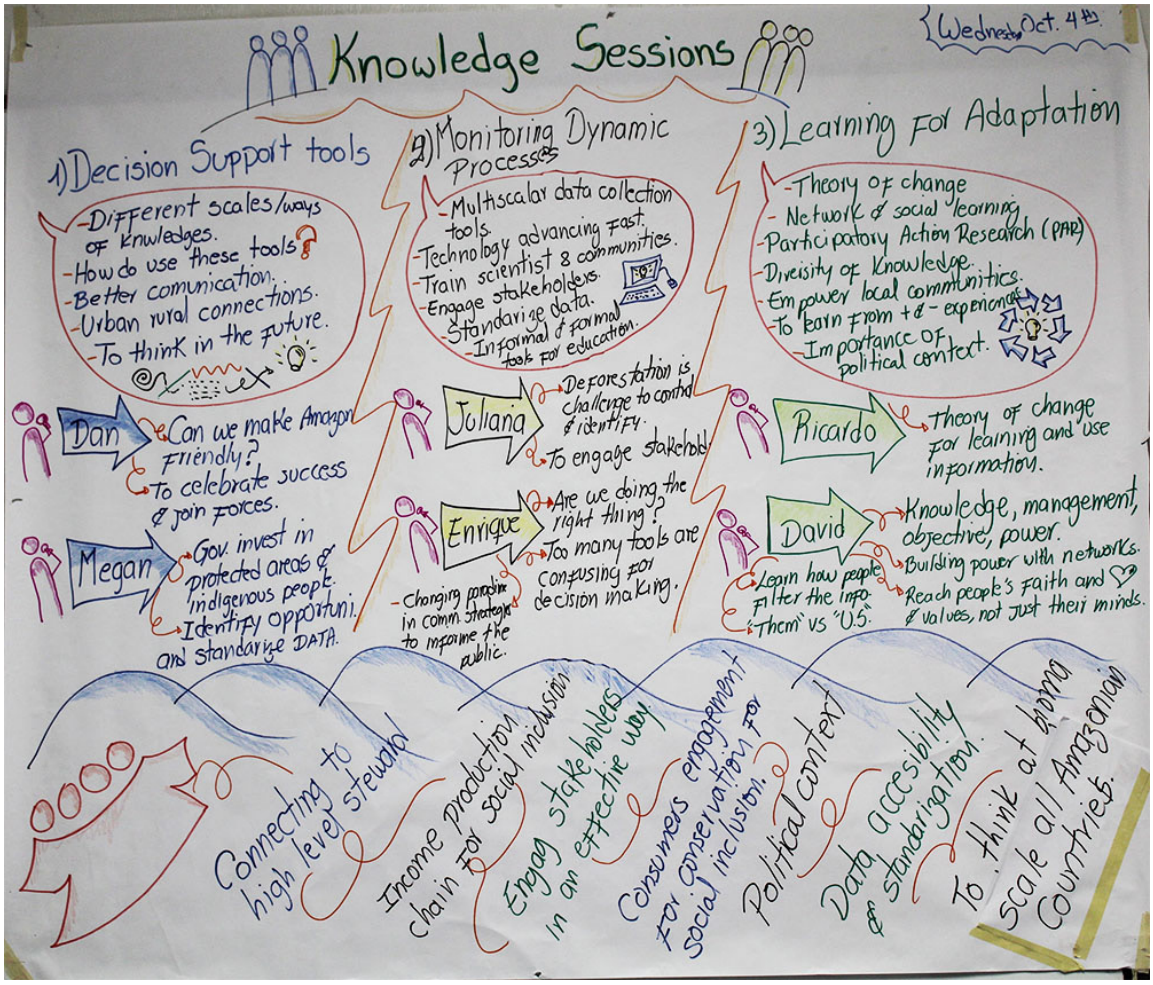

Figure 4. Visual memory of Knowledge Tools and Strategies sessions.

Session 1 – Decision Support Tools

"Scientific Analysis and Simulation Models to Support Conservation and Development Decision-making"
Cynthia Simmons (University of Florida), Marcia Macedo (Woods Hole Research Center),
Paul Moorcroft (Harvard University), and Lisa Famolare (Conservation International)
(pdf) (video)

This group presented a summary of the likely drivers of deforestation in the Amazon in the next few decades, as well as of the scientific analysis done to characterize these trends. They then outlined various approaches to modeling drivers at various scales, highlighting issues of infrastructure plans, data sources, land use frameworks, econometric specifications, spatial behavior of stakeholders, and global climate change as key considerations for modeling impacts on forests in the Amazon.

The group also highlighted that science and scientific analysis can contribute to conservation and sustainable development by reducing uncertainty in planning for future change, which helps bridge the gap between the creation of science-based knowledge and its application in policy decision-making. However, the timing to make effective use of scientific information as an input in the decision-making process is crucial: scientific knowledge should be integrated into the planning process as an early warning system that can check for impacts before a project is implemented, building capacity to prevent damage from threats.

Key findings from the scientific knowledge produced so far document the impacts of infrastructure and climate

change on forest cover loss. Despite those findings, results from models are rarely communicated to decision-makers and then acted upon in decision-making. That conclusion led to several recommendations for knowledge creation and dissemination: (1) extend the time frame of modeling to predict future effects; (2) model at the basin scale to permit dynamic treatment of cumulative and synergistic effects of infrastructure on natural systems; (3) use spatially-explicit models to create interactive decision platforms that permit decision makers to conduct risk assessments of various possible infrastructure project portfolios in order to aid decision-making; and (4) disseminate scientific knowledge and model results more broadly.

"Articulating Indigenous and Scientific Knowledge for Conservation and Development"

Simone Athayde (University of Florida), Robert Miller (Instituto Olhar Etnográfico), Glenn Shepard (Goeldi Museum), Michael Heckenberger (University of Florida), and Joenia Wapichana (Roraima Indigenous Council) (pdf) (video)

This group underscored the point that the knowledge held by indigenous and other traditional communities, referred to here as ILK (indigenous and local knowledge), is as important as scientific knowledge for decision-making on conservation and development in the Amazon. They highlighted that over a very long period of time, indigenous and local communities have shaped the biodiversity of the Amazon as we know it today, refuting the idea of the Amazon forest as an ecosystem untouched by human actions. They also stressed that indigenous territories and other types of protected areas occupied by traditional communities such as riverine populations, rubber tappers, babassu nut breakers, and Afro-descendant communities cover large parts of the Amazon, providing safe harbor for enormous natural resources and ecosystem services. Therefore, ILK is strategic to understand the past and the present of the Amazon, as well to design actions to safeguard its future. This implies that it is not only ethical but also strategically vital to incorporate this diversity of knowledges and perspectives in decision-making processes in the Amazon.

The articulation of indigenous and local knowledge and scientific knowledge is not only valuable to better understand the Amazon, it is also indispensable to recognizing the contributions and rights of indigenous peoples and local communities in planning and other decision processes affecting the future of the basin. A remarkable moment of the presentation was the talk by Joenia Wapichana, the only indigenous participant in the workshop, and the first female indigenous lawyer in Brazil. She explored how western science is based on short-term evidence gathered by outsiders, while ILK is based on long-term observation and experience on which indigenous and local societies depend.

These considerations motivated a focus on how to incorporate ILK and decision processes in the tools and strategies to foster conservation. Participatory methods to assess hunting impacts can empower local people and guide management strategies. Remote sensing and mapping technologies can be combined with ILK to produce ethno-management plans that establish protection for water resources, sacred sites, and fauna refugia. And ILK has a key role in juridical processes that can limit the impacts of dam, road and mining development.

"Scenario Planning via Stakeholder Development and Analysis of Alternative Futures"

Juan Carlos Vargas (GeoAdaptive LLC), Franklin Paniagua (University of Florida), Marieke Veeger (University of International Cooperation, Costa Rica) and Tom Ankersen (University of Florida) (pdf) (video)

The focus of this presentation was the application of a specific tool, scenario planning, and how it can contribute to conservation and development strategies. The presenters argued for the value of scenario planning as a tool that can involve other tools such as modeling, can be used at multiple scales, and is robust to scale, uncertainty and time. Scenario planning "can be a useful, stakeholder-driven, effective tool to open peoples' eyes and minds

to the future at multiple scales." It is also a useful tool for dealing with wicked (complex) problems.

Fundamental to the scenario planning tool is its potential to engender a social learning process that can lead to collective action. The group stated that specific scenarios themselves are less important than the process of collective engagement in conceiving a common future. Two case studies, from Alaska and Costa Rica, illustrated several aspects of the scenario planning tool, and demonstrated its power to engage diverse stakeholders and integrate different kinds of information. However, adopting the participatory scenario-planning tool involves some challenges, including: (1) it accounts for uncertainty in decision-making, but does not yield a single and unique "best" avenue for action; (2) it is counterintuitive to managerial simplicity; and (3) it is based on soft methods, providing soft answers that decision-makers may not consider sufficiently clear to be actionable. It should be seen as a methodology for visioning and social learning to build social capital and empower stakeholders to address uncertainty and change.

Session 2 – Monitoring Dynamic Processes with Application to Environmental Management

"Multi-scalar Data Collection Tools"

Eben Broadbent (University of Florida), Angelica Almeyda Zambrano (University of Florida),
Ane Alencar (Instituto de Pesquisa Ambiental da Amazônia)

(pdf) (video)

Environmental degradation in the Amazon is occurring on multiple scales and manifests in multiple ways, including forest loss, forest degradation, and defaunation. This group called attention to environmental monitoring as an integral part of an adaptive response to the conservation and development challenges unfolding in the Amazon Basin. Fortunately, there is now a suite of technologies that permit more effective monitoring of these problems.

To illustrate how cutting-edge technology is facilitating monitoring efforts, the presenters used the Xingu Indigenous Park in Mato Grosso, Brazil as a case study. Starting in 1997, Global Forest Watch (GFW) aimed to identify and monitor the world's deforestation frontiers to provide information vital for forest management to civil society and decision makers. In 2011, a new generation of satellite imagery allowed monitoring of deforestation in two to three month intervals. Starting in February of 2017, Planet Labs Inc. began offering daily high-resolution imagery with potential coverage of the entire planet every day. With this new remote sensing tool, it is now possible to assess deforestation trends within the reserve in near-real-time, which provides information on which regulatory authorities can act.

Monitoring systems at various geographic scales can be integrated to develop a comprehensive framework for detecting, monitoring and responding to degradation and deforestation in the region. Remote sensing technology can be coupled with airborne systems, including unmanned aerial systems (drones), as well as with field inventories to provide multi-scalar, high definition monitoring of deforestation and degradation at a relatively low cost. Much of the data generated from remote sensing platforms is open access. The data available, together with a proliferation of tools and platforms designed for use by various stakeholders, from regular citizens to scientists, is changing the effectiveness of monitoring efforts. However, the sheer quantity of data produced creates its own challenge for processing and access. This requires the development of more efficient mechanisms to make data available in usable form to more stakeholders. A key next step is to consolidate the data from extant observational platforms into user-friendly analytical tools to make information more easily accessible for interpretation and action, in a sort of "Netflix for the Amazon."

"Community Monitoring and Citizen Science"

Elizabeth Anderson (Florida International University), Mariana Varese (Wildlife Conservation Society), Foster Brown (Woods Hole and Federal University of Acre), Jynessa Dutka-Gianelli (University of Florida)

(pdf) (video)

Citizen science can be defined as any form of public participation in organized research. Participation can vary across a spectrum of citizen participation in which citizen scientists can be contributors, collaborators, or project leaders. This group offered a review of citizen science as a tool for conservation and development. They backgrounded their presentation by reviewing the scale and extent of citizen science within the last year and a half, in a total of 128 projects across seven countries. Only 5 of these were at a regional or global scale, indicating that, while widely used at local scales, citizen science is still uncommon in regional or national projects.

