A Booklet of Innovations on Climate Change Adaption and Mitigation in Uganda.

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This is an output of the project on ‘Strengthening Community Resilience to Change: Combining Local Innovative Capacity with Scientific Research,’ implemented by Environmental Alert and Kulika Uganda in partnership with KIT and financial support from the Rockefeller Foundation.
# Table of contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acknowledgements</td>
<td>3</td>
</tr>
<tr>
<td>Introduction</td>
<td>4</td>
</tr>
<tr>
<td>1.0 Background</td>
<td>5</td>
</tr>
<tr>
<td>2.0 How were these innovations identified? Methods and approaches</td>
<td>6</td>
</tr>
<tr>
<td>2.1 Key interventions implemented under the CLIC-SR project, which</td>
<td>6</td>
</tr>
<tr>
<td>resulted in identification of the innovations</td>
<td></td>
</tr>
<tr>
<td>3.0 Illustrative presentation of selected innovations described in Table 1</td>
<td>19</td>
</tr>
<tr>
<td>4.0 Conclusion</td>
<td>20</td>
</tr>
<tr>
<td>5.0 References</td>
<td>21</td>
</tr>
</tbody>
</table>
We hereby acknowledge the farmer innovators for the initiative they took in the development of their innovations as described in Table 1. Further appreciation to the farmer’s group members and all the other stakeholders who provided the necessary support in the process of identification of the innovations.

The Rockefeller Foundation is appreciate for the financial support through the CLIC-SR project, which provided the framework through which the innovations for climate change adaptation were promoted. The Royal Tropical Institute is appreciated for its international coordination role and technical backstopping during project implementation.
This booklet demonstrates farmer innovations for climate change adaptation and mitigation. Particularly this booklet aims at raising the awareness among stakeholders at different levels that climate change and variability is a reality and has impact on farmers, they are not seated. They are developing various innovations within their means to adapt to the climate change impacts.

However, their efforts need to be recognized, promoted and supported to add value to these innovations as appropriate. The few innovations documented in this booklet is an output from several intervention implemented through, ‘Strengthening Community Resilience to Change: Combining Local Innovative Capacity with Scientific Research (CLIC-SR),’ in Moyo and Nakasongola districts in Uganda for 3 years (2012-2015).
Farmers are not seated, they are developing new ideas to cope with the current climate variability and change. Climate change and variability impacts such as prolonged droughts are already evident in various parts of the country (NAPA, 2007). These do not only have negative impacts on crop productivity and household food security due to crop failure. This and other factors trigger farmer innovators to think outside the box to come with innovations as a way of overcoming such challenges.

One advantage is that most often these innovation fit within the local community’s context. Thus, the raw materials used in innovation development are locally and readily available. Consequently, the innovation products are accessible and affordable to the consumers. This would result in sustainable solutions to the climate variability and change challenges, there by contributing to long term community resilience.

Box 1. Definition of key selected terms

Climate is the prevailing or average weather conditions of a place as determined by the temperature and metrological change over a period of time. Various factors determine climate and the most important are rainfall and temperature (NAPA, 2007).

Climate change refers to any change in climate over time, whether due to natural causes or as a result of human activity (IPCC, 2001a).

Climate change adaptation - refers to adjustments in practices, processes, or structures to take into account changing climate conditions, to moderate potential damages, or to benefit from opportunities associated with climate change (NAPA, 2007).

Climate change mitigation - refers to an intervention to reduce greenhouse gas (GHS) emissions or enhance GHG sinks (NAPA, 2007).
Environmental Alert in partnership with Kulika Uganda, through financial support from Rockefeller Foundation coordinated by KIT conducted interventions which resulted into identification of various farmer innovations for climate change adaptation and mitigation. These interventions were implemented through the project on, ‘Strengthening Community Resilience to Change: Combining Local Innovative Capacity with Scientific Research (CLIC-SR).’ The project among other objectives aimed at:

a) Strengthening the resilience to change of smallholder communities, especially the women, by improving their innovative capacity and thus their livelihood

b) security through participatory innovation development (PID);

c) Increasing insights and awareness on relevance and effectiveness of PID through sharing and learning;

d) Mainstreaming PID as an approach within targeted national and international policies and programs related to agricultural development, natural resource management and climate change adaptation.

2.1 Key interventions implemented under the CLIC-SR project, which resulted in identification of the innovations

A) Stakeholder inception meetings

These meetings were held at the local and community level involving key stakeholders for project in Moyo and Nakasongola districts. The overall purpose of the inception meetings was to popularize the project among stakeholders and also solicited their
inputs into the working plans for implementation of the project. Besides, during these meeting stakeholders provided information about existing farmer innovations on climate change adaptation and mitigation. Follow up visits were organized to farmer innovators to further understand their innovations and generated information about their originally for further appraisal.

