MEETING REPORT

Tools to Make Scientifically Sound Decisions about Trade-Offs between Different Conservation Actions

A Case Study from the Greater Mahale Ecosystem, Tanzania

12–13th March, 2015, JGI Education Center, Kigoma, Tanzania

AFRICA BIODIVERSITY COLLABORATIVE GROUP

Project overview

Facing limited conservation resources, conservation managers and planners often need to make trade-offs in what they want to conserve and where. Such decisions often involve multiple stakeholders with dramatically different priorities, further complicating the decision making process. These decisions are also being made against a backdrop of all prior land-use decisions, which have often proved be short-sighted, leading to sub-optimal outcomes for all stakeholders. Climate change impacts such as shifting species ranges and modified agricultural practices further complicate the outlook. To address these often difficult resource allocation problems a suite of decision support tools have been developed to assist managers. One such tool, MARXAN, has been used around the globe to identify critical areas for species and ecosystem conservation that minimize the impact of conservation decisions on other stakeholders. MARXAN can also be used to assess trade-offs between competing objectives. This USAID funded project aims to provide case studies of how to integrate multiple objectives into a spatially explicit objective based planning process. The planning framework and scenario based approach is designed to allow stakeholders to identify clear trade-offs and prioritize robust investments at the landscape scale.

The Jane Goodall Institute (JGI) with technical support from the Wildlife Conservation Society (WCS) have organized a series of two day workshops to expose government officials, conservation managers, and planners to these relatively new tools and how they can be used to make better decisions for all concerned. The first workshop was held at the JGI's Education Center in Kigoma in May 2013. The workshop focused on the development of a case study and exploration of the trade-offs associated with different conservation and development objectives in the Greater Mahale Ecosystem in western Tanzania.   During the workshop the participants identified a number of ways in which the analysis could be refined and improved including through the suggestion of additional data layers and alternative conservation priorities. The participants also requested that the scope of the analysis be expanded to include the entire Mpanda district and two neighboring districts.

The second workshop in the series was held on March 12-13th 2015. The second workshop in the series was designed to build off the lessons learned in the first workshop and delve deeper into how decision support tools can be leveraged to inform complex planning decisions. The second workshop was aligned with a conservation action planning workshop that was also planned for the region so as to take advantage of synergies in data collection and processing.

The aim of this report is to provide a summary of the two-day meeting. The agenda for this workshop can be found in Appendix 1. The meeting was attended with the local and regional governments from Kigoma, Uvinza, and Mpanda regions, TANAPA and other NGOs.

Workshop Goals

1) Introduce the use of optimization tools to explore trade-offs in landscape prioritization
2) Learn problem formulation for Marxan
3) Review data collected, refine data and identify data gaps

Welcome

Emmanuel Mtiti welcomed workshop attendees and provided an overview of how the series of workshops planned under this project fits within JGI's wider efforts in the landscape. He noted that there was a lot of turnover in district representation and that many of the attendees had not had the opportunity to participate in the first workshop in the series. He stressed for participants that the agenda had be adjusted in accordance with number of new attendees and that anyone not present at the first workshop would not be at any disadvantage. He stressed JGI's hope that the process would be a collaborative effort between all partners, and that through that collaboration the results of the analysis would be much improved. He explained that the workplan is part of a collaborative effort between three NGOs (AWF, JGI, WCS) and that a similar series of workshops were being held in two other African landscapes.

Greater Gombe Mahale Landscape overview

Lilian Pintea then provided an overview of the biodiversity values and conservation challenges the landscape is currently facing, setting the stage for the rest of the workshop. Lilian talked about the changes that had been observed in the Greater Mahale ecosystem over the past 30 years, and highlighted specific successes and failures. He also outlined how the scope of the planning area had been updated since the first workshop. Then Lilian discussed the Greater Mahale and Masito-Ugalla conservation action planning (CAP) processes that JGI and FZS led that identified the conservation targets that will be used for the rest of the workshop. Lilian explained that the workshop was scheduled to accompany the updating of the CAP for the region, to take advantage of the potential synergy

between the two processes. He outlined how the CAP identifies broad activities and actions and how Marxan can uses those goals to identify specific areas where individual actions should be undertaken.