To illustrate the ways in which citizen science can be used as a tool to improve conservation, the presenters shared stories from their experience, from cases in Acre (Brazil), Florida (USA), Peru, and the Amazon Basin. These stories collectively emphasized four key points: (1) citizen science can be used as a tool for strengthening governance; (2) citizen science can help navigate conflicts between scientists and local people by increasing transparency and trust; (3) citizen science can be used to legitimize local, culturally significant knowledge in a way that validates it for other pertinent stakeholders; and (4) existing repositories of data acquired through citizen science efforts can widen the scale at which we can ask scientific questions, and make these questions more relevant to people's lives and overall well-being. Citizen science can thus build bridges among stakeholders and facilitate the integration of different forms of knowledge for conservation and development action.

"Data Challenges and Opportunities in the Amazon Region"

Denis Valle (University of Florida), Emilio Bruna (University of Florida), Douglas Soltis (University of Florida), Pamela Soltis (University of Florida), Robert Guralnick (University of Florida), Ethan White (University of Florida)

(pdf) (video)

Data are essential for evidence-based conservation and development policies. This group outlined the challenges and opportunities for improving accessibility to data about the Amazon to better support conservation and development action. A great barrier to quantifying the social and economic impacts of development projects in the Amazon Basin is that data are hard to find, organize and validate. Consequently, data analysis is expensive and time consuming. Data are also spatially and temporally limited and largely disorganized and decentralized, which may subsequently result in permanent loss of essential baseline data necessary to permit analysis of change due to impacts from development projects.

The time constraints which scientists face in order to conduct their research, combined with the challenges of gathering data, mean that current research is limited by what data are readily available. Data archiving, documentation and sharing need to become standard practice, supported by funders and required for funding, graduating, and publishing. Furthermore, the scientific community needs to define what data are essential to inform policy decisions in the Amazon, prioritize collection of the necessary data, and make it readily available with supporting documentation that affords ease of use by diverse stakeholders. An Amazon Data Hub could be a key mechanism to make data publicly available and broadly used. These are requisites to achieve the priority of fostering evidence-based conservation and development decisions.

Session 3 – Learning for Adaptation

"Monitoring and Evaluation of Conservation Tool Effectiveness"

Karl Didier (Wildlife Conservation Society), Claudia Romero (University of Florida), and Richard Margoluis (Gordon and Betty Moore Foundation)

(pdf) (video)

This group presented the tools of Monitoring and Evaluation (M&E) and Theory of Change (ToC), which can increase the impact of conservation and development strategies in Amazonia by facilitating social learning and adaptive management. A ToC explains how activities are understood to contribute to a series of intermediate results that produce the final intended impacts, while identifying assumptions and risks along the causal chain. Complementarily, monitoring tracks change through time, and evaluation analyses will help attribute change to factors internal or external to an intervention.

Ideally, a ToC will have a clear causal logic, but in complex adaptive systems causality is complicated by feedbacks that generate non-linear and emergent dynamics. Similarly, what works in one situation may not work in another, so that rather than making broad statements about "what works," the focus of evaluation should be on assessing the costs and benefits, and their distribution, to make them visible in order to better support policy via social, economic and environmental analysis. A key ingredient to M&E is the proper understanding of a problem. Since this conceptualization affects people and is based on their values, it should be collaboratively defined.

As a case study, two complementary knowledge-generating processes – theory-based impact evaluation and process evaluation – were presented in the context of the certification of natural forest management by the Forest Stewardship Council (FSC). The ultimate goal of these two processes is to understand how FSC certification serves to maintain or enhance forest values (biological, socio-economic, political), which is the goal of this intervention. Limitations for the use of these two processes in FSC certification include selection bias (i.e., intervention adoption is voluntary) that makes comparison between certified and non-certified units insufficient to answer impact questions and thus requires the use of more sophisticated statistical tools; and the lack of on-the-ground data for standards compliance, which will require a large effort to compile.

Structural problems that impede the adoption of an evaluation practice in conservation include insufficient capacity for the design of both monitoring and evaluation content and protocols; lack of institutional support to improve program implementation; short-term funding cycles that preclude assessment of long–term impacts and project adaptation; and insufficient funding to support social learning. As a consequence, it becomes difficult for practitioners and researchers to learn from successes and failures. To address these limitations and needs, the group argued for promoting partnerships to improve good M&E practices among different stakeholders.

"Collaborative Networks for Social Learning to Strengthen Governance"

Vera Reis (Government of Acre), Renato Farias (Instituto Centro de Vida), Wendy-Lin Bartels (University of Florida), Denyse Mello (University of Florida) and Robert Buschbacher (University of Florida)

(pdf) (video)

This group analyzed how convening and facilitating collaborative networks working at various scales can address the drivers of deforestation and forest degradation. They presented a Theory of Change whereby such networks enable social learning among diverse stakeholders, strengthen social and human capital, and thus support collaborative action for adaptation and resilience.

The Cotriguaçu Sempre Verde (CSV) Project created a participatory decision-making space, first with individual sectors and then among sectors in the Municipal Environmental Council. The Madre de Dios-Acre-Pando (MAP) Initiative developed a polycentric structure and multiple learning spaces. In both cases, networks facilitated exchanges of ideas and information that promoted social learning. In turn, social learning allowed collective deliberation about priorities and actions, fostering participatory decision making and constituting public support for plans and actions. As a result, networks build capacity for learning tied to action, and thus create enabling conditions for change.

Operationally, opening safe spaces for exchange and dialogue created the conditions for participant ownership of the deliberative process. Further, structuring dialogues in a polycentric fashion that explicitly recognized the importance of participation by diverse stakeholder groups was crucial to engendering broad support for priorities and actions proposed by the network. The presenters concluded by arguing that replication of these conditions in other contexts, through mechanisms such as the RECAM learning network, can multiply and expand such bottom-up processes, yielding proposals for action with broad support.

"Integrating Academia, NGOs, Communities and Government in Participatory Action Research"

Wendy Townsend (Noel Kempff Mercado Museum of Natural History), Diana Alvira (Field Museum),
Alexandre Olival (State University of Mato Grosso and Instituto Ouro Verde),
and Andrea Encalada (Universidad San Francisco de Quito)

(pdf) (video)

Participatory Action Research (PAR) combines community participation with scientific inquiry to empower local people while integrating the generation of knowledge with its dissemination and application. There are many promising case studies that illustrate how the dialogue of knowledge systems (*diálogo de saberes*) can put research into action: Community Based Stream Biomonitoring in Napo, Ecuador (USFQ); an assets-based approach for linking conservation and well-being in the Peruvian Amazon (Field Museum); the Agroforestry Research Center in northern Mato Grosso, Brazil (IOV); business and resource management for basket production and commercialization by Ye'kuana women (Earth Bound, Caura River Basin, Venezuela); and the Baures-Participatory Indigenous Planning Process (FCBC, in Bolivia).

There is a continuum in the relative extent of academic and stakeholder leadership in participatory research. As community involvement increases, academic credibility may decrease, but stakeholder empowerment and self-esteem increase, and these can improve local environmental governance as well as raise capacity to influence State governance. The construction of questions, and answering them together with scientists, improves self-esteem and facilitates collective deliberations to arrive at shared governance decisions.

Political, economic and social challenges need to be recognized and addressed in order to transform research agendas so that they are locally relevant and inclusive, and promote dialogue between academia, NGOs, communities and governments. The group recommended several strategies to address these challenges, including: 1) build relationships between all levels of participants; 2) adopt an integrated focus on assets and strengths; 3) have stakeholders generate questions to empower participation and respond to stakeholder needs; 4) empower women; and 5) formally recognize community members who participate in capacity-building efforts by awarding academic credit that can be used as a credential for employment. In conclusion, the presenters highlighted the importance of sustaining PAR over time, to use assets-based approaches, to recognize participant strengths, empower participants, be gender inclusive, and promote dialogue.

Interlude – Indigenous Visions

Michael Heckenberger (University of Florida), Afukaka Kuikuro (Kuikuro Indigenous Association), Wetherbee Dorshaw (Earth Analytic, Inc. and Puente GIS Institute), Bruna Franchetto (Universidade Federal do Rio de Janeiro)
(pdf) (video)

In a special evening session that included a video link to indigenous leader Afukaka Kuikuro (video), the role of indigenous people as stewards and especially managers of Amazon landscapes was highlighted. Evidence was provided that Amazonian landscapes are highly anthropogenic even when they appear pristine, due to millennia of indigenous use and management. Consequently, indigenous knowledge can play a key role in landscape restoration, since indigenous peoples have played this role historically. Cacique Afukaka expressed his worries with the ongoing deforestation in the lands surrounding the Xingu indigenous territories, and that this is having major repercussions on rainfall and water quality. Documentation and maintenance of indigenous languages are crucial to the maintenance of all kinds of diversity, memories and individual and collective mental and physical health (pdf) (video). In partnership with scientists, indigenous communities are applying innovative new geographic technologies to document impacts and carry out territorial planning (pdf) (video). A key element of all of these efforts is the agency of indigenous peoples combined with support for research, education and documentation.

2c. Negotiating Governance Strategies to Address Drivers of Deforestation

Figure 5. Visual memory of Negotiating Governance case studies.

The keynote speakers who opened this session, Beto Verissimo (Imazon) (pdf) (video) and Mauricio Voivodic (WWF-Brazil) (video), recognized the significance of Brazil's 80% reduction in Amazon deforestation rates

over the past 15 years, which they attributed to law enforcement, establishment of protected areas, and market mechanisms such as the soy moratorium. However, there has been a strong backlash, and recent political decisions have undercut both the legal framework of forest protection and enforcement of extant laws, leading to a recent uptick in deforestation and land grabbing.

Both speakers argued for a mix of legal, economic and political approaches. Well-trained public prosecutors and other agencies equipped with technological tools can inhibit illegal activities and help to protect the rights of indigenous and other local populations. There is broad recognition that the region's economic development is no longer predicated on deforestation, but continued efforts are needed to create an alternative model of forest-based development. Finally, political constituencies need to be mobilized to protect the region's forests, water and biodiversity as national patrimony and the basis for economic development. This requires dialogue, communication and technical arguments to engage voters, business, faith leaders and others.

The following case studies present initiatives that seek to promote more inclusive and effective governance to manage negative environmental impacts and support diversified local economies and conservation mosaics. The cases are summarized below, followed by a stakeholder analysis diagram of each case that illustrates the complexity and diversity of interest groups and values involved in negotiating governance strategies to address drivers of deforestation (these are based on the Advocacy Coalition Framework developed by Paul Sabatier and Hank Jenkins-Smith[2]).

Case 1 - Planning and Licensing of Hydroelectric Dams in the Brazilian Amazon

Simone Athayde (University of Florida), Ana Cristina Barros (The Nature Conservancy), Daniel Roquetti (Universidade de São Paulo), Angela Livino (Brazilian Energy Research Office, EPE), Marliz Arteaga (University of Florida), Ciro Campos (Instituto Socioambiental), Ubiratan Cazetta (Ministério Público Federal-Brazil), Carolina Rodrigues da Costa Doria (Universidade Federal de Rondônia), Adila Lima (Universidade Federal do Tocantins), Aidee Moser Luiz (Ministério Público Estadual-Rondônia), Elineide Marques (Universidade Federal do Tocantins), Paula Franco Moreira (German Corporation for International Cooperation, GIZ Brazil)
(pdf) (video)

This presentation engaged a group of participants that play diverse roles in the planning and licensing of dams in Brazil, some of whom are participants in the Amazon Dams Network, an international research network collaboratively studying hydropower development across the Amazon. They presented an analysis of public participation in different stages of the planning process for hydroelectric dam development. Looking at the planning process broadly, improved public participation is needed in the definition of the energy matrix as a whole, to achieve a well-crafted hydropower potential inventory while taking account of opportunities for alternative energy sources, like wind and solar.

