



MEETING REPORT

Tools to make scientifically sound decisions about trade-offs between different actions

An example from the Murchison-Semliki Landscape (Uganda)

27-28th August Metropole Hotel, Kampala

Background

Woodlands are important ecosystems in Africa that contain significant biodiversity. Currently, many woodland ecosystems are being cleared or degraded at an unprecedented rate across Africa and this loss will have a serious impact on biodiversity and greatly contribute to ongoing carbon emissions. In 2011 ABCG partners recognized the importance of having a work plan that developed methodologies to help identify and prioritize those woodland areas that will achieve large conservation and mitigation gains, so as to achieve the greatest return on limited conservation and REDD+ resources. Such interventions should also attempt to minimize social cost, and increase woodland connectivity to enhance resilience to climate change and human pressures.

In 2011, three ABCG partners, the Wildlife Conservation Society (WCS), Jane Goodall Institute (JGI), and African Wildlife Foundation (AWF) developed a concept "Carbon Flux under Conditions of Climate Change: Woodlands, trade-offs and Climate change" with an overall aim to provide methods and case studies of the best ways to integrate the objectives of climate change mitigation, climate change adaptation, and biodiversity. Three case study areas were chosen: Murchison Falls-Semliki landscape in Uganda (WCS), Imbirikani Group Ranch in Kenya (AWF), and Masito-Ugalla Ecosystem (JGI). In each landscape, the case studies would be generated by different stakeholder groups including REDD+ project developers, government stakeholders and planners in African countries with substantial woodlands as well as the funders of Climate change (adaptation and mitigation) in Africa (such as USAID). This concept was successfully funded in the 2012-2014 Biodiversity Analysis and Technical Support (BATS) for USAID/Africa process.

As part of the 2012 workplan, WCS conducted an initial meeting to explore targets for the social, biodiversity and carbon data that had been assimilated to date and to discuss the process of assessing trade-offs in planning. WCS held a two day workshop at the Metropole Hotel in Kampala (Acacia

Avenue) on 27-28th August 2012 for conservation managers, planners, members of the development community and government. The area of focus for the workshop was the Murchison -Semliki Landscape in Uganda, one of six key landscapes identified in the Albertine Rift. The Landscape is increasingly under pressure from mining, timber extraction and agriculture conversion, and is also a site where WCS has a REDD+ project in development.

The aim of this report is to provide a summary of the two-day meeting. The agenda for this workshop is found in Appendix 1. The meeting was well attended with members of USAID, ministries of the government of Uganda, international and national NGOs, Makerere University, industry (Tullow Oil), and members of the strategic environmental assessment team for oil in Uganda. The list of attendees is in Appendix 2.

Meeting Aims

There were four aims of the two day workshop. The first aim was to introduce scenario planning and the use of optimization tools to explore trade-offs in landscape prioritization. The second (and primary) aim was to elicit stakeholder objectives and preferences for biodiversity, and socio-economic development. The third aim was to review data collected thus far, identify data gaps, and shortcomings in the methods. The fourth aim was to elicit stakeholder forecasts for future human impacts in the landscape. Photos of some of the activities can be found at Appendix 3.

Introduction to scenario planning and optimization tools

The first half day of the meeting was devoted to talks given by different WCS staff that explained the theoretical underpinnings of systematic conservation planning and the most widely used optimization tools. Dan Segan and James Watson gave opening talks, which led to a dialogue around the fundamentals of systematic conservation planning, the evolution of the discipline as well as the importance of stating clear, explicit objectives when using optimization tools. To give the theoretical side of the talks some real world applicability, Miguel Leal explained the latest developments of the REDD+ work in the Murchison-Semliki landscape and Sam Ayebare gave a presentation of the species distribution modeling work he has done in the landscape. These presentations provided some of the background data (biodiversity, carbon, deforestation rates) that were discussed later in the workshop. Dan Segan then provided the meeting with a summary of how these data (when targets were set) would be used in the spatial optimization analysis tool being utilized (Marxan).