B) Participatory innovation development meeting at community level

Meeting were held at the community level focusing on PID. The entry point was awareness creation on PID among stakeholders and this was linked to the identified and selected innovations for joint experimentation through PID. These were the transitional bee hive in Moyo district and the economic utilization of water in a tree nursery bed in Nakasongola district. They were selected because they met all the requirements of the TEES test to a greater extent compared to other innovations, innovations which were identified.

The TEES test i.e. [T-Technical effectiveness (It should address the challenges or problems being faced by the local community; E-Economically viable (Uses locally available and inexpensive materials within the community, E-Environmentally friendly (Should not have adverse environmental concerns or negative impacts on the environment); and S-Socially acceptable (It should confirm to the norms, values and culture of the people so that they will be willing to accept and adopt)].

The PID for the selected innovations involved joint experimentation with active participation of different stakeholders (farmers’ group members, NGOs, researchers, extensionists, political leaders), each with a differentiated but equally important role, with the farmer innovator at the centre stage. In addition the innovator’s family members (wife and children) and his famer group were also involved in the process at different stages.

Before the joint experimentation process the stakeholders agreed on the overall purpose of the joint experimentation and their individual roles and responsibilities.

C) Farmer group innovation assessment meetings

The involved participatory assessment of innovation involving the farmer innovator, the members of his group, facilitating development civil society organization (thus, in this case Environmental Alert and Kulika Uganda) and respective district local government staff. The innovations are assessed based on the set parameters during the joint experimentation.
The assessment was conducted for innovations which went through the joint experimentation i.e. the transitional bee hive in Moyo district and the economic utilization of water in a tree nursery bed in Nakasongola district. Besides, the assessment the interaction provided opportunity for information sharing and networking among the stakeholders who participated.

D) Documentation of the innovations

The documentation process for the selected innovations was very interactive and it involved further interactions with the respective farmer innovators. These were guided by administering check list of questions to capture the key results of the innovation in terms of performance in respect to the set parameters under PID. Besides, observations were made on site and photos taken depicting progress in the innovation development. Members of the innovator’s farmer group were involved in the process for information sharing and cross learning.

The innovations identified through these interventions are presented in Table 1.
Table 1: The list and description of the identified innovations for climate change adaptation and mitigation.

<table>
<thead>
<tr>
<th>Innovation</th>
<th>Name of innovator/s</th>
<th>Description of innovation</th>
<th>Source of idea (originality)- How did one come up with the idea</th>
<th>Comments/key observations</th>
<th>Way forward</th>
</tr>
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<tbody>
<tr>
<td>a) Transitional bee hive</td>
<td>Matalocu Fred +256779580637 Pajakiri village, Metu Sub County in Moyo district</td>
<td>Improving the transitional hive – A local innovation to reduce hive cost and colonization. Completely on his own, Fred started constructing the transitional hive using bamboo stems, he designed it to mimic KTB as much as possible. Unlike commercial hives, it does not have frames, foundation or excluders. Instead, it just has top bars, allowing the bees to do what they would in a fallen log: build beautiful, natural combs. Because it is less intrusive to the bees, it’s easier to make and manage, which makes it a perfect for low income earners.</td>
<td>Matalocu Fred has been raising bees since he was a youth. “I was engaged in crop production, and I was always into something”, remembers. “I was interested in bees, and I started with one hive but it did not colonize, so I gave it out to another farmer. When the farmer baited the hive it colonized within a short duration. More than 20 years later, Fred is still raising bees in the rocky bamboo covered hills of Metu. However, he’s trading his idea of using commercial KTB hives for a new hive he makes from bamboo stems which he calls the Transitional hive. As a bee farmer Mr. Matalocu Fred was trying out better ways of improving the production and quality of hive products. His experience with using improved hives was the costs for improved hives “KTB” is expensive to make as it requires solely timber. Mr. Fred described how he started to innovate. Through trial and error, he came up with this innovative ways of constructing the Transitional bee hive using locally available bamboo stems with top bars.</td>
<td>According to Mr. Fred, his first prototype hive did not work out well. The durability of the hive, its standardization and suitability to reduce abscondment of bees due to uncontrolled hive temperature as a result of big size. This though did not distract him from sticking to his research objective of increasing colonization rate and reduce the cost of the hive. This is how the process worked out; When the big size of the hive created a problem, so he reduced the size of the hive so that the standard top bar of KTB can properly fit on the transitional hive He used a strong polythene sheet to cover around the hive so that rain water does enter into the hive since this causes unfavourable condition in the hive and resulting into bees swarming away. He positions the transitional hive in sites that protects it adequately from strong winds, fire and pests like ants. Traditionally, Ma’di women are not involved in bee keeping, as hives are placed high up the trees and women are not allowed to climb trees. But with the transitional hives, hives are placed at a considerable height for women to manage as well. The provision of protective gear would enhance women participation in beekeeping.</td>
<td>The innovation looks simple, cheap and easily replicable. This case calls for joint experimentation with farmers, researchers or scientists to validate the local innovation. It is a better idea to invite the scientist in the process of joint experimentation but the farmer should be in the lead.</td>
</tr>
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b) Economic utilization of water in the tree nursery bed