The planning process of a specific hydropower project is carried out initially by the Ministry of Mines and Energy (MME) in consultation with the Brazilian Agency for Energy Research (EPE); this stage is not open to the public. Public participation is possible in the second stage, when permits and environmental licensing are carried out, but many decisions and investments have already been made by this point. The energy auction, and construction and operation stages then follow (Figure 6).

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[2]Sabatier, Paul A., and Hank C. Jenkins-Smith. 1993. *Policy Change and Learning: An Advocacy Coalition Approach.* Boulder, CO: Westview Press.

The presenters emphasized the necessity and potential benefits of improving social consultation in the planning and licensing process for hydroelectric dams. Based on case-studies from the Tocantins, Madeira and Xingu rivers in the Brazilian Amazon, the presenters concluded that the process often does not work as well as envisioned because it lacks adequate public participation. Usually, consultations come too late for the opinion of local and indigenous communities to be taken into account in decision-making, so rather than receiving constructive input, projects are instead besieged by conflict.

Poor planning has caused forced population displacement, loss of community livelihoods, health problems, extensive flooded areas, and loss of biodiversity. Most projects underestimate the medium and long-term impacts. The process of planning and licensing needs to be rethought, so as to include all the actors that have legitimate interests at stake, in all stages of the inventory and planning process. The group concluded with recommendations to improve transparency and public participation in the definition of the energy matrix and associated decision-making for hydroelectric dam development in the Amazon.

Planning and Licensing of Hydroelectric Dams in the Amazon

ADVOCACY COALITION FRAMEWORK

Case Studies: Tocantins - Madeira - Xingu

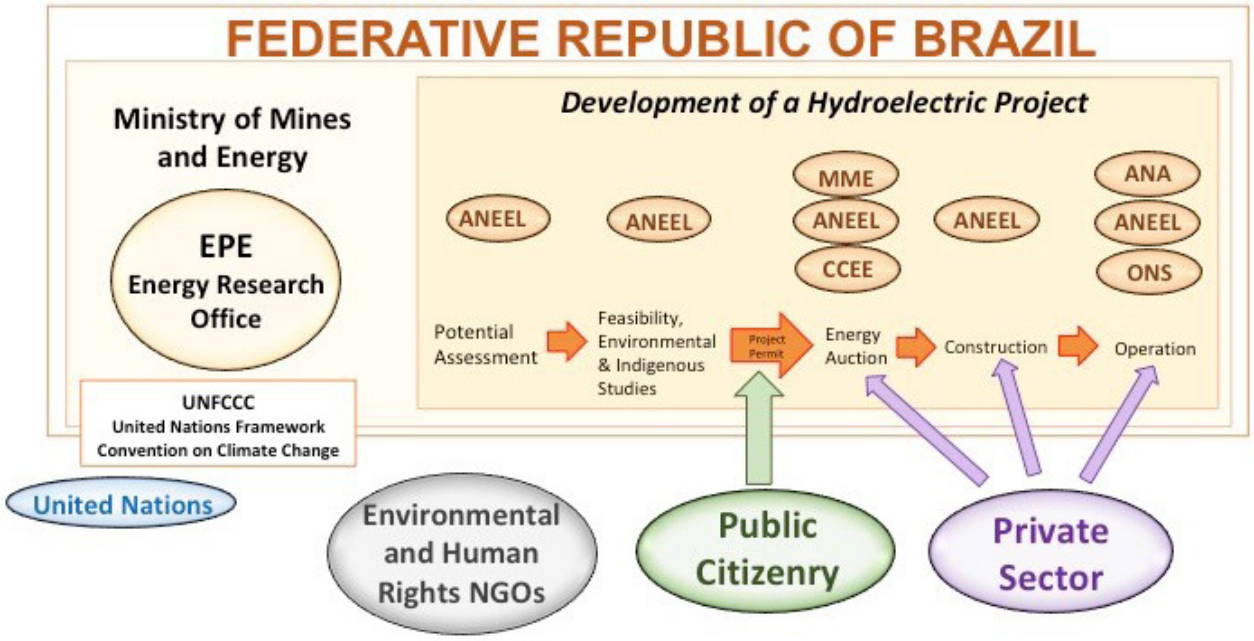

Figure 6. Stakeholder Map for Planning and Licensing of Hydroelectric Dams in the Amazon[3].

[3]Source: Arteaga, M. and Luna, V. 2017. *Final Report. Panel #4: Negotiating Governance Strategies to Address Drivers of Deforestation*. Unpublished manuscript.

Case 2 - Formalization of Alluvial Gold Mining in the Peruvian Amazon: Rationale & Challenges

Bruno Sanguinetti (Consorcio Madre de Dios/CEDE), Roxana Barrantes (Pontificia Universidad Católica del Perú) and Pedro Solano (Sociedad Peruana de Derecho Ambiental)
(pdf) (video)

Because of the severe environmental degradation it causes, alluvial mining should ideally not be allowed to occur in the Amazon. However, alluvial gold mining has been occurring in Madre de Dios over the past 50 years, driven by the fact that it makes a significant contribution to the country's GDP.

Recently the Peruvian government differentiated illegal mining and informal mining: the former is that which occurs in protected areas, using forbidden methods, or without any mining registry, while the latter does not. Even though the government has been making efforts focused on formalization of mining since 2002, with the strategic aim of eliminating the illegal mining, to date no miner has actually completed the procedures nor been formalized in Madre de Dios. The failure to implement the many laws that restrict mining in Madre de Dios is related to the corruption and illegality that are present at all levels of government, mining's economic importance in the region, and the political support of illegal mining by elected public officials including mayors, congressmen, and the Governor of Madre de Dios.

The Consorcio Madre de Dios and CEDE, with the private sector, have been developing a reduced-impact mining model that is environmentally and socially responsible and does not use mercury. They train miners in environmental restoration, with proper procedures to close mining sites, giving emphasis to soil recovery and reforestation that take into account the topography of the landscape and nearby water bodies. Training of miners in turn builds the capacities of local authorities and leaders.

The Sociedad Peruana de Derecho Ambiental (SPDA) carries out research, advocacy, and legal analysis, and raises public awareness. Their research documents the magnitude of the threat from illegal mining in the Amazon, especially within protected areas such as the Tambopata National Reserve, and evaluates the market chain of illegal alluvial gold to its destinations in international markets. SPDA has also analyzed legislative and regulatory proposals to improve the legal framework and to strengthen the formalization process of small-scale mining and artisanal mining.

The main challenge currently facing all of these efforts is that the current Governor of Madre de Dios openly supports illegal mining, and has blocked the formalization process. The steps that need to be implemented, such as technical assistance, land management regulation, soil and landscape restoration, and the promotion of alternative economic activities in the region require Peruvian government officials from multiple agencies to work together with each other and the private sector. Figure 7 shows the range of stakeholders involved in this process.

Public opinion has a crucial role in influencing the public sector. SPDA has developed campaigns and documentaries to inform public opinion about the problem of illegal mining, the difference with informal mining, and the importance of the Tambopata Reserve, and thus contribute to the construction of a social consensus. They also inform the public about the position of the presidential candidates regarding mining.

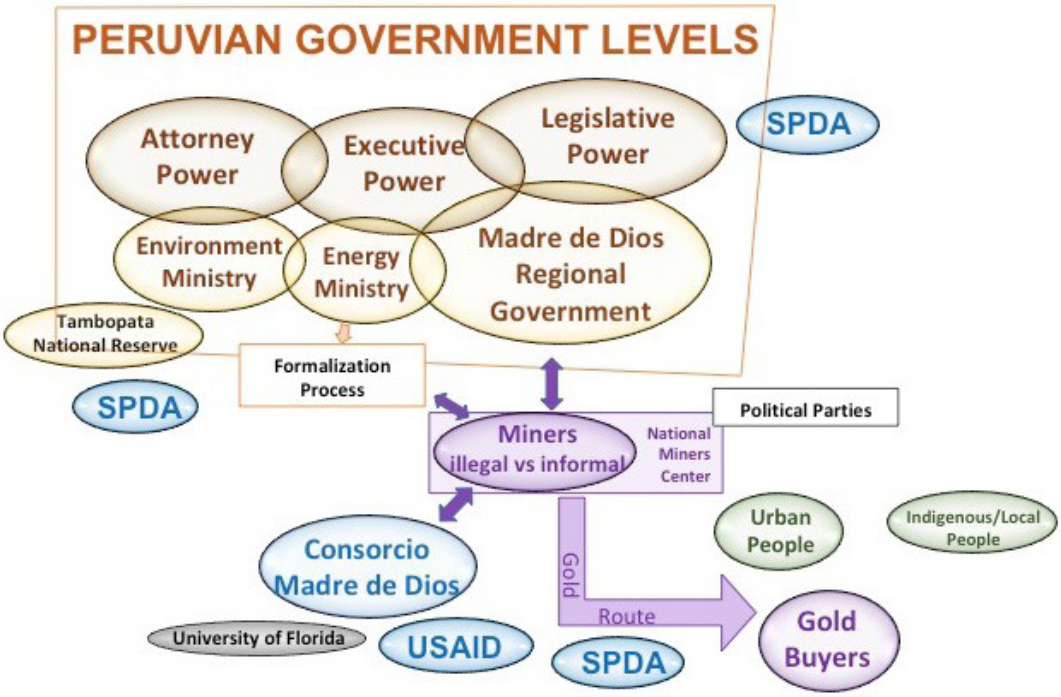

Figure 7. Stakeholder Map for Formalization of Alluvial Gold Mining in the Peruvian Amazon[4].

Case 3 - Infrastructure Development in Western Amazonia

Sarela Paz (Universidad Mayor de San Simón), Rob Wallace (Wildlife Conservation Society-Bolivia),
Mariano Castro (Pontificia Universidad Católica del Perú), and
César Gamboa (Derecho, Ambiente y Recursos Naturales - Peru)
(pdf) (video)

The drivers of infrastructure development in the Western Amazon come both from within the countries of the region, with their growing middle classes who demand commodities and services, and from outside the region such as the G20, Chinese investments, and COSIPLAN (South American Council on Infrastructure and Planning). These drivers have created considerable conflict between the market and environmental regulations, with consequent weakening of environmental protection in order to ensure certain economic outcomes, sometimes related to corruption. Infrastructure development in the Amazon does not necessarily benefit local people, but rather it facilitates the extraction of forest resources to attend to specific political and economic interests. Big investments such as the Amazonian Hydrovia in northern Peru, to be constructed by the Chinese company SINOHYDRO, result from powerful external government and private sector interests, local corruption, and a generic pro-construction paradigm of development, rather than taking full account of long-term costs and benefits.

[4]Source: Arteaga, M. and Luna, V. 2017. *Final Report. Panel #4: Negotiating Governance Strategies to Address Drivers of Deforestation.* Unpublished manuscript.

This panel suggested a series of measures at various scales to address infrastructure projects in order to improve conservation outcomes:

1. Strengthen regional and international NGO networks, such as those shown in Figure 8, which are made up of institutions based in Colombia, Bolivia, Ecuador, Brazil, Peru, and Venezuela.
2. Inform civil society about the social-ecological impacts of big infrastructure.
3. Empower local people who are directly affected by infrastructure development to participate in decision-making processes.
4. Connect rural and urban people, and build support for effective citizen participation.
5. Reform consultation procedures to be more inclusive and participatory of all interested stakeholders.
6. Improve legislation for the enforcement of environmental regulations.