Generating elicited stakeholder objectives and preferences for biodiversity and socio-economic development

The most important element of the meeting was to allow attendees to provide their preferences and objectives for both biodiversity and socio-economic development. This information will then be assimilated and utilized in the spatial prioritization process, to be conducted after the workshop. It was clear that as well as biodiversity and carbon conservation there are several other competing land uses in the Murchison-Semliki Landscape and it made sense to include these as well as the REDD+ potential and biodiversity of the landscape.

Attendees of the meeting were asked to undertake three different activities. The first activity was to assess how important the major socio-economic land uses in the landscape were to Uganda, when compared against each other. The five major socio-economic land uses identified were agriculture, REDD+, oil development, timber harvesting and biodiversity-oriented tourism. The second activity was to assess how each land use would likely impact other users of the landscape in a compatibility/incompatibility analysis. For the third activity, each group was asked to generate specific targets for groups of ecosystems and species (based on their endemism and threat) to be used in the conservation planning activities that would take place following the workshop. The following is a more detailed explanation of these activities and a summary of the key results.

(1) Assessing the importance of socio-economic activities across the landscape

For the first activity, analytic hierarchy process was used so to develop logically consistent weightings of the relative importance of individual activities (Saaty, 2008)¹. This type of method is commonly used in multi-criteria analysis to elicit expert opinion on the relative priority of divergent options. Each socio-economic land use option (agriculture, REDD+, oil development, timber harvesting and biodiversity-oriented tourism) was compared with each other in terms of their relative importance. A rating scale of 1-9 was used to achieve this (e.g. if group members thought one activity was much more important than another, they would give a score of 9. Conversely, if group members thought the activity was much less important than the other, they were to give a score of 1/9. A score of one indicated that the two were of equal importance). As groups conducted the pair-wise comparison, a consistency score was provided to them to ensure that their ratings were logically consistent.

¹ Saaty, T.L. (2008) 'Decision making with the analytic hierarchy process', *Int. J. Services Sciences*, Vol. 1, No. 1, pp.83-98.

The meeting was divided into two groups, each having representation from the different stakeholder groups at the meeting. The first group was asked how they felt the Government of Uganda currently assessed the importance of each land use in the landscape in terms of what is currently happening on the ground. The second group was asked, if they were government, how much importance would be placed on each land use activity in the landscape.

The two groups came up with similar scores but there were also clear differences (Table 1). Both groups identified agriculture as by far the most important land use in the landscape. There was some disagreement with the next most important activity with the first group identifying oil as a very important land use to the Government of Uganda whereas the second group identified tourism as the next most important activity because of its longer term potential for income generation. REDD+ activities were seen to be much more important by the second group than the first group. Timber harvesting in the landscape was not scored highly by either group.

Table 1. A pair-wise analysis of the importance of socio-economic activities in the Murchison-Semliki landscape. The importance of each activity in the first column was compared against each of the other activities, with the highest rating being a 9 and the lowest rating being 1/9. The overall weight (relative importance) is provided in the last column.

Group 1. Group 1 assessed from the perspective of what they thought the Government of Uganda was currently placing priority on.

| | Agriculture | REDD+ | Oil | Timber | Tourism | Overall Weight |
|-------------|-------------|-------|------|--------|---------|----------------|
| Agriculture | 1.00 | 9.00 | 3.00 | 5.00 | 7.00 | 0.4989 |
| REDD+ | 0.11 | 1.00 | 0.11 | 0.33 | 0.20 | 0.0327 |
| Oil | 0.33 | 9.00 | 1.00 | 5.00 | 3.00 | 0.2688 |
| Timber | 0.20 | 3.00 | 0.20 | 1.00 | 0.33 | 0.0729 |
| Tourism | 0.14 | 5.00 | 0.33 | 3.00 | 1.00 | 0.1266 |

Group 2. Group assessed as if they were government, and could place importance on whichever activity they felt was most important.