Introduction to systematic conservation planning

Dan Segan then explained the theoretical underpinnings and origins of systematic conservation planning. The talk covered the fundamental principles of systematic conservation planning, including setting quantifiable objectives, complementarity, and efficiency. He also emphasized the importance of working through participatory planning process that uses a transparent decision framework.

Reserve design game

After hearing about the basics systematic conservation planning the participants were asked to partake in a simple game that illustrated the application of those principles. The game walked participants through a simple planning problem, that was set up in Microsoft excel. In the problem participants were given the task of protecting 20% of population of three species. They were given the population of each species in 100 different planning units, and the cost of setting aside the planning unit for conservation. The participants were instructed to select planning units for protection to achieve the planning objective, while minimizing the overall cost of protecting the three species. After they were satisfied with the areas they had selected, participants were asked to write the cost of protecting 20% of all the species on the white board along with their name (provided that another participant hadn't already protected the species at a lower cost). Participants worked in groups and were given about 30 minutes to complete the task. The first participant that wrote their cost on the board was $8000, while the final one was just over $2000. As a group we then discussed the challenges of selecting areas to work by hand, and looked at how in less than a minute Marxan identified a set of planning units that could achieve the objectives for just $1700. There was general consensus that the task was difficult with three species and that with multiple objectives and many more than 100 potential places to work a decision support tool could be very useful.

What is marxan?

Then Dan introduced the Marxan decision support tool, and provided and overview of the 'lingo' used in Marxan analysis and explained the cost minimization approach of the tool and emphasis of importance of setting targets. After the audience had been introduced to the basics, they were walked through the interpretation of Marxan results with particular emphasis on the difference between conservation value

(as assessed in Marxan) and biologic value. He noted that people familiar with targeting conservation activities based solely on species richness maps or threat maps may be surprised by the outputs of a Marxan prioritization effort. Marxan, he explained, attempts to find areas that most cost effectively meet the conservation objectives. Within this context the tool is not trying to target effort towards the greatest threat, is it trying to target effort where it can most cost efficiently mitigate threats to achieve the objectives of the analysis. A number of stylized examples (with only nine planning units and single conservation feature) were then presented, where the objective stayed the same but the cost surface changed. Dan walked the participants how the areas identified by Marxan would change in each cost scenario. He highlighted that even the areas with highest richness would not always be selected if they were also the highest cost. However, he emphasized that the achievement of targets is the highest priority within Marxan, and even the most expensive areas would be selected, if they were required to achieve the objectives.

Data overview

Lilian then gave a presentation on the data that had been gathered to support the planning processes to date. He covered both the biodiversity data used in the analysis as well as the socioeconomic layers, placing particular emphasis on data layers that were added or updated after the first workshop. Lilian noted how the gap in elephant migration corridor on the north eastern portion of Katavi national park, had been adjusted as a result of workshop participants questioning the outputs of Marxan run at the first workshop.

Participatory data review

After Lillian's talk, workshop attendees were divided into working groups and tasked with reviewing the data in their district. Representatives of each of four districts were asked first to review the socio-economic data collected for the analysis. Each was tasked with checking the existing roads, location of village locations and settlements, district boundaries, protected area boundaries, and existing agricultural areas. Each district was then asked to assign a relative likelihood that conservation efforts to a village would be successful based on their assessment of each village's current structure and receptiveness to engage in conservation efforts. This was the last activity on day one.

Participatory data review

The second day began with a review the information covered in the first day and presentation on the information collected during the participatory mapping exercise.

Posing "Marxan" questions?

