Enhancing Climate Change Resilience in Great Lakes Regional Watersheds: Lake Kivu Catchment and Rusizi River CRAG Project

Technical report of the Field Work on Gathering Relevant Key Variables

For the CRAG done from 13th to 16th May 2015 in Nyamasheke and Rusizi Districts

Funded by
Contents
1. Background ...........................................................................................................................................2
2. The case of Nyabitekeri site and CRAG intervention needed .................................................................2
   2.1 CRAG Intervention needed in Nyabitekeri sector ..................................................................................5
3. The case of Rangiro site and CRAG intervention needed .........................................................................6
   3.1 CRAG project intervention needed in Rangiro sector ...........................................................................8
4. The case of Muganza site and CRAG intervention needed ......................................................................10
   4.1 CRAG project intervention needed in Muganza sector ......................................................................13
5. Conclusions ...........................................................................................................................................15
6. Recommendations ...................................................................................................................................15
7. Way forward/Next step ...........................................................................................................................16
8. Acknowledgement ...................................................................................................................................16
1. Background

The CRAG project partners ACNR (The Association pour la Conservation de la Nature au Rwanda), HN (Horizon Nature), ABO (Association Burundaise pour la Protection des Oiseaux), WCS (Wildlife Conservation Society), had a meeting with Albert Schenk, the project manager and Ian Gordon, the Birdlife International program advisor, on Wednesday the 22nd of April from 13:00 to 16:00 in which every partner presented about the progress of the project, challenges faced during the first year of the project (April 2014-March 2015) and the plan for the next 12 months, main activities, proposed timelines, and discussed and agreed on synergies and opportunities for collaboration. The project implementing partners have shared experience through presentations, questions and discussions. During the discussions we have identified and agreed on the possible opportunity for ACNR and WCS to build synergy since they are operating on the same landscape.

All project partners have expressed that it is necessary and urgent to start the interventions under Objective 3 within the very first beginning of quarter 1 of the year 2 of the project, and the project manager advised the project coordinators from ACNR, HN, and ABO to go back to the field and gather relevant information on the CRAG key variables especially where the on-ground intervention should start to build resilience to climate change in the south Kivu catchment. The objective of the field work was to gather relevant geo-referenced information on CRAG by collecting GPS waypoints (X, Y, Z) coordinates and pictures of selected events and activities, and record climatic histories and historical weather events or related disasters such as landslides, famine events/drought, floods, crop failure, change in rainfall patterns, disease outbreak, receding lake water levels and forest cover, seismic and volcanic events and their impacts and/or responses.

In this framework, Jean Paul Kubwimana, the ACNR CRAG project coordinator was on the field from 13th to 16th May 2015 in Nyamasheke and Rusizi district, and managed to collect needed information as presented below.

2. The case of Nyabitekeri site and CRAG intervention needed
Nyabitekeri sector office nearby the showers of Lake Kivu (photo: ACNR)

No irrigation activities done in this sector. And the artisanal mining of sand and rocks is practiced in Muyange cell located at 1614m of Altitude. GPS waypoints: S 02°20.503' and E 029°01.777'. Bugiga Kayenzi and Ntango are other cells in which the artisanal mining of rocks for construction is practiced.

Left: the Executive Secretary of Nyabitekeri Sector helping in mapping pressure areas. Right: case of land slide frequently observed in Kamahogo cell, an effect of heavy rain.

Differently to other areas of the country, the dry season in Nyabitekeri sector starts in May and end up in mid October (a period of 6months). They have two agriculture seasons. The Season A (October- January) Season B (March-June). According to local people the prolongation of the dry season started in 2003. This case of prolonged drought cause crop failure, and scarcity of folder species for cattle, the reason why the local people chose to sell their cattle at the beginning of the drought period since they cannot get herbs and other folder species and they by other cattle at the beginning of the rain season. This repeated case impacts the economy of the communities and lead famine events. The most serious famine event in the sector took place in 2003 and the event continued till 2009, and the gravity was increased because of the Seismic activity which took place in 2008 and caused the death of people, destruction of houses and classrooms.