Environmental Conservation Group comprising Kavuma Fredrick, Naja Robinah, Sebyala Beatrice, Sebyala Moses and Betty Kabugo, Nakitooma Sub county

Treatment 1. Raising seedlings in a raised (ridged) nursery bed with no manure. Treatment 2. Raising seedlings in a raised nursery bed with soil and manure put in plastic bottles. Treatment 3. Raising seedlings in a sunken nursery bed having soil mixed with compost manure but lined with a polythene sheeting to economize water lose through leaching. Treatment 4. Raising seedlings in hollow plastic bottles with a mixture of soils and compost manure and placing these in a sunken Nursery bed lined with polythene

Result 1: Water consumption

<table>
<thead>
<tr>
<th>Treatment number</th>
<th>Water consumption details</th>
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<tbody>
<tr>
<td>1</td>
<td>The tree seedling required watering daily both in the morning and the evening. It was consuming 5 ltrs of water a day.</td>
</tr>
<tr>
<td>2</td>
<td>The tree seedlings required watering every day but only once in the evening. It was consuming roughly 5 ltrs of water a day.</td>
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<tr>
<td>3</td>
<td>Required watering two times a week for the first month and thereafter required watering once every week.</td>
</tr>
<tr>
<td>4</td>
<td>The seedling required watering two times in a week but was consuming less water, about two litters per watering.</td>
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Result 2: Germination performance

- All seedlings in all treatments started germinating the same day.
- Percentage of germination:
  - Treatment No. 4 & 3 gave the best performance – the percentage was 55/60 seedlings which is 91.7%.
  - Treatment No. 2 the germination percentage was 45/60 seedlings which is 75%.
  - In treatment number 1 the germination percentage was 40/60 seedlings which is 67%.

Result 3: Survival of seedlings with reduced watering

- Treatment 1 and 2: 20 seedlings died off when water was withheld for 2 weeks.
- Treatment 3 and 4: All the seedlings were able to survive without water for 2 weeks.

Result 4: Growth of the seedlings

- Treatment number 1: The seedlings in treatment number 1 showed the slowest growth.
- Treatment Number 2: The seedlings were growing faster than those in treatment number one but slower than those in treatment number 3 and 4.
- Treatment Number 3: The seedlings were growing faster than those in treatment number one and two but slower than those in treatment number 4.
- Treatment number 4: The seedling showed the fastest growth.

Result 5: Vitality/Vigor of the seedling

- The seedlings in treatment number 1 had the worst vigour.
- Seedlings in treatment number 2 had the third best vigour.
- Seedling in treatment number 3 were the second best in vigour.
- Seedling in treatment Number 4 had the best vigour.

Result 6: Survival up to transplanting stage

- Treatment number 1: 16.7% survival rate.
- Treatment number 2: 33.3%.
- Treatment number 3 & 4: 83.3%.

The innovation is replica and be promoted and adapted by community.
Exploring alternatives to natural forage for bees – Use of dried mango peels as supplementary feed

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Actions</th>
<th>Observation</th>
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<tr>
<td>Feeding honey bees on syrup made by shocking dried mango peels in water - FRED observed that bees are in danger of disappearing from his area. FRED says this is because the natural food of the honey bee consists of pollen, nectar, or honey, and water. In early rainy season, before pollen and nectar are available or other times of the year when these materials are not available for bees in the field or in the hive, supplementary feeding may help the colony survive.</td>
<td>To feed the bees, he shocked the dried mango peels in water and placed them on a container. He then used a leak proof container, such as a trough, to store the syrup.</td>
<td>FRED notes that large quantities of thick syrup are suitable for feeding to bees to store for dry season, whereas small quantities of thin syrup fed regularly stimulates the colony to expand the brood area.</td>
</tr>
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<td>Feed supplementary foods, such as dried mango peels, to honey bees in areas where the natural food is scarce.</td>
<td>FRED took a decision to peel and dry ripe mango peels, an idea which now pays in his apiary. During the mango season, he collects ripe mangoes, washes them and removes the sweet-tasting juices from overripe fruit and plant exudates.</td>
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Comments