| | Agriculture | REDD+ | Oil | Timber | Tourism | Overall Weight |
|-------------|-------------|-------|------|--------|---------|----------------|
| Agriculture | 1.00 | 7.00 | 5.00 | 7.00 | 5.00 | 0.5450 |
| REDD+ | 0.14 | 1.00 | 0.33 | 3.00 | 0.33 | 0.0826 |
| Oil | 0.20 | 3.00 | 1.00 | 3.00 | 0.33 | 0.1311 |
| Timber | 0.14 | 0.33 | 0.33 | 1.00 | 0.33 | 0.0498 |
| Tourism | 0.20 | 3.00 | 3.00 | 3.00 | 1.00 | 0.1915 |

(2) Assessing the compatibility of each socio-economic activities with each other across the landscape

For the second activity, both groups worked on the same question: how compatible is each land use with other land uses? The land uses were first split up into non-extractive activities (REDD+, Tourism) and extractive activities (Oil development, timber extraction, agriculture). A final activity (biodiversity conservation) was included to see how each of the groups felt the extractive activities impacted biodiversity in the Landscape. Each group was asked to assess each activity against each other and give a score between 1-9, with 1 being 'complete incompatibility' and 9 being 'complete compatibility'.

After assessment the full group convened and a representative of each smaller group presented their compatibility matrix to the larger group. There was some similarity between the groups, but group 2 was more pessimistic of the consequences of development in the landscape on biodiversity conservation and the other non-extractive land uses (Table 2). Group 2 argued that there could be high compatibility between timber harvesting and REDD+, but only if the industry was well regulated (that is FSC certified and utilized reduced-impact logging (RIL) protocols). Both groups thought the development of the oil industry would be highly incompatible with biodiversity conservation and tourism.

There was quite a bit of discussion over these scores with group 2 stating that they had scored based on the current situation in Uganda while group 1 was operating under the idea that this is what it should be. This led to the development of a third compatibility matrix in plenary, based on the full group felt could be achieved under the ideal situation where companies and stakeholders operate in as 'green' a way as is possible to minimize their negative impacts on biodiversity and non-extractive uses. These ideal scores are also given in Table 2.

Table 2. An analysis of the compatibility of land use options in the Murchison-Semliki Landscape. The compatibility for each land use was assessed against each other and given a score between 1-9, with 1 being complete incompatibility and 9 being complete compatibility.

Group 1.

| | Biodiversity | REDD+ | Tourism |
|-------------|--------------|-------|---------|
| Oil | 2 | 4 | 2 |
| Timber | 4 | 7 | 5 |
| Agriculture | 2 | 3 | 2 |

Group 2.

| | Biodiversity | REDD+ | Tourism |
|-------------|--------------|-------|---------|
| Oil | 2 | 2 | 3 |
| Timber | 3 | 3 | 3 |
| Agriculture | 1 | 2 | 2 |

Ideal scores.

| | Biodiversity | REDD+ | Tourism |
|-------------|--------------|-------|---------|
| Oil | 6 | 9 | 4 |
| Timber | 4 | 7 | 5 |
| Agriculture | 3 | 5 | 2 |

(3) Generating targets for ecosystems and species (based on their endemism and threat) for which conservation planning.

For the third activity, each group was asked to generate specific conservation targets for the major ecosystem types and key species groups (based on their endemism and threat) for which conservation planning trade-off analyses need to be based upon. A sensitivity range was included to provide groups the opportunity to explore the impact of a range of targets on the landscape configuration. The major ecosystems identified in the landscapes were: Woodland, Grassland, Wetland, Bushland, Colonizing Forest, Tropical High Forest (Fully Stocked), and Tropical High Forest (Depleted). The species groups were separated based on their level of endangerment, population density, and endemism. An additional category was provided for groups to set targets for species of high value to tourism (see Table 3 for the categories).