The succession of 4 hills at the showers of Lake Kivu Located at 1661m of Altitude, GPS way points S: 02°19.844' and E: 029°02.495' are not covered by trees, and during heavy rain sediments are removed by water and channeled directly into lake Kivu
Unprotected hills on showers of Lake Kivu, soil erosion channeling sediments directly in the Lake (photo: ACNR)

Kabunyoni hill presents the case of what is happening within 50 meters from the lake. It is located at 1652m of Altitude, GPS way points S: 02°18.416’ and E: 029°02.609’ illegal artisanal mining of rocks is done and the soil is thrown in the lake, in addition to other sediments carried out by rain runoff water.

CRAG Project coordinator taking GPS way points on Kabunyoni hill in Nyabitekeri sector (photo ACNR)
2.1 CRAG Intervention needed in Nyabitekeri sector

As Vision 2020 Umurenge program (VUP), a program of the Government of Rwanda has helped the community to establish terraces where necessary in this sector, the intervention of CRAG project required is reforestation, agro-forestry and plantation of folder species on the already established terraces and within 50 m from the Lake Kivu as summarized in the table below.

<table>
<thead>
<tr>
<th>No</th>
<th>Item</th>
<th>Area (Ha)</th>
<th>Plant species appropriate for this region</th>
<th>Estimated number of trees to be planted</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Need for afforestation and reforestation on a consolidated land</td>
<td>50ha</td>
<td>1. Eucalyptus maiden</td>
<td>80 000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. Euphorbia tirucalli (imiyenzi)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Within 50 m from lake kivu 3 lines from Rwoga to Ntango (30km) 3m</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. Bamboo sp</td>
<td>9 000</td>
</tr>
</tbody>
</table>
between one line with another. 10m between one plant and another.

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Agroforestry</td>
<td>500ha</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1. Grevillea robusta</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Markhamia Lutea (Imisave)</td>
</tr>
<tr>
<td>3</td>
<td>Fruit trees</td>
<td>Each household will receive 1 tree on each species</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1. Mangoes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2. Avocados</td>
</tr>
</tbody>
</table>

4. Two cooperatives here known as Local Conservation Groups (LCGs) within the CRAG project context were selected to became partners of the project

1. KOKINYA composed of people relocated within 50m from Lake Kivu (21 males + 30 females = 51 members)
2. COGEFONYA (Cooperative de Gestion des forets Nyabitekeri) composed of 16 males + 20 females = 36 members

3. The case of Rangiro site and CRAG intervention needed.

The sector is located in Nyamasheke district and touches on Nyungwe National Park, and its mountains have the steep slope that favors the increase of soil erosion rate. The sector is one of nine others identified as vulnerable to climate change and selected as highly vulnerable where CRAG project activities should start. The same as Nyabitekeri sector, the intervention of VUP has facilitated the community to establish terraces on mountains as a way of reducing their vulnerability to erosion using the “Cash for work approach” but they still need another intervention to be able to establish terraces on a large area. At 1717m of altitude, GPS way points S: 02°24.559' E: 029°10.718' the community were establishing terraces (see image below).

Terraced Irrigation is the main system used in Rangiro sector where on steep sloped hills the land is cut into steps and supported by retaining walls, with the flat areas used for planting and the water flows down each step, while watering each plot (radical terracing), but on hills on small slop, progressive terraces are used for both irrigation and erosion control (see the image below), unfortunately, the local communities were not able to protect those terraces either with plants or with other means.
Intervention of VUP where the community establish terraces on steep sloped hill in Rangiro sector (photo ACNR)

Interview with the community in Rangiro sector (photo ACNR)

Members of the community I met in BANDA cell at 1792m of altitude S: 02°26.704’ and E: 029°12.144’ explained that landslide cases are severe during the rainy season on some hills of Banda and Murambi cells. It is a cold area because of Nyungwe National Park and the rain season starts in September and end up in mid July. The dry season last only 2 months (July-September). The heavy rains appear from April to June and causes soil erosion and crop failure. Cases of floods caused by Karundura River occur during the rainy season, which contribute to the famine events. Rangiro sector also has known the seismic event in 2008 which resulted in destruction of houses and schools but no reported death case.