- Always the apiary site needs to be kept clean.
- Maintenance of the feed trough is a concern since when it's exposed, it attracts insect pests. Fred needs to jointly experiment with other farmers on how to control insect pests, especially since the apiary particularly gets attracted to sweet shocked mango peels that may cause the bees to swarm away.
- For him, this is largely an economic decision as the costs associated with feeding substitutes are low.
- Fred notes that large quantities of thick syrup are suitable for feeding to bees to store for dry season, whereas small quantities of thin syrup fed regularly stimulates the colony to expand the brood area.

Circumstances under which feeding supplements are beneficial for colonies vary from location to location. There is still a lot not understood about feeding supplements, and how they benefit the colony. It is important to experiment with different supplements in different conditions to determine which are most effective.

For Fred, feeding sugar syrup extracted from dried mango peels has proved to be highly beneficial in keeping colonies alive during the long dry spells. Hence paying attention to honey bee nutrition is just one of the more important aspects of successful beekeeping, especially in the dry season.
| Environmental Conservation Group comprising Kavuma Fredrick, Najja Robinah, Sebyala Beatrice, Sebyala Moses and Betty Kabugo, Nakitooma Sub county | Crash the Nkulukuku soil (small ant-hill soil) and re-moulding this into fuel saving cook stoves. | They were facing challenges of get fire wood and resorted to use Charcoal, However the cooking stove made out metallic was expensive and also used to take a lot of charcoal to prepare a meal. They wanted to save the use of charcoal and thought out the use of small ant hill. However this was not durable then they resorted first mould the small ant hill. | The re-molded cook stove proved to be very fragile as it developed cracks from time to time whenever the group attempted to use it for cooking. They tried to burn/bake the re-molded cook stove as a way of making it stronger before using it for cooking but did not help much as some of the stoves would crack while being baked or shortly while being used for cooking. The longest such a stove would last was one month. The non-molded cook stove was used for up to six months of continuous use before developing any damages, and was used for another 4 months before crumbling down completely. The disadvantage with the non-molded stove was that it takes a longer time to fire it and the hole/depression dug in its middle to contain charcoal is deep and requires a large amount of charcoal to cook and for the heat to effectively heat/cook the food in the sauce pan. It is also heavy and not easy to lift and move around to different positions. The advantage with the re-moulded stove is that it is easier to light and it is easy to regulate the amount of charcoal to use depending on the volume of the items to be cooked. | The innovation is simple, gender sensitive and economically viable. |
| e) Management of tree regeneration of remnant tree stumps | Betty Kabugo, Nakitooma Sub county | Management of remnants of indigenous trees that are felled (tree stumps) for charcoal and other uses to promote re-growth and restoration of local ecologies for resilience to climate change. | Re-forestation requires a lot of labour establish to manage to maturity. In addition this involves a lot of money. Then thought of regeneration of remnant tree stumps. | Deforestation is leaving behind bare grounds in Nakasongola district. The community could be encouraged to re-growth of trees from tree stumps and regeneration. The ground that bare are easily covered by some natural vegetative cover. The innovation could be integrate goat production. | The innovation is integrated with keeping. In addition to other multiple enterprises for household livelihood. the innovation is an effective strategy resilience and the negative impacts of climate change. It is less costly and easily to adopt. |
Kajura Robert Lwanga, Kyangogolo, Nabisweera Sub county

| Dig ditches under the ground and line the ditches with polythene, then harvest rainfall surface runoff water for irrigation of oranges and other crops. | Nakasongola District is one of the districts where orange production is becoming an important economic activity for smallholder farmers. However, due to water scarcity and poor soils, production remains poor. Mr. Robert Kajura Lwanga are develop economic ways of managing scarce water resources and soil fertility amendments by harvesting rainfall surface run off water. | Robert planted four orange seedlings in four plots and each plot was subjected to a different treatment. Formulations: 10 kg of manure of each type (goat or cow) mixed in 20lts of water and left to stand for 2 weeks before use. Use is of a diluted solution with a water ration of 1:1 (one part of liquid manure:1 part of water) Application: The mixture was applied onto the ground around the plant but about 1 feet away from the plant Frequency of application: Application was done weekly for the first 3month, and there after, once every month Treatment Number 1: Water plus goat dung liquid manure applied to the four orange seedlings Treatment Number 2: Water plus liquid cow dung manure applied to the four orange seedlings Treatment Number 3: Only water applied to the four orange seedlings Treatment Number 4: The plants under this treatment received neither irrigation water, nor animal dung liquid manure.