The two groups came up with similar targets for the ecosystem types, with wetlands considered to need higher levels of protection, and relatively lower targets set for bushlands. The one discrepancy was for tropical forest ecosystems that had been harvested, with the groups disagreeing on the conservation value of these forests (one group felt that after a forest had been depleted, it takes many years for it to regain habitat value for forest-dependent species, and as such is a lower priority).

There was some variation in the species targets, with one group saying that all the groups identified needing 100% protection, while the other willing to have slightly lower targets (especially those species that have high densities). Both groups mentioned that they would need to see the impact of the targets on the landscape before final decisions could be made on these targets.

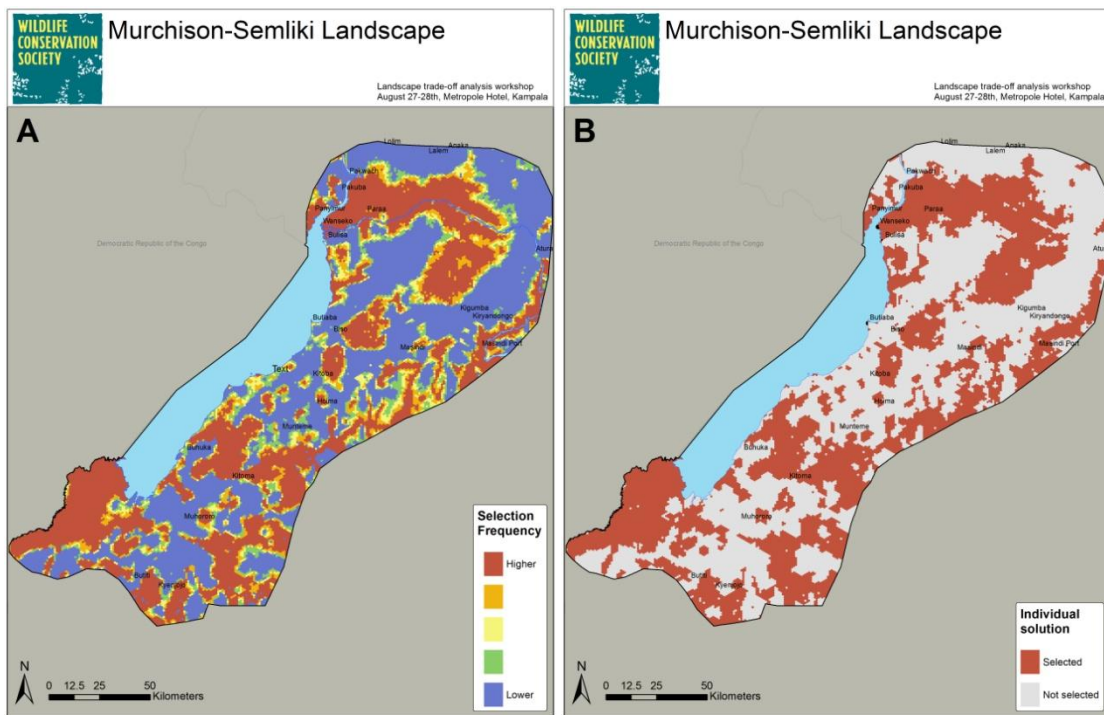
Table 3. Targets set by each group, with a sensitivity range for major ecosystem types and species groups in the Murchison-Semliki landscape.