Dan began by outlying the general types of questions that Marxan could help users answer. These were illustrated with examples of questions that were appropriated formulated for Marxan and those that were not. Then he presented two Marxan questions and asked the participants to identify the information required to solve the problem. As the participants suggested data that might be necessary to answer the question, he explained why that might or might not be useful. A number of the suggested data layers suggested a level of complexity well beyond that simple problems designed as examples for teaching. Because of the complexity of the questions, the discussion first focused on how simple problems could be formulated in Marxan, and then how more complex problem could be formulated at solved. Among the more detailed examples participants asked about were Marxan's ability to accommodate individual population units of a species, or areas that were only seasonally important to a species. Dan noted that anything that can be mapped can be included in a Marxan analysis, and the more accurately species needs could be articulated and delineated spatially, the more likely the outputs from the analysis would be to look reasonable and provide for the persistence of the species. The participants also suggested that often different types of management actions are appropriate in different parts of the landscape, and Dan explained that this was a Marxan with Zones type of question.

Formulating planning problems for Marxan

After the participants had a more detailed understanding of the types of questions Marxan could help answer, they had the opportunity specify their own conservation objectives and questions for marxan. For this group working session, participants were again divided into groups based on the district they worked in. Lilian then provided each group with a list of conservation features and costs for the region and allowed each group to formulate their own planning problems. The participants were also asked for additional suggests for either conservation features, or costs that they would like to see included in the analysis.

Among the data layers suggested by the participants for inclusion in the analysis was the location of waterfalls. The participants noted that waterfalls were very important tourist attractions and that they

should be included in conservation areas when possible to enhance the quality of the tourism experience in the region.

Marxan Demonstration

The conservation strategies developed by each district (and a JGI group) were loaded into Marxan during the lunch break. After lunch Lilian and Dan then demonstrated what a Marxan solution to each of the conservation strategies the groups had outlined would look like on the landscape. Marxan decision tool for the workshop and walked users through how the data compiled for the preliminary analysis had been integrated into the decision support tool. For example Apendix 3 shows Marxan results using Uvinza District scenario 1 that includes the following ranking:

Conservation targets:

Chimpanzee habitats (90%)

Chimpanzee known locations (85%)

Elephant paths and known locations (80%)

Wetlands (98%)

Mountain ecosystems (75%)

Priority watersheds (80%)

Woodlands (95%)

Riverine Evergreen forests (75%)

Bamboo (50%)

Biomass/Carbon (90%)

Tree cover (85%)

Waterfalls (30%)

Costs:

Maximize distance to settlements (included)

Maximize the distance to roads (not included)

Minimize the overlap with current agriculture areas (included)

Minimize the overlap with future agriculture areas (included)

Workshop conclusion and next steps

Mtiti lead a discussion about what the participants learned during the course of the workshop and what the next steps might be. He said JGI would continue to be the technical lead for the landscape analysis, but reminded participants that it was critical to build capacity within each of the districts. In order to carry on the work, he asked that each district nominate a point person. The point person within each district would be responsible for data collection and synthesis, and liaising with the JGI project lead to ensure the appropriate information continued to be utilized in the analysis. Critically it was noted that even the expanded project planning area was not sufficient and that it should be expanded again to reflect new district boundaries. The process for expanding the scope of the analysis will be supported by the point person in each district.

Appendix 1. Workshop agenda

Tools to make scientifically sound decisions about trade-offs

between different conservation actions

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Project overview

Facing limited conservation resources, conservation managers and planners often need to make trade-offs in what they want to conserve and where. Such decisions may involve multiple stakeholders with dramatically different priorities, further complicating the decision making process. These decisions are also being made against a backdrop of all prior land-use decisions, which have often proved be short-sighted, leading to sub-optimal outcomes for all stakeholders. Climate change impacts such as shifting species ranges and modified agricultural practices further complicate the outlook. To address these often difficult resource allocation problems a suite of decision support tools have been developed to assist managers. One such tool, MARXAN, has been used around the globe to identify critical areas for species and ecosystem conservation that minimize the impact of conservation decisions on other stakeholders. MARXAN can also be used to assess trade-offs between competing objectives. This USAID funded project aims to provide case studies of how to integrate multiple objectives into a spatially explicit objective based planning process. The planning framework and scenario based approach is designed to allow stakeholders to identify clear trade-offs and prioritize robust investments at the landscape scale.