Infrastructure Development in Western Amazon

ADVOCACY COALITION FRAMEWORK

Case Studies: Common Elements at Regional Level

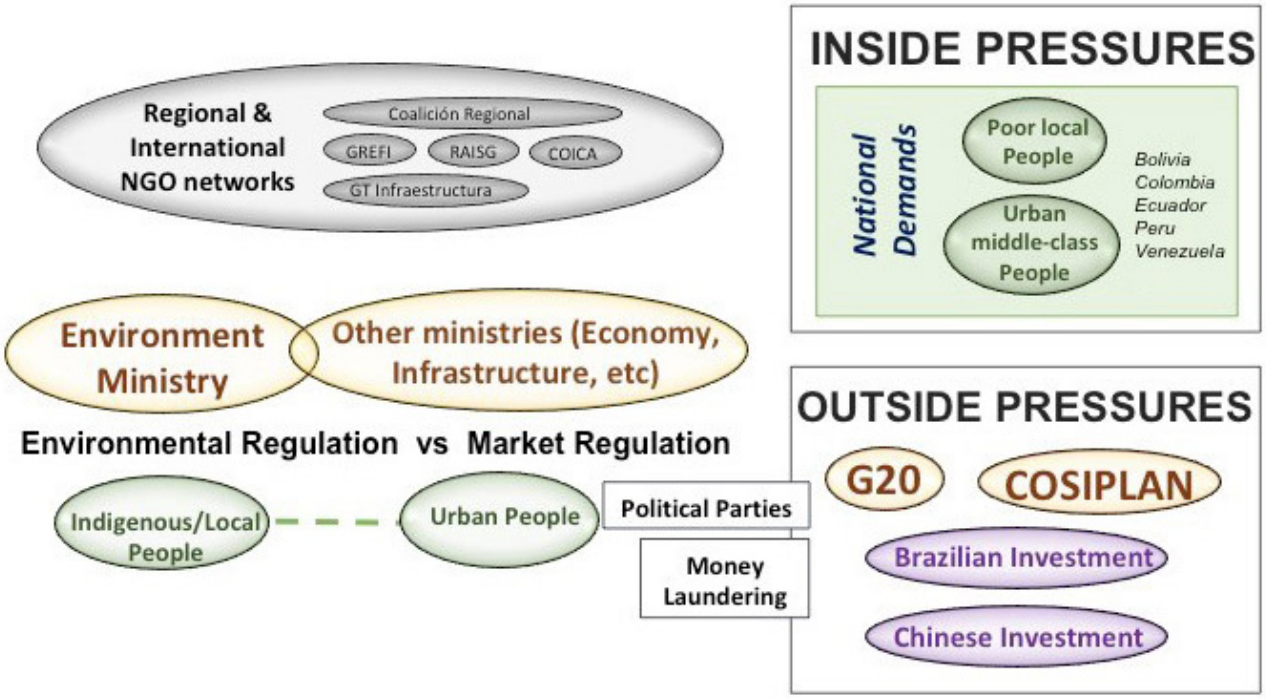

Figure 8. Stakeholder Map for Infrastructure Development in Western Amazon[5].

[5]Source: Arteaga, M. and Luna, V. 2017. Final Report. *Panel #4: Negotiating Governance Strategies to Address Drivers of Deforestation.* Unpublished manuscript.

3. Lessons Learned and Recommended Actions

The experiences and analyses summarized above from the working groups on knowledge and negotiation tools and strategies were complemented by reflections and comments from two panels of senior scientists and practitioners. This in turn fed into a broader discussion among workshop participants, who were asked to identify surprises, insights, emergent ideas, and new connections and meanings. The group of participating UF graduate students compiled, transcribed and reviewed all discussion notes, flip charts and index cards. This provided the basis for their preliminary analysis, which was then reviewed by a group of UF faculty, and ultimately by a group of workshop participants. This section provides a **synthesis of the key points** that were distilled from this multi-stage analysis, as well as **recommendations for possible action items** - how the lessons learned can be put to work to improve future conservation efforts in the Amazon[6].

There was a common understanding among workshop participants that information and knowledge are important inputs to governance: they can help to anticipate impacts, identify alternatives, and inform political and economic constituencies. Yet it was also clear that scientific findings have not been effectively communicated to generate adequate policy decision outcomes. There are opportunities for improvement in the relevance and applicability of scientific information, but also a clear need for new and improved approaches for influencing decision-making processes.

The globalization of the economy has fostered the hegemony of international capital as a determinant of development policy. This has meant that power relations are defined at a trans-national level, and that local and regional peoples and environments are subject to externally imposed development initiatives. As a result, infrastructure development in the Amazon does not primarily connect or benefit local people, but rather is designed to make forest and aquatic resources more accessible for extraction and exploitation at the regional, national and international levels. Decision-makers and beneficiaries of development initiatives thus live and work in places far removed from the impacts of their decisions, and reap the benefits without bearing the costs. All that said, many local actors in affected areas have interests aligned with conservation and long-term sustainability, especially as they have experienced the costs and burdens of ill-advised development investments firsthand. There is thus both a need and an opportunity to strengthen and support local stakeholders, by providing them with access to knowledge and opportunities to be included in decision processes, and by linking the demands for better development planning and conservation outcomes of these local actors to broader economic and political constituencies.

An effective conservation strategy must therefore take into account both information and knowledge as key inputs, and power dynamics as a key determinant, while integrating social actors across scales in decision-making that affects conservation outcomes. Below we outline key findings and recommendations distilled from the multi-stage analysis of the insights harvested from the Amazon workshop. **We organize these ideas and recommendations around an intervention framework that begins with knowledge management, proceeds to empowerment of local actors to influence infrastructure planning and territorial management, considers negotiation strategies to address unequal power relations, and ends with learning and adaptation.**

[6]Given that the workshop did not address some key conservation strategies in depth - notably protected areas, specific production systems, and economic incentives – these recommendations do not comprise a complete conservation strategy, but rather the key elements that emerged from our focus on knowledge and negotiation strategies for environmental governance.

3a. Knowledge Management

Note: *See working groups 1, 2 and 4 under Next Steps (Section 4 following) for further ideas to address this topic.*

Incorporate stakeholders in knowledge generation and application

Translating science in ways that make its findings understandable to other stakeholders, including decision-makers, politicians, the private sector, and indigenous and traditional populations, is one way to increase science's influence on actions. Types of information that should be incorporated into decision-making processes include models of the impacts of deforestation on rainfall and hydroelectric power generation, as well as the impacts of infrastructure on spatial land use, industrialization dynamics, and thus biodiversity and ecosystem services. Also needed are demonstration and documentation of cost-effective alternative energy sources, reduced-impact mining techniques, and ecosystem restoration protocols.

However, science must go beyond informing different publics to engaging those publics in interactive dialogue and mutual learning. This requires breaking out of the silo of academic science to include stakeholders in the practice of science and knowledge production, through articulation of non-academic knowledge systems (i.e., indigenous, traditional, local, juridical). Participation by diverse stakeholders, including women, minorities and youth, in all stages of research, from selection of research questions to analysis of results, makes the research more likely to meet their needs and more likely that knowledge will be recognized and translated into conservation action.

Apps and other low-cost, user-friendly technologies can facilitate data collection by local people (although accessibility to smart phones and adequate internet connectivity may be issues that need to be addressed). These citizen science technologies and approaches are critical to enable bottom-up data collection that informs, builds capacities, and empowers local people, while at the same time generating data that can be aggregated and is research-grade. For example, incorporating local and traditional knowledge to monitor water quality or hunting impacts can empower communities, and motivate protection of critical habitat. Community assessment of assets and needs can guide more cost-effective research that informs improved management of production systems and landscapes. Gender equity is a key consideration for citizen science and participatory monitoring.

There are also opportunities for integrating different scientific tools. For example, modeling is a useful tool to project drivers of change, while scenario planning is a useful tool to empower stakeholders to respond to change. These tools can thus be combined to project and then monitor. Further, such scientific tools can be combined with local knowledge to develop and implement territorial management plans. An example is the integration of scientific and indigenous or traditional knowledge to develop ethno-management plans (*planes de vida*) for indigenous and community owned lands. Such "life plans" and other community-generated zoning and planning products are required by many Amazonian governments when ceding access rights, land titles and/or reserve designations to indigenous or local populations; cutting-edge mapping, monitoring and modeling tools can strengthen these mandated land use management tools to be scientifically grounded living documents.

Recommendation 1. Citizen science and participatory action research

Incorporate and validate indigenous and other local knowledge systems, through dialogue based on epistemic justice, to strengthen and empower grassroots stakeholders. Train local stakeholders, including women, minorities and youth, in technology and data creation, access, analysis and use, as part of a system for monitoring and enforcement. To generate information that is relevant at larger scales (e.g. the Amazon basin or key sub-basins), strengthen or create Amazon-wide (or large-scale) networks that collect data that can be aggregated, that share these data, and that have the necessary capacities to use these data to influence decisions and policies.

Broaden the use of data by improving accessibility to information

The production of data on biodiversity, resource management and land use is expanding rapidly, but tools for accessibility to data by different stakeholders have not kept pace. Rapid advances in remote sensing and high-definition satellite imagery collected at multiple scales are already occurring, and there are many opportunities to apply this fast-growing technology for conservation, including implementation of machine learning approaches to data collection, 3D analysis of forest structure, and remote sensing of defaunation.

As the quantity of data proliferates, data archiving becomes increasingly important. Investments are needed to ensure that researchers have and use appropriate structures, such as an Amazon Data Hub, to store their data to make it public and accessible. Workshop participants called for mobile phone and online applications that allow for public access to remote sensing data (with the proviso that sensitive information, such as location of species that poachers target or location of uncontacted tribespeople, should not be posted online). This includes both access to raw data for processing by scientists and technical experts, as well as pre-processed data that allows end users to observe ecosystem change over time and space.

A key challenge in this context is to identify the specific data needs of stakeholders in order to prioritize data and information needs, and design platforms to give them access to the data they need in a form they can use effectively. In particular, data on governance has not yet achieved the same level of collection and transparency as environmental and land use data. A strategic assessment should therefore be conducted, with engagement of local communities, political decision-makers, researchers, and other relevant stakeholders.

Recommendation 2. New tools to monitor biophysical change

Use data to promote transparency and make decision-makers more accountable. Embed information in decision-making, policy monitoring and law enforcement. Improve systems for information management and synthesis to make useful data/information available to stakeholders. Develop cell phone and online apps for information access and expand reach of these tools to larger audiences.

Recommendation 3. Governance monitoring

Develop new tools to address the gap in monitoring and transparency of government planning, decision-making, budgets, licensing and law enforcement.

Use multi-scalar approaches to understand and address large-scale drivers of deforestation

The increasing influence of large-scale economic processes such as globalization of marketing chains, trade agreements, and internationally-funded investments in infrastructure and extractive industries calls for empowering local stakeholders to advocate and influence governmental and financial decision-making at larger scales. This in turn requires a systemic approach to understanding how top-down drivers of change interact with decision-making by local stakeholders to determine system dynamics.

Changes in aquatic and terrestrial environmental conditions, as well as socio-economic dynamics, need to be continuously monitored at different scales. Environmental assessment and planning (e.g. Environmental Impact Assessments) need to be more strategic, explicitly considering the longer-term and indirect effects of infrastructure, rather than being limited to direct construction effects.

Complementary to the need for data on multi-scalar system dynamics, actors on local and regional scales require avenues for conveying their needs, concerns and proposals for action on the basis of those data to stakeholders operating on larger scales. Transboundary watershed management, coordinated management

of transnational blocks of protected areas, and strategic environmental assessments exemplify this multi-scalar approach, linking stakeholders and data across scales from the local level to regional scale and beyond. Regional (Amazon-wide) citizen science efforts also provide a multi-scalar means of generating data that is research-quality and can be aggregated, thus informing and empowering local constituencies (citizens) with respect to national/regional interests and authorities.

Recommendation 4. Multi-scalar perspective

Use a systemic approach to understand current and projected dynamics of Amazonian landscapes, including the interaction of drivers from multiple levels and cumulative and indirect impacts. Empower local actors to influence decisions made at higher scales that affect their environment and quality of life.