The source of Karundura River is in Nyungwe National Park and it is formed by four small affluents (Nyirakesha, Rwasa, Rusise, and Mutongo) that pass in Banda, Gakenke, Murambi, and Jurwe cells and it crosses Cyato sector where there are large quarries for exploitation of Colltan in a legal way. Although the
exploitation is legal it contributes much to the pollution of Karundura River and hence Kivu Lake since Karundura is affluent to Lake Kivu.

The impact of poor management of the wetland in Rangiro sector include throwing sediments (soil and other materials) in the river while cultivating and crop flooding and failure in case there is heavy rain, and pollution of Lake Kivu waters and receding of its water levels which impacts fish production. This results in famine and poverty increase in the community which almost depends on agriculture as the main source of income.

3.1 CRAG project intervention needed in Rangiro sector

The intervention of CRAG project required is reforestation, afforestation, agro-forestry, and protection of Karundura River by plantation of folder species and Bamboo on within 10 m along its length, and establish progressive terraces as summarized in the table bellow
<table>
<thead>
<tr>
<th>No</th>
<th>Item</th>
<th>Area (Ha)</th>
<th>Tree species to be planted</th>
<th>Estimated number of trees to be planted</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The length of Karudura River</td>
<td>12,4 km</td>
<td>1. Pennisetum purpureum (urubingo)</td>
<td>10 000 vegetative cuttings / ha * 12,4ha *2 =248 000 vegetative cuttings</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4. A line of bamboo sp. Will cover Pennisetum p. with 10m between two plants</td>
<td>1240*2 = 2480 bamboo</td>
</tr>
<tr>
<td>2</td>
<td>Need for terracing (imirwanyasuri)</td>
<td>50 ha</td>
<td>2 lines of calliandra or Leucaena planted 30cm*30cm on progressive terraces (umurwanyasuri)</td>
<td>266,000 plants</td>
</tr>
<tr>
<td>3</td>
<td>Agroforestry</td>
<td>50 ha</td>
<td>1. Grevillea robusta</td>
<td>285 plants/ha = 14 250 plants</td>
</tr>
<tr>
<td>4</td>
<td>Fruit species appropriate for the region</td>
<td></td>
<td>1. Avocadoes</td>
<td>4000 plants</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. Maracuja (Passiflora edulis)</td>
<td>50 000 plants zizahingwa ku buso buhuje</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3. Ananas</td>
<td>100 000 plants</td>
</tr>
<tr>
<td>5</td>
<td>Need for afforestation and reforestation on a consolidated land</td>
<td>50 ha</td>
<td>Eucalyptus microcorys</td>
<td>2 000 plants/ha = 100 000 plants</td>
</tr>
<tr>
<td>5</td>
<td>The two Cooperatives here known as Local Conservation Groups (LCGs) in the CRAG project context were selected to become project partners</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1. TWITE KU BIDUKIKIJE RANGIRO, (11 males + 16 females = 27 members)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. TUBEHO NEZA TWITA KU MUTUNGO KAMERE (14 Males + 19 Females = 33 members)</td>
<td></td>
</tr>
</tbody>
</table>
The case of Muganza site and CRAG intervention needed

Muganza sector is located in Rusizi district and a big part of it is a plan landscape surrounded by higher mountains on both Rwanda and Burundi sides, and it is in this sector that CIMERWA Factory is planted.