| | Group 1 | | Group 2 | |
|------------------------------------------------------------------------------------|---------|-------------|---------|-------------|
| | Target | Sensitivity | Target | Sensitivity |
| Ecosystems | | | | |
| Woodland | 70% | ± 20% | 60% | ± 10% |
| Grassland | 80% | ± 5% | 80% | ± 10% |
| Wetland | 100% | ± 10% | 90% | ± 10% |
| Bushland | 45% | ± 10% | 60% | ± 15% |
| Colonizing Forest | 80% | ± 20% | 100% | ± 0% |
| Tropical High Forest Fully Stocked | 80% | ± 20% | 80% | ± 10% |
| Tropical High Forest Depleted | 80% | ± 20% | 30% | ± 5% |
| | | | | |
| Species | | | | |
| Threatened species at low density (<1/km ²) | 80% | ± 10% | 100% | ± 0% |
| Threatened species at medium density (1-20/km ²) | 70% | ± 20% | 100% | ± 0% |
| Threatened species at high density (>20/km ²) | 50% | ± 10% | 100% | ± 0% |
| Albertine Rift endemic species at low density (<1/km ²) | 90% | ± 10% | 100% | ± 0% |
| Albertine Rift endemic species at medium density (1-20/km ²) | 80% | ± 20% | 100% | ± 0% |
| Albertine Rift endemic species at high density (>20/km ²) | 80% | ± 20% | 100% | ± 0% |
| Tourism value species (Chimpanzee, lion, elephant, leopard, giraffe, hyena, hippo) | 80% | ± 15% | 100% | ± 0% |
| Species where >10% of World population occurs in region | 90% | ± 10% | 100% | ± 0% |

Reviewing data collected thus far, identify data gaps, and shortcomings in the methods

Once the targets were set, Dan Segan provided some of the first scenario Marxan analysis using the preliminary species, ecosystem-type, carbon and land class data. Dan showed what the outputs of a Marxan-style analysis would look like, and how they could be used to support decision making. Meeting attendees agreed that the outputs were extremely useful in understanding which sites are more important than others but identified a number of shortcomings with the current species data, particularly for future projections under climate change. It was agreed that the methods behind the species distribution modeling would be re-assessed and more accurate species distributions models produced. The carbon biomass data seemed adequate for the purposes of this work.

Figure 1. Preliminary output presented for discussion at the workshop. Figure 1A displays the relative importance of areas to achieve conservation objectives efficiently (higher importance in red). Figure 1B shows a single Marxan solution (red areas) that achieves the specified conservation objectives.



Eliciting stakeholder forecasts for future human impacts in the Murchison -Semliki landscape

The final activity undertaken by the group was an assessment of what the future human-impact across the Murchison-Semliki Landscape was likely to be. Grace Nangendo first gave an overview of the human footprint in the landscape, and how this has changed over the past decade. Grace then provided insights in what the future human footprint will look, looking at current development pressures and human population growth in the region. She provided a series of scenarios, based on the expansion of the oil developments and agricultural expansion. The final component of her talk was about the possible effects of climate change on agricultural suitability, and what this may mean for the region.

Once this was completed, the two groups were asked to draw on large A0 maps of the landscape all the future activities they believed were going to occur in landscape during the next 10 years. The groups identified likely areas for urban and agricultural expansion, new development projects, and infrastructure required to support the landscape of the future (Figure 1). A representative of each group then presented the group's projections to the plenary for discussion. The outcome was a much clearer picture of what the future development patterns are likely to look like in the landscape.

Figure 2. The two different land use forecast maps generated by the two groups.

Group 1



Group 2



Outcomes of the meeting and future work

The workshop successfully achieved the four stated aims. Beyond the most important aim of generating targets and an understanding of the future economic activities, the meeting allowed stakeholders to understand the planning process that is going to be undertaken and ultimately achieved stakeholder buy-in. The attendees of the meeting were very interested in seeing what the Marxan analysis with their objectives will produce and looked forward to the second meeting.

We agreed to write up a first run of the Marxan using the targets the group established to show the details of a full analysis incorporating some of the results of the relative priorities for different land uses. This report will demonstrate how Marxan can be used to examine trade-offs in these competing land uses in the Murchison-Semliki Landscape. While this report will provide a first cut, a number of workshop participants recognized the need for government engagement in the process, specifically in establishing national conservation objectives. One intended audience for this report will be to interest the ongoing Strategic Environmental Assessment for Oil in Uganda in using Marxan to assess trade-offs in land use options.