3b. Empowerment of Local Actors to Influence Infrastructure Planning and Territorial Management

Note: *See working group 3 under Next Steps (Section 4 following) for further ideas to address this topic.*

A recurring theme that emerged from all of the negotiating governance case studies was the insufficiency of opportunities for participation by the affected stakeholders in planning processes. Especially conspicuous has been the absence of stakeholder participation in the initial stages of decision-making about infrastructure projects and economic policies that affect natural resource exploitation. Stakeholders generally only find out about the proposed projects or policies after governments have decided to pursue them. Also particularly salient is the lack of attention by governments and banks to Environmental Impact Assessments, which tend to be viewed as bureaucratic procedures in planning and licensing processes rather than key decision points.

There is a need for greater transparency via information dissemination and social participation in monitoring for governance of economic and environmental processes. Transparency fosters shared decisions that reflect broader interests among stakeholders, including interests in conservation. Crucially, investments in transparency also enable social learning via dialogue and feedback among stakeholders, which in turn facilitates social learning and adaptation. Approaches to planning and governance such as scenario planning, citizen science, integration of indigenous and scientific knowledge, and collaborative networks can all empower stakeholders to share their knowledge, learn from each other, jointly make decisions on the basis of more information, and adapt their strategies based on initial outcomes.

There is a crucial caveat to this approach, however: if initial power asymmetries are not addressed, the process may further entrench the hegemony of more powerful groups. Therefore, marginalized groups (i.e. indigenous and local communities, social and ethnic minorities, women and youth) should be supported with capacity building and advocacy tools in order to disseminate their knowledge, advance their perspectives, and thereby influence the understandings of other stakeholders and their decision-making about conservation and development. Knowledge, learning, and respect also build self-esteem, which is an important aspect of empowering marginalized groups.

Recommendation 5. Participatory planning

Build social capital and empower local stakeholders to participate in decision-making through participatory processes for visioning and social learning. Link modeling, scenario building, and monitoring in ongoing, participatory, social learning processes that feed into planning and territorial management decisions.

Recommendation 6. Indigenous peoples' and local communities' territorial management

Invest in ethnomanagement plans as a powerful tool for territorial management and empowerment of indigenous people and local communities as land stewards. Use "Hope Spots" to communicate an optimistic view of Amazon conservation, highlighting the economic, environmental and sociocultural values of indigenous and local community territorial management, thereby recognizing the key role of indigenous people and local communities in Amazon conservation.

3c. Negotiation Strategies to Address Unequal Power Relations

Note: *See working group 6 under Next Steps (Section 4 following) for further ideas to address this topic.*

It was clear from all of the negotiating governance case studies that the primary determinants of decision-making are not technical criteria but rather the interests of powerful organizations that stand to benefit from intensive use and industrialization of Amazonian ecosystems. Those organizations range from construction companies to local constituencies such as mining associations that demand access to natural resources for their livelihoods. These groups are in turn linked to politically powerful elected officials, economically influential investors, and foreign and domestic corporations and governments. The alignment of economic and political interests in resource exploitation fosters widespread political corruption that in turn promotes infrastructure projects and extractive economic activities with inadequate environmental impact assessments and weak enforcement of environmental regulations. Corruption also impedes transparency and blocks some stakeholders' participation in decision-making.

The impacted populations, as well as environmental agencies, NGOs, and universities, can potentially serve as a counterpoint to these powerful actors. A key challenge then is to identify political strategies for such stakeholders to engage hegemonic actors in order to negotiate better environmental governance. To that end, different forms of power can be leveraged via specific strategies. Engagement with researchers and other knowledge producers offers a knowledge-based strategy of disseminating information to question claims of benefits from development initiatives. Communication strategies can support knowledge strategies by adopting specific targets for information dissemination, whether affected populations, media outlets, or the decision-makers themselves. The potential for calling out banks, corporations and governments through public "naming and shaming" for lack of transparency about environmental impacts was highlighted during the workshop. To that end, a key source of power that needs to be activated is using communication strategies to build broader political and economic constituencies, especially in urban areas where the majority of citizens live, to highlight the relevance of Amazonian socio-biodiversity to sustainability, and pressure governments and companies to make better environmental decisions. Workshop participants highlighted the need for a strategic communications plan to develop and strengthen ties from conservation groups and rural peoples to potentially crucial urban constituencies, including those outside the Amazon. Other means of creating linkages between rural and urban constituencies include promotion of citizen science, ecotourism, environmental education, gastronomy and food security.

Stakeholders can further leverage knowledge and communication to intervene in the administrative procedures required for infrastructure or policy promulgation. Provision of information or dissemination of alternative claims at key decision points, ideally at the outset of planning or during the environmental impact assessment,

can help gain access to the planning process. In turn, it is crucial to build capacity among less powerful stakeholders to afford them stronger terms of engagement in negotiations. Knowledge exchange and capacity-building can foster increased self-esteem and thereby empower stakeholders to more proactively participate in planning processes and decision-making, including but not limited to public consultations. Knowledge exchange to understand costs and benefits of alternative development strategies can provide powerful arguments in planning processes. As a complement, training on leadership and communication can foster more assertive engagement in planning and decision-making by stakeholders.

Legal strategies, whether by retaining legal counsel and/or filing complaints with legal authorities, can complement or supplement the previously mentioned strategies. In Brazil, an important source of stakeholder power, both through direct action and through support of the impacted populations, is the Public Prosecution Service (*Ministério Público*). Inquiries led by Public Prosecutors can improve transparency of governments and corporations with regard to decisions and investments, including about budgets, licensing decisions, and compliance with rules and regulations. The results of such inquiries can result in law enforcement actions to combat corruption and illegal land uses. NGOs, researchers, and other supporters of concerned stakeholders can facilitate complaints to Public Prosecutors and thereby contribute to transparency and accountability by hegemonic actors.

Failing all else, political mobilization, whether for protests on the ground or online, remain an option for many stakeholders, notably local peoples and regional constituencies in affected regions.

Recommendation 7. Importance of judicial processes

Build civil society capacity to engage with legal systems. Engage public prosecutors, judges, and other legal authorities.

Recommendation 8. Coalitions

Bring together various networks / groups / institutions at different scales. Include grassroots organizations and faith communities. Strengthen these coalitions through capacity-building and information. Promote conservation by understanding and addressing strategic behavior of groups and organizations. Engage business interests and sympathetic political and opinion leaders. Address development needs.

Recommendation 9. Build constituencies

Recognize that scientific knowledge does not drive decision-making. Promote urban – rural connections to build political and economic constituencies that can pressure elected officials and corporations for conservation and development. Improve the science-policy dialogue and science communication to stakeholders and decision-makers during strategic windows of opportunity.

3d. Learning and Adaptation

Note: *See working group 4 under Next Steps (Section 4 following) for further ideas to address this topic.*

Conservation advocates and change agents (NGOs, social movements, academia) need to continuously learn and adapt. In particular, workshop participants cited a need to develop learning spaces to reflect on strategies and their outcomes (especially failures and limitations) in order to learn from them. This complements the need for broader implementation of monitoring systems and evaluation protocols in collaboration with stakeholders.

Recommendation 10. Evaluation

Improve monitoring and evaluation as a tool to strengthen conservation and development initiatives through social learning and adaptation, adding adequate resources in all project budgets to ensure that evaluations are present and effective.

Recommendation 11. Flexibility and long-term perspective

Promote policy experimentation and local action to develop and test innovative approaches. Adapt strategies continuously as contexts change and learning occurs.

4. Next Steps

An "Open Space" session during the last afternoon of the workshop provided an opportunity for self-organized groups to consider priority actions, tools, and strategies to effectively respond to drivers, including integrating different approaches in larger strategies, linking local and macro scales. Six groups formed to consider possible paths forward to continue the process for working together, within the group of workshop participants and beyond.

Presented below are the titles and participants of each group (names in bold were indicated as group leaders), plus the discussion highlights and commitments / next steps that were recorded by each group.

Group 1: Macro-coordination to Confront Infrastructure Threats to the Amazon

Cynthia Simmons, Megan MacDowell, Cesar Gamboa, Manolo Morales, Bruno Sanguinetti, Lisa Famolare, Paul Moorcroft, Tom Ankersen, Mariana Varese, Aghane Carvalho Antunes, Jacy Hyde, Daniel Roquetti

Discussion Highlights:

- Better understand the cumulative impacts of multiple infrastructure projects
- Getting to the table → who sits at the table?
- How to get in front of projects
- Big picture
- Promoting Strategic/Programmatic Environmental Assessment (policy level)

Commitments and Next Steps:

- Spatializing the threats
- Coordinating infrastructure planning database
- Synthesizing infrastructure plans
- Compiling case studies about experiences with infrastructure projects
- Forming new alliances
- Disseminating information through regional networks
- Gaps analysis
- Follow the money (from China)
- General alternative model
- Get to the table (basin-scale planning processes: existing + promoting new ones (COSIPLAN/IIRSA)+PAC+PAC2 etc.)
- AMAZON INFRASTRUCTURE NETWORK

Group 2: How can technological innovation assist in linking monitoring with on the ground actions?

Angelica Almeyda, Eben Broadbent, Foster Brown, Mabel Baez, Andrea Chavez, Vanessa Luna, Jynessa Dutka-Gianelli

Discussion Highlights:

- Two temporal scales: continuous change and longer-term
- Make data relevant and used at political decision levels
- Give voice to different stakeholders

Commitments and Next Steps:

- Pilot study
- Collaborative funding proposal

Group 3: Strategies to Empower Indigenous Peoples to Participate in Decision Making to Avoid Threats, Integrate Scales and Consolidate Territorial Management

Ane Alencar, Joênia Wapichana, Aline Carrara, Robert Miller, Michael Heckenberger, Glenn Shephard, Bruna Franchetto, Simone Athayde, Marion Adeney, Wendy Townsend, Maira Irigaray, Felipe Pinheiro

Discussion Highlights:

- Strengthening of indigenous institutions, leaders, actions and projects. Access and exchange of technology.
- Development of programs and networks for integrating indigenous rights to territorial management plans, and training indigenous rights defenders (ongoing, concept note to be presented to potential funders).
- Training of indigenous researchers as well as educational institutes organized by themselves (e.g. Indigenous Amazonian University, existing examples from Mexico, US, New Zealand).
- Promote opportunities for indigenous peoples to engage with broader society, bringing awareness and sharing their knowledge and worldviews on issues such as water, biodiversity (biocultural diversity) and climate.
- Promote forums for indigenous peoples to share and access technology, tools and experiences in territorial management and consultation protocols (e.g. ISE Belém+30 2018, UF-LAS 2020 Conference on Indigenous Lives and Ancestry).

Commitments and Next Steps:

- Develop a concept note for a program aimed at implementing an indigenous defenders network across the Amazon, integrating the defense of human rights with territorial management and outreach to broader society.
- Promote a Pan-Amazonian indigenous forum along with the International Society of Ethnobiology Conference in Belém in August of 2018 (Belém+30) – involves fund-raising with potential donors/ funders.
- Organize the 2020 UF Center for Latin American Studies Conference coinciding with 50th Earth Day, focusing on the theme of valuing indigenous and local peoples' lifestyles and ancestry.
- Develop a platform for synthesizing and sharing indigenous and local experiences in territorial management and consultation protocols, co-led by indigenous organizations.

Group 4: Research to Action for Change

Bob Buschbacher, Karen Kainer , Catherine Tucker, Denyse Mello, Bette Loiselle, Mariano Castro, Juliana Santiago, Tita Alvira, Angela Livino, Andrea Encalada, Ricardo Mello, Renato Farias, Alexandre Olival, Andrezza Spexoto, Pedro Solano, Wendy-Lin Bartels, Sinomar Fonseca, Ana Luiza Violato Espada

Discussion Highlights:

- Link research to organizations that are acting locally. Carry out research to document and support the work of organizations who work with local communities.
- Create a multi-scalar research network and parallel learning networks of local actors.
- Influence institutions by presenting results to major global biodiversity and climate events in 2020.