The unusual weather induced events like landslides and floods that negatively impact livelihoods of people in Muganza sector have root causes in Gitambi sector. At 1100m of altitude, GPS way points S: 02°36.764' and E: 029°01.123' a case of erosional downcutting destroyed the road to CIMERWA and houses of the community within 25m from the main road. The mentioned impacts become severe during the rainy season. On the other hand, CIMERWA expansion activities blocked the water channels toward Rubyiro River where all waste water from the factory were channeled before and the waste waters are actually oriented in the channel from Gitambi Mountain but they promised to retain their waste waters for recycling after the completion of expansion activities.
Destruction of the main road to CIMERWA and houses of local people in Muganza (photo ACNR)

At 1059 m of altitude within approximately 2500 m from the main road GPS way points S: 02°61.705’ and E: 029°02.184’ there is a good example of how Altitudinal gradients are vulnerable to extreme climatic events. This point is as the base level of the runoff water from Gitambi Mountain and the waste water from CIMERWA and a floodplain has been created in field of the communities. Currently the floodplain is unpredictably increasing such that it has expanded toward a large scale in the communities fields’ and caused crop failure.

Case of flood in the communities’ fields. ACNR_CRAG project coordinator having interview with local people (photo ACNR)
There is a possibility that the two floodplains are connected through underground channels (photo ACNR)

The main crop grown in Muganza is rice but they also grow maize, coffee and fruiting trees such as mangoes, orange and avocado etc. In the entire plain rice is grown on 1500 ha where 840ha are in Muganza sector and the main sources of irrigation water is Katabuvuga river, which has a big part in Muganza while it comes from Rwimbogo and Gitambi mountains. The Ditch irrigation system is used to form different channels that can distribute water in different fields.

Left:Upstream of Katabuvuga river. Right: The ditch has been destroyed by water during the last rainy season (photo: ACNR)

The picture shows that the water levels are currently decreasing because we are approaching the dry season. The ditch is at 1069m of Altitude, GPS way points S: 02°037.968’ and E: 029°00.561’. During the rainy season the waters of this river increase and destroy some of the infrastructures like the ditches, houses of local people, the roads and bridges
Left: The Bridge on the main road is being rehabilitated after its destruction during the last rainy season. Right: Katabuvuga river banks destroyed and local people’s houses and fields flooded (photo ACNR).

Left: at 1049 m of Altitude, GPS way points S: 02°33.143’ and E: 029°00.728’ Jean Claude BACEBASEME, the Agronomist of MUGANZA sector discussing with Jean Paul Kubwimana, The ACNR_CRAG Project coordinator on possible intervention to protect Katabuvuga river. Right: The old woman is explaining how the river destroyed neighbors’ houses (photo ACNR).

4.1 CRAG project intervention needed in Muganza sector

The intervention of CRAG project required is reforestation, afforestation, agro-forestry, and protection of Katabuvuga river by plantation of folder species and Bamboo on within 10 m along its length, and establish progressive terraces as summarized in the table bellow.
<table>
<thead>
<tr>
<th>No</th>
<th>Item</th>
<th>Area(Ha)</th>
<th>Plant species to be planed</th>
<th>Estimated number of trees to be planted</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Length of Katabuvuga River</td>
<td>(3 Km)</td>
<td>1.imigano</td>
<td>3500</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2.urubingo</td>
<td>350000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Need for terracing</td>
<td>50ha</td>
<td>40 ha on Gitambi and Rwimbogo mountains, And 10ha in Muganza on Katabuvuga upstream</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Agroforestry</td>
<td>30ha</td>
<td>1.Greveria</td>
<td>8000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2.Cedrela</td>
<td>6000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3.Calliandra</td>
<td>4000</td>
</tr>
<tr>
<td>4</td>
<td>Fruit trees</td>
<td>20ha</td>
<td>1.Orange</td>
<td>3500</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2.Mango</td>
<td>2500</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3.Avocado</td>
<td>1000</td>
</tr>
<tr>
<td>5</td>
<td>There is no place (consolidated land) in Muganza that requires afforestation or reforestation</td>
<td></td>
<td>1.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3.</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>The cooperative here known as Local Conservation Group (LCG) in the CRAG project context was selected to become partner of the project</td>
<td></td>
<td>1.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3.</td>
<td></td>
</tr>
</tbody>
</table>
5. Conclusions