The Jane Goodall Institute (JGI) with technical support from the Wildlife Conservation Society (WCS) held a two day workshop at the JGI's Education Center in Kigoma on 23-24th of May 2013 to expose government officials, conservation managers, and planners to these relatively new tools and how they can be used to make better decisions for all concerned. The workshop focused on the development of a case study and exploration of the trade-offs associated with different conservation and development objectives in the Greater Mahale Ecosystem in western Tanzania.

This is the second workshop in the series, and was designed to build off the lessons learned in the first workshop and delve deeper into how decision support tools can be leveraged to inform complex planning decisions. Based on the recommendations of participants at the first workshop, the data used in the case study have been updated and revised and the scope of the planning area has been expanded to include additional districts not considered in the first workshop.

Workshop Goals

1) Introduce scenario planning and the use of optimization tools to explore trade-offs in landscape prioritization
2) Learn problem formulation for Marxan and identify key questions to address in the region
3) Review data collected, refine data and identify data gaps

Day 1 – Thursday, March 12th			
Time	**Topic**	**Description**	**Speaker**
8:30 – 9:00	Arrival	Registration	
9:00 - 9:15	Welcome	Why are we here?	Emmanuel Mtiti
9:15 – 9:30	Introductions		All
9:30 – 10:00	Conservation planning	Overview of Conservation Action Planning process in the region	Lilian Pintea
10:00 - 10:30	Introduction to SCP	What is systematic conservation planning?	Dan Segan
10:30 - 11:00	Planning game	Individual design their own protected area network and compare the costs	Dan Segan
11:00 - 11:30	Coffee/Tea break		
11:30 – 12:45	Introduction to Marxan	What is Marxan? How does it support systematic conservation planning? Marxan in practice: Case studies of how marxan has been used.	Dan Segan
12:45 - 1:15	Workshop 1	Review output from the workshop	Lilian Pintea
1:15 - 2:00	Data	Review of data used to inform decision making. Updates to datasets since the first workshop	Lilian Pintea
2:00 – 3:00	Lunch		
3:00 - 4:30	Participatory mapping	Instructions provided on PowerPoint	Individual District groups
End of day 1			

Day 2 – Thursday, March 12th			
Time	**Topic**	**Description**	**Speaker**

8:30 – 9:00	Arrival	Registration	
9:00 - 10:00	Review	Review of information captured during participatory mapping	
10:00 – 11:00	Problem formulation	Marxan and decision making - what kinds of questions can marxan help answer?	Facilitated discussion Dan/Lilian
11:00 - 11:30	Coffee break		
11:30 - 1:00	Problem formulation	Break up into smaller groups and develop individual questions for Marxan What are the key spatial question we are dealing with? What information do we need to answer them?	District groups
1:00 - 2:00	Lunch		
2:00 - 2:30	Present questions	One member from each group presents the groups problem back to the whole group	
2:30 - 4:00	Live demo	Review of potential solutions posed in the group discussions	Dan Segan
End of workshop			

Appendix 2. Photos from the workshop agenda

Group photo of Marxan workshop participants

Participatory mapping of local expert knowledge validating and updating MARXAN database

Apendix 3. Example of MARXAN results using Uvinza District Scenario 1

GOMBE MAHALE ECOSYSTEM
MARXAN RESULTS (UVINZA DISTRICT SCENARIO 1)

Legend

☐ Districts		▨ Forest Reserve	
▨ National Parks		▨ Local Authority Forest Reserved (proposed)	
		▨ Village Forest Reserves	
		— Major roads	

Map developed: Lilian Pintea & Jovin Lwehabura
March 20, 2015