Commitments and Next Steps:

- Elaboration of a participatory research project directly linked to the practices of organizations that work with communities (within 6 months).
- Development of an online platform (IOV can help to lead this).

Group 5: Colombian Peace Process

Corine Vrisendorp, Dan Nepstad, Enrique Ortiz, Marcia Macedo, Bruce McKenney, David Kaimowitz, John Reid, Elizabeth Anderson, Claudia Romero, Jon Dain, Paulina Arroyo, Xavier Haro-Carrion, Robinson Botero

Discussion Highlights:

- Dynamic process on the ground, lots of money coming in, huge social and environmental costs.
- Elections soon. Think short gains now, but focus on election and post-election processes.
- Opportunities to work with business sector, e.g. FENAGRO.
- Plano de ordenamiento ferrovial – who leads this?

Commitments and Next Steps:

- Explore possible learning exchanges (including with Alianzas Campesinas, Resguardos Productivos, Indigenas, Acre)
- Read about other post-conflict processes around the world + environmental impacts. Learn (David Kaimowitz)
- Plan for "post-election, post-conflict" Colombia
- Mayor's conference in Miami
- Exchange with N. Ireland, Maños de Paz (Charo)

Group 6: Linking Rural Amazonia to Cities Through Communication

Rob Wallace, Aidee Moser Luiz, Marliz Arteaga, Gabriel Carrero, Ana Luiza Peterlini, Sarela Paz, Amy Juelsgard, Franklin Paniagua, Steve Perz, Johanna Espin, Adila Lima, Roberta de Carvalho, Bruno Sanguinetti

Discussion Highlights:

- Communication as a power tool (as a mean of mobilization and governance)
- Develop project communications with transparency (engaging and inspiring)
- Lowering barriers for new voices
- Agenda – setting through communication
- Strategic communication campaigns
- Dialogue (2 ways communications)
- Communication for: Whom? When? What?

Commitments and Next Steps:

- Learn from think tanks (e.g.: Canada / UK)
- Effective communication for policy (e.g.: Public Health)
- Effective communication examples: ODI ROMA Manual; The Think Tanks Initiatives; Action Research
- Moving towards engagement through: citizen science, crowd sourcing, crowdfunding. Doing not just receiving information
- Pride + identity: Peru gastronomy and Identidad Madidi (Bolivia) examples
- Positivity, faith and meeting people where they are
- Pope visit to Peru
- Connecting people to nature through experiences in cities
- Social media for future generations

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Principal author: Robert Buschbacher

UF Graduate Students who produced report sections

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Monitoring of Dynamic Processes – Mabel Baez, Farah Carrasco and Xavier Haro-Carrion
Learning For Adaptation – Pamela Montero-Alvarez, Angelica Garcia Villacorta and Sinomar Fonseca Jr.
Negotiation Strategy Case Studies – Marliz Arteaga, Vanessa Luna and Johanna Espin
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Connie Campbell - University of Florida
Andrea Encalada - Universidad San Francisco de Quito
Megan MacDowell - Andes Amazon Fund
Bruno Sanguinetti - Consorcio Madre de Dios / CEDE
Mariana Varese - Wildlife Conservation Society
Rob Wallace - Wildlife Conservation Society

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I. TCD Learning Day

II. List of Posters presented at Workshop Opening

III. Links to Presentation Documents and Videos

IV. Workshop Program

V. List of Participants

Appendix 1: TCD Learning Day

The group of UF graduate students who participated in the workshop took advantage of the presence of so many inspiring visitors to organize a "Learning Day" that would focus on their interests and concerns as aspiring researchers and conservationists. The students enrolled in a special course on "Knowledge, Governance and Land Use Dynamics in the Tropics," and invited some of the workshop participants to arrive a day early to interact with themselves and other TCD faculty and students.

The students were eager to discuss experiences and solutions for addressing conservation and development challenges; reflect on how research can effectively contribute to conservation and development; and promote networking between TCD students, alumni and partners.

Because TCD students seek to embed their research in the context of the people who inhabit and manage tropical landscapes, and face challenges in relating to communities as outsiders and researchers, they organized one panel to discuss *"Ways to engage with communities in research and project design."*

Recognizing the great expertise on modeling that would be present at the workshop, and having reflected on the challenges and difficulties of translating scientific results into policy and management, students organized a second panel on *"Application of climate and landscape simulation models to inform decision-making."*

TCD students grapple with the challenge of how to address the conflicting interests and power imbalances between conservation, local development and large-scale economic extraction. They were therefore eager to hear from professionals who could discuss strategies and experiences for *"Building collaborative alliances in conservation and development initiatives."*

Finally, students wanted to create a format that would erase the line that typically prevents career-based discussions from meandering into the personal aspects of work in the field of conservation and development. They therefore organized two sessions of *"Professional storytelling."*

The students planned and facilitated a series of interactive sessions that emphasized group dynamics, engaging conversations, and a diversity of presentation topics. These are summarized below.

Community Engagement in Research and Project Design

The objective of this session was to identify the main challenges and strategies to effectively engage in participatory processes of knowledge generation. The session consisted of four panelists, a rotating discussion through four "topic stations," and a final synthesis by each panelist.

- Foster Brown (Woods Hole Research Center and Federal University of Acre) showed how scientists can empower and contribute to communities by using innovative pedagogy (workshops, field courses, participatory research) that valorizes and enhances local knowledge.
- Robert Miller (Institute Olhar Etnográfico) presented experiences using both technology and story-telling to guide indigenous communities to reflect on the past and present conditions of their lands, in order to develop management plans for their future.
- Karen Kainer (University of Florida) discussed the potential benefits (for both parties) of academics working with communities, reviewed the barriers to this, and presented strategies for making community-oriented research successful.
- Diana Alvira (Field Museum) showed how an asset-based approach can build community support for conservation while making sure that conservation planning takes community needs and aspirations into account.

Participants acknowledged the many challenges that confront scientists who want to work with communities, but were also adamant that it is worth the effort. Understanding complex social-ecological systems requires effectively incorporating the knowledge of local people, and involving local communities in the production of knowledge can make research relevant and applicable. The session was therefore an opportunity for junior researchers to be inspired by more senior practitioners, exchange ideas, and discuss concrete strategies. Key messages are summarized below.

Entry to a community is a critical and potentially difficult first step in building a relationship. It is important to have consent before entering a community, and to have previous communication with government. NGOs can play an important role in opening doors with communities, but their history and role in a community will affect how a researcher is perceived. Similarly, every researcher will influence how future researchers are perceived.

In order to ground questions in community needs, researchers must start by recognizing the complexity of communities, which are dynamic and diverse. They may have complex internal conflicts, power structures, delicate topics, and hidden (informal) leaders. Engaging with community women may require creative methods and using informal spaces. Researchers need to be flexible, adaptable and sensitive to local conditions. This does require time and investment, which is not always compatible with academic or donor timelines. [TCD students are privileged to have the opportunity to receive exploratory research grants to improve their future Ph.D. research development.]

Research questions should address practical challenges grounded in reality, and it is important to discuss and share questions with the community, while recognizing that researchers might not be able to address all of a community's questions or needs. Communities are seeking solutions to immediate needs, especially in terms of new economically viable activities, and solutions for ongoing problems such as health and education. Remember that time is also an important resource for community members, and a researcher must always consider and appreciate the time a community provides to him or her.

Scientists may not be able to address these immediate needs, so should add value in other ways. Science can be used to provide new ideas, raise status and self-esteem, and to awaken curiosity. Researchers can also help to build capacity in a local community; that is why it is important to develop skills as facilitators or intermediaries among people in academia and communities.

At the end of the day, a constructive relationship depends on building trust and being willing to learn from community members. This implies sharing ownership of the results. Communication plays an important role: exchange information with sincerity and clarity, in a very simple and humble way, identifying practical information for the communities. It is important to be patient, invest time and energy into relationships, and use your human side such as charm, humor, music etc. -- researchers can have important entertainment value!

Application of Climate and Landscape Simulation Models to Inform Decision-making

In this session, panelists described their work with development of models to simulate climate and land use change, and were asked to address the link between the information generated and public policy and other land-use decision-making.

- Cynthia Simmons (University of Florida) described a computation platform intended to integrate economic, land change, climate and hydrological components in order to holistically project synergistic and cumulative impacts of multiple infrastructure projects.
- Lisa Famalore (Conservation International) presented Tremarctos, an open access tool that measures environmental vulnerability of infrastructure projects in Colombia.
- Marcia Macedo (Woods Hole Research Center) discussed pan-Amazon mapping of forest biomass,

deforestation and degradation linked to climate models.
- Ane Alencar (Instituto de Pesquisa Ambiental da Amazônia) presented various mapping platforms and apps that provide information on land use, carbon and climate.

The array of modeling tools presented was extremely impressive in terms of their ability to integrate and analyze diverse sources of data and project impacts spatially. They clearly document the threat posed to forest cover, biodiversity and water quality if current economic and land use trends in the Amazon continue. A remaining challenge is to incorporate secondary impacts such as human migration and industrialization. In addition, the models do not incorporate economic and political processes, and cannot account for surprises and non-linear processes.

It was recognized that incorporating model results into decision-making processes is difficult, but different strategies are being applied. These include analysis of alternative development pathways early on in the planning process, and direct communication to powerful decision-makers such as government agencies and investment banks. However, additional communication channels are needed.

There are also important innovations in collaborative development of monitoring tools, such as mapping land cover annually throughout Brazil in a multi-institutional platform (Mapbiomas.org). In addition, several management tools are being developed that involve users, from indigenous communities to environmental agencies, in the design, input, analysis and use of tools to: respond to climate alerts (Indigenous Climate Alert app), manage protected areas (somai.org) and land reform settlements (pas-simpas.org.br), and monitor the implementation of deforestation reduction policies (indicar.org.br).

Collaborative Alliances for Conservation and Development

The primary aim of this panel was to discuss how to build collaborative alliances among diverse stakeholders from various sectors and with different backgrounds, interests, perceptions, and views on conservation and development. The panelists were selected to represent different sectors: academia, an international and a Brazilian conservation NGO, and a governmental environment agency. Each of the panelists responded to a specific question:

- Ricardo Mello (WWF-Brazil) focused on: What are the main challenges for building alliances and synergies among diverse stakeholders with different interests and backgrounds (local x national, urban x rural)?
- Claudio Padua (Instituto de Pesquisas Êcologicas) addressed: How to identify people's different interests and perceptions of conservation and development?
- Vera Reis (State of Acre Climate Change Institute, IMC) reflected on: How to implement actions when stakeholders have conflicting interests or worldviews?
- Alexandre Olival (State University of Mato Grosso) discussed: How would you define successful communication among diverse stakeholders; and what tools and strategies would you recommend for communicating with different stakeholders?

The panelists presented strategies for fostering multi-stakeholder processes and reaching meaningful engagement among them, and engendered a discussion on how to cope with conflicting interests and views between stakeholders. The most common ideas mentioned by the panelists as strategies for creating collaborative alliances were to recognize and respond to changing environments, embrace difference, look for commonalities, build alliances, and increase knowledge sharing. The discussion is summarized in the following Word Cloud.

Professional Storytelling

Finally, a professional storytelling activity was organized at two different times during the day, aimed at building relationships and empathy among participants, through sharing of personal stories that reveal both the professional and personal aspects of work in this field. Panelists Renato Farias (Instituto Centro de Vida), Connie Campbell (University of Florida), Denyse Mello (University of Florida), Andrezza Spexoto (Instituto Ouro Verde), and Susana Padua (Instituto de Pesquisas Ecológicas) recounted their personal and professional experiences by responding to a number of the following questions selected at random:

- How did you start working in the Amazon? (First job experiences)
- What is a normal day and what is a crazy day at work for you? (Most memorable anecdotes)
- What were - and perhaps still are - the main challenges you face? (Personal and/or professional level)
- What gives you joy in your work?
- What advice can you share with us?