The objectives of the field work have been achieved since on-ground information and CRAG key variables have been collected and documented. The geo-referenced information on CRAG through GPS waypoints (X, Y, Z) coordinates and pictures of selected events and activities, will help in monitoring the effectiveness of the on-ground CRAG project interventions, and recorded climatic histories and historical weather events should be considered as baselines that can help in farther fundraising activities within the CRAG approach.

Local conservation Groups selected to be partners of the project will contribute much to the realization of the project activities and will benefit much since they are among the most affected by the stochastic events related to climate change in the identified pressure points (Muganza Sector in Rusizi District, Rangiro and Nabitekeri Sectors in Nyamasheke district)

6. Recommendations

The main part of the on-ground intervention in the three sectors concerns agro-forestry which requires seedlings preparation. It is highly recommended to facilitate the project coordinator to start the activities as soon as possible so that we can cope with the agriculture seasonal effects.

The root causes of the floodplains is in the communities' field (near CIMERWA factory) is out of Muganza Sector (they are from Rwimbogo and Gitambi Sector), except that waste water coming from CIMERWA. To sustainably deal with and manage this problem we have to orient our intervention in upstream level (Gitambi and Rwimbogo sector). However, district technicians we have worked with during the consultation meeting have not mentioned Gitambi and Rwimbogo Sectors as a pressure point (see ACNR_CRAG Annual progressive report on page 6). It is highly recommended to plan our intervention accordingly especially in terms of budgeting and fundraising.

The approach used to gather this information and map CRAG key variables was highly appreciated by both the project coordinator and the district technicians since they provide relevant insights, hence recommended to be used even during our next field activities.

For the period of April 2015 – March 2016 it is better to put more effort in agro-forestry in the three pressure points and afforestation were required and plan for terracing for the last year of the project, since we have to make sure we strengthened the apacity of the LCGs who are among the key stakeholders to implement the project activities.
FONERWA is ready to support projects that seek to address climate change problems putting much emphasize on value addition like CRAG. We should start the implementation and put much emphasize in developing partnership with Rusizi and Nyamasheke District so that we can be eligible for FONERWA’s fund and write a proposal for the next calls.

7. Way forward/Next step

Priority 1: production of the on-ground intervention outline that will include budget breakdown per activity, work plan, and monitoring and evaluation scheme

Priority 2: Consultation with WCS (to be accomplished as soon as possible), to get to know how we can join our effort to successfully implement on-ground activities. It is during this consultation that we should be informed about which Birdlife toolkits for ecosystem services and biodiversity monitoring that have been identified to enhance climate change resilience.

Priority 3: To organize a meeting with members of the 6 Local Conservation Groups already identified, and build their capacity in applying Birdlife toolkits for ecosystem services and biodiversity monitoring, and other technical needs to successfully implement the best on ground actions to enhance climate change resilience.

Priority 4: Start piloting the Implementation of LCG/SSG actions that will reduce soil erosion through terracing and planting of soil-binding, fertility-restoring, riparian ground-cover vegetation including indigenous trees that have been depleted in the landscape and other useful trees and monitor and enforce legislation barring cultivation along the banks of rivers and streams in at least three of the pressure points identified under the plan.

Priority 5: contribute in validating and enrich outputs till the final version of CIP is ready for us to start its wider dissemination to different stakeholders.

8. Acknowledgement

The Association pour la Conservation de la Nature au Rwanda (ACNR), wishes to express its sincere appreciation to the Mayors of Nyamasheke and Rusizi Districts for their willingness to collaborate and facilitate its activities in the districts they are heading.

In addition, ACNR wants to thank field facilitators from the mentioned districts who were with the project coordinator throughout difficult terrains and for all the information provided.