The next steps in the “Carbon Flux under Conditions of Climate Change: Woodlands, trade-offs and Climate change” workplan are for WCS to:

1. Undertake the preliminary analysis incorporating the feedback from the workshop as identified above. The analysis will focus on highlighting how the inclusion of different stakeholder interests can be used to explore options for conserving the biodiversity of the Landscape.
2. Refine all the data layers based on the targets identified in the workshop. This will include the cost surfaces (based on the compatibility analysis), and the species and ecosystem data.
3. Once the data layers are refined, WCS will generate the scenarios based on the different targets using the best data we have. This will be written up as a report and communicated back to the group in a second meeting to be held in Uganda in FY 13.
4. Using the lesson learned from this workshop we will refine the workshop content and activities to support the JGI and AWF case studies that are going to be undertaken in FY 13.

Appendix 1. Agenda for the Tools to make scientifically sound decisions about trade-offs between different actions workshop held on the 27-28th August, Metropole Hotel, Kampala

| Day 1 – Monday, August 27th | | | |
|-----------------------------------------------|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|----------------|
| Time | Topic | Description | Speaker |
| 8:30 – 9:00 | Arrival | Registration | |
| 9:00 - 9:15 | Welcome | Why are we here? | Andy Plumptre |
| 9:15-9:30 | | What is BATS/ABCG | James Watson |
| 9:30 – 9:45 | Introductions | | All |
| 9:45 – 10:30 | Conservation planning | What is systematic conservation planning? | James Watson |
| 10:30 – 10:45 | Coffee break | | |
| 10:45 – 12:30 | Introduction to Marxan | What is Marxan? How does it support systematic conservation planning? Example applications: case studies of how people went through the process. | Dan Segan |
| 12:30 – 1:00 | REDD | Overview of REDD and REDD project work to-date in the Murchison-Semliki (MS) Landscape. | Miguel Leal |
| 1:00 – 2:00 | Lunch | | |
| 2:00 – 2:40 | Data – Species | Overview of species data, and the modeling processes used to forecast distribution of flora/fauna in the Albertine Rift. | Sam Ayebare |
| 2:40 – 3: 45 | Approach | Application of Marxan in MS landscape Introduction to scenario planning & target setting. | Dan Segan |
| 3:45 – 4:00 | Break | | |
| 4:00 – 5:00 | Scenario discussion | Break into small groups to identify scenarios and weightings. | Working groups |
| 5:00 – 5:15 | Day 1 wrap up Break | What’s been covered, what to expect from day 2. | Andy Plumptre |

| Day 2 – Tuesday, August 28th | | | |
|------------------------------------------------|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|
| Time | Topic | Description | Speaker |
| 8:30 – 9:00 | Arrival | | |
| 9:00 – 10:00 | Scenarios discussion 2 | Full group discussion, report back from smaller group discussions. Reach goals consensus. Identify scenarios to be compared. | 1 representative from each group |
| 10:00 – 10:30 | Scenarios | Scenarios in Marxan – review example output. | Dan Segan |
| 10:30 – 10:45 | Break | Coffee | |
| 10:45 – 12:15 | Setting Targets | Working groups to assess proposed targets for Marxan and to propose modifications. | Working groups |
| 12:15 – 12:45 | Group Discussion – targets | Reconvene – Working groups present targets identified for discussion. | 1 representative from each group |
| 12.45-1.45 | Lunch | | |
| 1:45 – 2:30 | Zoning | What is Marxan with zones? Application of Zones to solve more complex problems (eg competing uses). | Dan Segan |
| 2:30 – 3:00 | Forecasting change | What is the current human footprint? Clearing/Land use change patterns in the past X years? Present conceptual models from Strategic planning project? | Grace Nangendo |
| 3:00 – 4:15 | Working groups – growth | Forecasting the landscape of the future: (1) how is population expected to change? (2) what kinds of economic growth and development projects are expected? (3) how will climate change impact population and economic growth? | Working groups |
| 4:15 – 4:30 | Break | | |
| 4:30 – 5:00 | Group Discussion – future growth | Reconvene – working groups present individual growth scenarios, and identify growth collective growth scenarios | 1 representative from each group |
| 5:00 – 5:15 | Day 2 wrap-up & evaluation | What have we covered? How will this information be used? What happens next | Andy |
| END OF WORKSHOP | | | |