This activity created a more intimate environment in which panelists and participants could engage in a more informal way, setting a positive tone for the following days of workshop discussion. The panelists truthfully and even sometimes emotionally talked about their personal experiences, in a way that participants could relate to and truly understand some inner and outer elements of their career paths.

The panelists were passionate about their work, because they deal with challenges (of conservation and development) every day and to give their best they must be really connected with the work. Honesty, transparency and self-control are key attributes. They also made clear that their personal and professional lives are not separate, and some shared gender and personal obstacles that they had faced. It requires great commitment and courage to be in the front line trying to make positive changes in the world, and this can take a toll on personal and family well-being. A vision of a better future for their children, and having the support of those around you, is key to help overcome the daily challenges.

Stories also touched on the relationships between these professionals -- from academia, non-profits and government -- with local communities. They emphasized respect for culture and people, and humility to learn

from the communities and to recognize our own errors and shortcomings in a continuous learning process for everybody. There were stories about making connections with local people by getting closer to women in the context of the professionals' own struggles with gender inequality. Immersing ourselves in the reality of the communities or municipalities, and engaging in everyday life, helps to better understand their perspectives and gain deeper trust. The process of "becoming a local" can be crucial for creating legitimacy and meeting the actual needs and realities of people. Finally, working with people and the environment requires long-term engagement because change takes time.

It was inspirational to hear this wide range of professionals talk about how intensely personal their work was for them, how they had confronted personal obstacles, but that the rewards of contributing to conservation and development were truly important to each person. In general everybody remembered their pathways with happiness and excitement, and seemed to relate to the students as reminders of how they were in the past!

Appendix 2: List of Posters Presented at Workshop Opening

(Available for access here: http://uftcd.org/wp-content/uploads/2017/10/Amazon.Workshop_Poster-session.pdf)

GROUP 1: Decision Support Tools

	Authors	Title
1	Elizabeth Anderson, Javier A. Maldonado-Ocampo, Andrea C. Encalada, Max Hidalgo & Fernando Carvajal-Vallejos	Rios Vivos Andinos: Collaborative Science for Conservation of Andean Amazon Rivers
2	Jhon Farfan, Jose Lahura, Luis Masias, Francisco Roman & Bruno Sanguinetti	Small Scale Alluvial Gold Mining in the Peruvian Amazon. Environmental Mitigation and Restoration
3	Jhon Farfan, Jose Lahura, Luis Masias, Francisco, Roman & Bruno Sanguinetti	Small Scale Alluvial Gold Mining in the Peruvian Amazon. The challenge to formalize
4	Juan Carlos Vargas	Landscape Conservation and Climate Change Scenarios for the State of Florida
5	Juan Carlos Vargas	Prioritizing Science Needs Through Participatory Scenarios for Energy and Resource Development on the North Slope and Adjacent Seas
6	Kelle Koenig, Karyn Tabor & Emma DeCamp	Where there's heat… Mapping Fires and Fire Risk with Firecast
7	Lilian Painter, Robert Wallace, Ariel Reinaga, Elvira Salinas, Cristina Pabón & Andrés Ramírez	Territorial Management and Forest Conservation
8	Michael Heckenberger, Afukaka Kuikuro, Bruna Franchetto & Wetherbee Dorshow	Kuikuro Casa da Cultura: A Village in Town, Canarana, Mato Grosso
9	Miroslav Honzak	The Cloud Forest Blue Energy Mechanism. Using Green Infrastructure and Innovative Finance to Drive Cloud Forest Restoration
10	Robert P. Miller & Ney Maciel	Ethnomanagement Plans: Tools for Supporting Environmental and Territorial Management of Indigenous Lands in Brazil

GROUP 2: Monitoring Dynamic Processes

	Authors	Title
11	A. Christine Swanson & John F. Weishampel	Effects of Scale on LiDAR Interpretation in a Neotropical Rainforest
12	Guayasamin, Carolina Sampedro & Carlos Mena	Napo Community-based Stream Biomonitoring
13	Glenn H. Shepard Jr.	Indigenous Landscape Classification in Amazonia: case studies in "ethnobotanical ground-truthing"
14	Glenn H. Shepard Jr., Julia Ohl-Schacherer, Taal Levi, Carlos Peres & Douglas W. Yu	Participatory Monitoring of Hunting Sustainability in Manu National Park, Peru
15	Grace Palacios	Sustainable Tourism Assessment and Mitigation Strategies for the Protection of the Natural and Cultural Assets of Two Ashaninka Indigenous Communities in Peru
16	Jacy Hyde, Denis Valle & Stephanie Bohlman	Transmission Lines in the Brazilian Amazon: an under-acknowledged conservation thread
17	Juliana Santiago	Amazon Fund: Fostering Sustainable Development in Tropical Forest
18	Marcia N. Macedo, Alessandro Baccini, Paulo M. Brando, Andrea A. Castanho & Michael T. Coe	Integrating Science and Policy to Ensure the Future of Amazon Protected Areas
19	Mariana Varese	Citizen Science for the Amazon
20	Tito J. Muto, Cesar Ruiz, Fabio Arjona, Jose Vicente Rodriguez & Lisa Famolare	Tremarctos Colombia

GROUP 3: Learning for Adaptation

	Authors	Title
21	Alexandre de Azevedo Olival & Andrezza Alves Spexoto Olival	Participatory Action Research: Integrating Academia, NGOs, and Communities: the experience of Agroforestry Research Center/ Instituto Ouro Verde
22	Diana Alvira, Corine Vriesendorp, Alaka Wali, Ashwin Ravikumar, Miguel Macedo & M. Keller	Community Empowerment: linking human well-being and conservation through a biocultural assets-based approach
23	Jynessa Dutka-Gianelli, Carolina R. C. Doria, Simone Athayde, Chelsey Crandall & Kai Lorenzen	Engaging Stakeholders in Place-based Fisheries Management and Citizen Science Initiatives
24	Marieke Veeger & Joost Vervoort	Socio-economic Scenarios to Develop and Test Agricultural Adaptation Policies in the Andes and Central America
25	Michael Esbach	Biocultural Corridors: Exploring Social and Ecological Connectivity in Amazonian Ecuador
26	Michael Heckenberger, Wetherbee Dorshow, Bruna Franchetto & Afukaka Kuikuro	Heritage Forests of the Terra Indígena do Xingu (TIX), Mato Grosso
27	Natalie Cooper, Ana Luiza V. Espada, Denyse Mello, Karen Kainer, Lucía Wadt, Fernanda Fonseca, Eduardo Bongiolo, Ricardo Mello, Jon Dain, Marcus Vinício D' Oliveira & Juliana Paulo Saraiva	Logging in Protected Areas: communities that flourish can inform those that struggle
28	Pamela Montero-Alvarez & Angelica Almeyda	Communal Rural Sustainable Tourism: lessons learned from La Minga, Loreto, Peru
29	Robert Buschbacher, Wendy-Lin Bartels, Denyse Mello & Simone Athayde	Amazon Conservation Leadership Initiative: linking UF TCD to conservation & development practitioners
30	Wendy R. Townsend, Roberto Vides Almonacid & Damián I. Rumiz	The Impact of an Academically Recognized Participatory Planning Process for the Baures Indigenous Territory, Beni, Bolivia

GROUP 4: Negotiating Governance

	Authors	Title
31	Andrea Baudoin Farah & Sarela Paz Patiño	¿Carretera ecológica?... ¡Sólo Dios puede hacer Milagros! Lessons learned from the TIPNIS conflict and resistance - Bolivia
32	Maria M Fontecha-Tirado	Building Trust and Collaborating with Others: challenges for a sustainable peace in Caquetá, Colombia
33	Paula Franco Moreira, Cristina Inoue, Eduardo Viola, Simone Athayde & Sonia Seixas	Triple Target Strategy: the Southern Transnational Advocacy Net-work against Brazilian Dams in the Peruvian
34	Simone Athayde, Bette Loiselle, Tom Ankersen, Maíra Irigaray, Felício Pontes, Ubiratan Cazetta, Paula Franco Moreira, Timothy McLendon, João Andrade, Fernanda Oliveira & Cynthia Simmons	Indigenous Defenders Network: promoting social- environmental justice in the context of large infrastructure development across the Amazon
35	Simone Athayde, Elineide E. Marques, Juliana Laufer, Paula Franco Moreira & Lígia Raquel Soares	Participatory Management of Biocultural Diversity across Indigenous Lands Affected by Hydroelectric Dams in the Amazon

Appendix 3:
Links to Presentation Documents and Videos

Availalble online at: http://uftcd.org/2017-uf-amazon-workshop/

Plenary Lectures

Carlos Nobre – Land use and climate change risks to the Amazon forests (pdf) (video)
Thomas Lovejoy (audio)

Knowledge as a Key Input for Governance

Stephen Perz – Knowledge and governance for conservation and development in the Amazon (pdf) (video)
Claudio Padua – Knowledge as a key input for governance (pdf) (video)

Knowledge and Learning Tools for Planning and Adaptation

Session 1: Decision Support Tools

1.1 Scientific Analysis and Simulation Models to Support Conservation and Development Decision-Making: Cynthia Simmons, University of Florida; Marcia Macedo, Woods Hole; Paul Moorcroft, Harvard University; Lisa Famolare, Conservation International (pdf) (video)
1.2 Articulating Indigenous and Scientific Knowledge for Conservation and Development: Simone Athayde, University of Florida; Robert Miller, Instituto Olhar Etnográfico; Glenn Shepard, Goeldi Museum; Michael Heckenberger, University of Florida; Joenia Wapichana, Roraima Indigenous Council (pdf) (video)
1.3 Scenario Planning via Stakeholder Development and Analysis of Alternative Futures: Juan Carlos Vargas, GeoAdaptive LLC; Tom Ankersen, University of Florida; Franklin Paniagua, University of Florida (pdf) (video)

Session 2 – Monitoring of Dynamic Processes with Application to Environmental Management

2.1 Multi-scalar Data Collection Tools: Eben Broadbent, University of Florida; Angelica Almeyda Zambrano, University of Florida; Ane Alencar, Instituto de Pesquisa Ambiental da Amazônia (pdf) (video)
2.2 Community Monitoring and Citizen Science: Elizabeth Anderson, Florida International University; Mariana Varese, Wildlife Conservation Society; Foster Brown, Woods Hole / UFAC; Jynessa Dutka-Gianelli, University of Florida (pdf) (video)
2.3 Data Curation for Dissemination, Analysis, and Application: Emilio Bruna, University of Florida; Doug Soltis, University of Florida; Denis Valle, University of Florida (pdf) (video)

Session 3 – Learning for Adaptation

3.1 Monitoring and Evaluation of Conservation Tool Effectiveness: Claudia Romero, University of Florida; Karl Didier, Wildlife Conservation Society; Richard Margoluis, Gordon and Betty Moore Foundation (pdf) (video)
3.2 Learning Networks to Strengthen Governance: Renato Farias, Instituto Centro de Vida; Vera Reis, Government of Acre; Robert Buschbacher, University of Florida; Wendy-Lin Bartels, University of Florida; Denyse Mello, University of Florida (pdf) (video)
3.3 Participatory-Action Research: Integrating Academia, NGOs, and Communities: Alexandre Olival, Instituto Ouro Verde; Andrea Encalada, Universidad San Francisco de Quito; Wendy Townsend, Noel Kempff Mercado Museum of Natural History; Diana Alvira, Field Museum (pdf) (video)

Summary of Sessions –

Session 1: Oswaldo Medina, University of Florida; Daniel Roquetti, Universidade de São Paulo; Gabriel Carrero, University of Florida (video)

Session 2: Xavier Haro Carrion, University of Florida; Vanessa Luna, University of Florida; Farah Carrasco, University of Florida (video)

Session 3: Natalie Cooper, University of Florida; Angelica Garcia, University of Florida (video)

Panel Discussion - David Kaimowitz, Ford Foundation; Ricardo Mello, World Wildlife Fund-Brazil; Megan MacDowell, Andes-Amazon Fund; Dan Nepstad, Earth Innovations Institute; Enrique Ortiz, Andes-Amazon Fund; Juliana Santiago, Amazon Fund-BNDES (video)

Special Session: Indigenous Visions of the Past and Future of the Amazon

Michael Heckenberger – Introduction to the Session (pdf) (video) (Note: embedded videos of (1) Chief Afukaka and (2) climate change are captured below in higher quality; advance through videos in Heckenberger's webinar)

Indigenous Visions video – Chief Afukaka Kuikuro (video)

Kuikuro Climate Change video - (video1)

Bruna Franchetto – (pdf) (video)

Wetherbee Dorshaw – GIS and Kuikuro (pdf) (video)

Negotiating Governance Strategies to Address Drivers of Deforestation

Mauricio Voivodic – Knowledge and governance for conservation and development in the Amazon (video)

Beto Verissimo – Negotiating governance strategies to address drivers of deforestation (pdf) (video)

Negotiating Governance Case Studies

Case Study 1: Planning and Licensing of Hydroelectric Dams in the Amazon – Simone Athayde, University of Florida; Ana Cristina Barros, The Nature Conservancy; Daniel Roquetti, Universidade de São Paulo; Angela Livino, Brazilian Agency for Energy Research EPE; Marliz Arteaga, University of Florida; Ciro Campos, Instituto Socioambiental; Ubiratan Cazetta, Ministério Público Federal-Brazil; Carolina Rodrigues da Costa Doria, Universidade Federal de Rondônia; Adila Lima, Universidade Federal do Tocantins; Aidee Moser Luiz, Ministério Público Estadual – Rondônia; Elineide Marques, Universidade Federal do Tocantins; Paula Franco Moreira, German Corporation for International Cooperation, GIZ Brazil (pdf) (video)

Case Study 2: Formalization of Alluvial Gold Mining in the Peruvian Amazon: rationale & challenges – Bruno Sanguinetti, Consorcio Madre de Dios/CEDE; Roxana Barrantes, Pontificia Universidad Católica del Perú; Pedro Solano, Sociedad Peruana de Derecho Ambiental (pdf) (video)

Case Study 3: Infrastructure Development in Western Amazonia – Sarela Paz, Universidad Mayor de San Simón; Rob Wallace, Wildlife Conservation Society-Bolivia; Mariano Castro, Pontificia Universidad Católica del Perú; César Gamboa, Derecho, Ambiente y Recursos Naturales (pdf) (video)

Panel Discussion - Connie Campbell, University of Florida; Michael Goulding, Wildlife Conservation Society; Manolo Morales, EcoLex; John Reid, Independent (video)

Appendix 4: Workshop Program

Tuesday, October 3, 2017 Smathers Library East, Room 100	
6:00 pm to 7:00 pm	Registration, Reception and Interactive Poster Session
7:00 pm to 7:15 pm	Welcome: **Philip J. Williams**, University of Florida & **Avecita Chicchón**, Gordon and Betty Moore Foundation
7:15 pm to 7:45 pm	Plenary Lectures: **Carlos Nobre**, National Institute of Science & Technology for Climate Change and World Resources Institute – Brazil; **Thomas Lovejoy**, George Mason University & United Nations Foundation
7:45 pm to 8:45 pm	World Café Conversation
8:45 pm to 9:30 pm	Reception
Wednesday, October 4, 2017 **Austin Cary Forest Campus, Learning Center**	
7:20 am to 7:45 am	Transfer to Meeting Site
7:45 am to 8:45 am	Registration, Continental Breakfast and Mixer
8:45 am to 9:30 am	Welcome: **Kent Fuchs**, President, University of Florida & **Aileen Lee**, Gordon and Betty Moore Foundation Introductions & Overview of Workshop Expectations and Objectives: **Charo Lanao**, Facilitator **Bette Loiselle**, University of Florida
9:30 am to 10:00 am	Knowledge as a Key Input for Governance Key Note Speakers: **Stephen Perz**, University of Florida & **Claudio Padua**, Instituto de Pesquisas Ecológicas
10:00 am to 10:20 am	Coffee Break
10:20 am to 12:30 pm	Knowledge and Learning Tools for Planning and Adaptation (Parallel Sessions): Session 1 – Decision Support Tools *1.1 Scientific Analysis and Simulation Models to Support Conservation and Development Decision-Making:* **Cynthia Simmons**, University of Florida; **Marcia Macedo**, Woods Hole; **Paul Moorcroft**, Harvard University; **Lisa Famolare**, Conservation International *1.2 Articulating Indigenous and Scientific Knowledge for Conservation and Development:* **Simone Athayde**, University of Florida; **Robert Miller**, Instituto Olhar Etnográfico; **Glenn Shepard**, Goeldi Museum; **Michael Heckenberger**, University of Florida; **Joenia Wapichana**, Roraima Indigenous Council *1.3 Scenario Planning via Stakeholder Development and Analysis of Alternative Futures:* **Juan Carlos Vargas**, GeoAdaptive LLC; **Tom Ankersen**, University of Florida; **Franklin Paniagua**, University of Florida

10:20 am to 12:30 pm	Session 2 – Monitoring of Dynamic Processes with Application to Environmental Management *2.1 Multi-scalar Data Collection Tools:* **Eben Broadbent**, University of Florida; **Angelica Almeyda Zambrano**, University of Florida; **Ane Alencar**, Instituto de Pesquisa Ambiental da Amazônia *2.2 Community Monitoring and Citizen Science:* **Elizabeth Anderson**, Florida International University; **Mariana Varese**, Wildlife Conservation Society; **Foster Brown**, Woods Hole / UFAC; **Jynessa DutkaGianelli**, University of Florida *2.3 Data Curation for Dissemination, Analysis, and Application:* **Emilio Bruna**, University of Florida; **Doug Soltis**, University of Florida; **Denis Valle**, University of Florida Session 3 – Learning for Adaptation 3.*1 Monitoring and Evaluation of Conservation Tool Effectiveness:* **Claudia Romero,** University of Florida; **Karl Didier**, Wildlife Conservation Society; **Richard Margoluis**, Gordon and Betty Moore Foundation *3.2 Learning Networks to Strengthen Governance:* **Renato Farias**, Instituto Centro de Vida; **Vera Reis**, Government of Acre; **Robert Buschbacher**, University of Florida; **Wendy-Lin Bartels**, University of Florida; **Denyse Mello**, University of Florida *3.3 Participatory-Action Research: Integrating Academia, NGOs, and Communities:* **Alexandre Olival**, Instituto Ouro Verde; **Andrea Encalada**, Universidad San Francisco de Quito; **Wendy Townsend**, Noel Kempff Mercado Museum of Natural History; **Diana Alvira**, Field Museum
12:30 pm to 2:00 pm	Lunch
2:00 pm to 2:30 pm	Session Summaries: UF Graduate Students
2:30 pm to 3:30 pm	Panel Presentations and Discussions from Knowledge Sessions – distill ideas plus feedback Panelists: **David Kaimowitz**, Ford Foundation; **Ricardo Mello**, World Wildlife Fund-Brazil; **Megan MacDowell**, Andes-Amazon Fund; **Dan Nepstad**, Earth Innovations Institute; **Enrique Ortiz**, Andes-Amazon Fund; **Juliana Santiago**, Amazon Fund-BNDES
3:30 pm to 3:50 pm	Coffee Break
3:50 pm to 4:30 pm	Open Space: Dialogue in Groups
4:30 pm to 4:45 pm	Wrap-up: **Marion Adeney**, Gordon and Betty Moore Foundation & **Stephen Perz**, University of Florida
5:00 pm to 6:30 pm	Evening Reception & Dinner
6:30 pm to 7:45 pm	Special Session: Indigenous Visions of the Past and Future of the Amazon Welcome and Purpose – **Michael Heckenberger**, University of Florida Speakers: **Afukaka Kuikuro & Assuso Kuikuro**, Kuikuro Indigenous Association; **Wetherbee Dorshaw**, Earth Analytic, Inc. & Puente GIS Institute; **Bruna Franchetto**, Federal University of Rio de Janeiro

Thursday, October 05, 2017 Austin Cary Forest Campus, Learning Center	
7:30 am to 7:50 am	Transport to Meeting Site
7:45 am to 8:30 am	Continental Breakfast at Meeting Site
8:30 am to 8:50 am	Welcome: **Marianne Schmink**, University of Florida & **Paulina Arroyo**, Gordon and Betty Moore Foundation Networking & Brief Summary of Day 1 and Program for Day 2
8:50 am to 9:20 am	Negotiating Governance Strategies to Address Drivers of Deforestation Key Note Speakers: **Mauricio Voivodic**, World Wildlife Fund-Brazil & **Beto Verissimo**, Instituto do Homen e Meio Ambiente da Amazônia (IMAZON)
9:30 am to 10:05 am	Negotiating Governance Case Studies *Case Study 1: Planning and Licensing of Hydroelectric Dams in the Amazon* – **Ana Cristina Barros**, The Nature Conservancy; **Ubiratan Cazetta**, Ministério Público Federal-Brazil; **Angela Livino**, Brazil Energy Research Office (EPE); **Simone Athayde**, University of Florida; **Paula Moreira**, State University of Campinas - UNICAMP; **Ciro Campos**, Instituto Socioambiental; **Aidee Moser Luiz**, Ministério Público Estadual – Rondônia; **Marliz Arteaga**, University of Florida; **Adila Lima**, Universidade Federal do Tocantins; **Daniel Roquetti**, Universidade de São Paulo; **Carolina Rodrigues de Costa Doria**, Universidade Federal de Rondônia; **Elineide Marques**, Universidade Federal do Tocantins
10:05 am to 10:40 am	Negotiating Governance Case Studies *Case Study 2: Formalization of Alluvial Gold Mining in the Peruvian Amazon: rationale & challenges* – **Bruno Sanguinetti**, Consorcio Madre de Dios/CEDE; **Roxana Barrantes**, Pontificia Universidad Católica del Perú; **Pedro Solano**, Sociedad Peruana de Derecho Ambiental
10:40 am to 11:15 am	Negotiating Governance Case Studies *Case Study 3: Infrastructure Development in Western Amazonia* – **Sarela Paz**, Universidad Mayor de San Simón; **Rob Wallace**, Wildlife Conservation Society-Bolivia; **Mariano Castro**, Pontificia Universidad Católica del Perú; **César Gamboa**, Derecho, Ambiente y Recursos Naturales
11:15 am to 11:30 am	Coffee Break
11:30 am to 12:30 pm	Negotiating Governance Panel Discussion – distill ideas plus feedback: Panelists: **Connie Campbell**, University of Florida; **Michael Goulding**, Wildlife Conservation Society; **Manolo Morales**, EcoLex; **John Reid**, Independent
12:30 pm to 12:40 pm	Reflections: **Marina Campos**, Gordon and Betty Moore Foundation & **Robert Buschbacher**, University of Florida
12:40 pm to 2:00 pm	Lunch
2:00 pm to 4:00 pm	Open Space Dialogue by Themes to Distill Key Conclusions and Discuss Next Steps
4:00 pm to 4:40 pm	Sharing Key Conclusions and Next Steps
4:40 pm to 5:00 pm	Reflection – Collective Next Steps – Evaluation Closing Ceremonies: **Avecita Chicchón**, Gordon and Betty Moore Foundation & **Marianne Schmink**, University of Florida

Appendix 5: Workshop Participants

(alphabetical by first name with UF participants at end of table)

Individual bios available online at http://uftcd.org/wp-content/uploads/2017/10/Amazon.Workshop_Bios.pdf

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