Appendix 2. Attendees at the trade-offs workshop as well as those interested in seeing reports who could not attend.

| Name | Affiliation | E-mail contact |
|------------------------------------------------------------|-----------------------------------------------------|--------------------------------------------------------------------------------------------|
| Andrew Plumptre | Wildlife Conservation Society (Ug) | aplumptre@wcs.org |
| Miguel Leal | Wildlife Conservation Society (Ug) | mleal@wcs.org |
| Arineitwe Valance | Ministry of Water and Environment | alivalence@gmail.com |
| Michael Opige | Nature Uganda | michael.opige@natureuganda.org |
| Sam Ayebare | Wildlife Conservation Society (Ug) | sayebare@wcs.org |
| Phillippe Boubet | Tullow Oil | phillippe.boubet@tullowoil.com |
| Barbara Nalukowe | Tullow Oil | barbara.nalukowe@tullowoil.com |
| Paul Hatanga | CSWCT | conservation@ngambaisland.org |
| Simon Nampindo | Wildlife Conservation Society (Ug) | snampindo@wcs.org |
| Panta Kasoma | Jane Goodall Institute | panta@janegoodallug.org |
| Mugabi Stephen David | Ministry of Water and Environment | mugabisd@gmail.com |
| Derek Pomeroy | Makerere University | derek@imul.com |
| Deo Kujirakwinja | Wildlife Conservation Society (DRC) | dkujirakwinja@wcs.org |
| Collins Oloya | Ministry of Water and Environment | oloyacollins@gmail.com |
| James Watson | Wildlife Conservation Society (NY) | jwatson@wcs.org |
| Dan Segan | Wildlife Conservation Society (NY) | dsegan@wcs.org |
| Turyakira Wilberforce | State House, Presidents office | wilber.turyak@statehouse.go.ug |
| Geeta Uhl | USAID Uganda | guhl@usaid.gov |
| Geoffrey Muhanguzi | Budongo Conservation Field Station | geoffre.muhanguzi@gmail.com |
| Timothy Twongo | Consultant for SEA process | ttwongo@yahoo.com |
| Edith Kahubire | ESIPPS (SEA Process) | kahubire@gmail.com |
| Aggrey Rwetsiba | Uganda Wildlife Authority | aggrey.rwetsiba@ugandawildlife.org |
| Grace Nangendo | Wildlife Conservation Society (Ug) | gnangendo@wcs.org |
| <i>People who could not attend but asked to see report</i> | | |
| Dr Andrew Seguya | Uganda Wildlife Authority | |
| Edgar Buhanga | Uganda Wildlife Authority | |
| Margaret Mwebasa | REDD Focal Point, Ministry of Water and Environment | |
| Akankwasah Barirega | Ministry of Tourism Wildlife and Heritage | |
| Dozith Abeinomugisha | Petroleum Exploration and Production Department | |
| Lilly Ajarova | CSWCT | |
| Sam Kajoba | Norwegian Embassy | |
| Lance Martin | Total Oil | |
| Waiswa Ayazika | National Environment Management Authority | |
| Bjørn Kristoffersen | SEA Process Leader, Norwegian Government | |
| Xavier Mugumya | REDD Focal Point, National Forest Authority | |

Appendix 3. Photos of some activities taken at the meeting

Dan Segan providing an overview of Marxan to the group



Grace Nangendo providing an explanation of Group 1's thoughts on the future landuse change in the landscape



Group 2 in a break out discussion on the major land-use activities that are going to occur across the landscape



Group 2 discuss the targets for species and ecosystems