**Results i: Number of leaves**
- Treatment number 1: After one month, had the second largest number of leaves. However, the leaves were small in size and not dark green in colour
- Treatment number 2: After one month, had the largest number of new leaves (35) but their size and quality were second best.
- Treatment number 3: The seedling under this treatment hard the largest number and best quality of leaves during the first month after planting.
- Treatment number 4: Had the least number and worst quality of leaves

**Result ii: Fruit Formation**
- Treatment 1: first one to bear orange fruit at 7 months after planting. However it was an isolated case because other plants under this treatment were not showing signs of forming flower buds or fruits at this time.
- Treatment Number 2: Started forming flower buds during the 11th month after planting.
- Treatment Number 3: No signs of developing flower buds by the 11th month after planting.
- Treatment Number 4: Very slow growth with no signs of developing flower buds or fruits, during the 11th month after planting.

Further experiments could be done on the quantity of production per tree and the quality of the oranges fruits.
g) Social Innovation in generating incomes through creating financial credit facilities through group based actions (savings and credit, small enterprises.

| Kafu Women’s group has 30 members 25 women and 5 men, Kafu Village, Nakasongola District |
| The social innovations involve 3 farmers groups composed of mostly vulnerable women (widows, single women with dependants, HIV/ Aids affected and/or infected) aimed at supporting each other in generating incomes through creating own financial credit facilities. |
| The have been observing the micro finance in their area. They agreed to start up a loan scheme among themselves and who ever take a loan pay a very small interest. The aim of the group is explore the extent to which they can creatively use the loan facility to add value to their small enterprises. And develop their own synopsis of loan and repayment activities. |
| The challenge is on repayment of the loan. 8 members took the loan however none has returned 100% the money received in the loan. |
| Further research need to be done on how to manage repayment of the loan received from the group. |
h) Feeding the pigs on local feed sources

| Feeding the pigs on local feed sources using planting materials as cheap feed source. The feed is prepared from Sweet potatoes (carbohydrates and starch), Green vegetables (vitamins), Silver fish Mukene (Protein), Clay from the anthill (iron), Brown salt (minerals). |
| In preparation of the feeds, you crush and dry the sweet potatoes under sunshine for about 2 days, and pack it in sack, harvest fresh cowpeas leaves and dry under shade for 2 days. Drying under shade ensure that strong sun heat does not destroys vitamins. |
| Add a small quantity of small fish (mukene) and dry for a short while under sunshine. Then add small quantity of table salt. Also provide red soil from the anthill for the pigs to eat. |
| Clara Anzoa is a piggery and poultry farmer in Moyo district. When Clara used to feed her pigs on commercial pig feed, the feeding cost increased terribly by two (2) folds since the number of pigs on the farm increased from 4 to 40 pigs. But she used to cultivated vegetables on her farm for household consumption and sells the surplus. So an idea came in her mind of replacing the commercial feed by feeding the pigs on local feed sources using planting materials that she grows on the farm. |
| She crushes and dries the sweet potatoes under sunshine for about 2 days, and packs it in sack, collects cowpeas leaves and dries them under the shade for about 2 days to ensure the vitamins are not destroyed by direct sunlight and also packs them, buys mukene and dry little bite under sunshine, collects clay from the anthill and buys table salt. She then uses the below formula to make the feed. |

So far, the feeding cost of the farmer has reduced by 50% compared to when using commercial feed sources. The farmer also notes that the pigs are healthy and do not put on a lot of fats an undesired attribute in pork.

In a year she is able to rear about 100 piglets in the piggery unit. She spends money on drugs and other ingredients to make it a complete feed formulation for the piglets.

Challenges faced

Adverse weather conditions cause failure of the potatoes and vegetables. The unpredictable rainfall manifested by late onset of rains led to low yield of sweet potatoes.

Water shortage especially in the dry season which affected the feeding habits of the pigs and hence their growth rates.

Labour shortage to employ in cultivation of the sweet potatoes which is most likely to raise production costs

Recommendations by the researchers

For feeding the pigs, the researchers have advised the farmer to;

- Carry out laboratory analysis of the sweet potatoes, green vegetables and mukene.
- Include 0.5kg of general purpose premix in the ratio
- Place anthill soil at a corner and pigs to feed on it at will
- Use 3kg of plant seedcake for every 100kg of Sweet potato
- Carry out observation of weaned piglets, weigh them every after 1 months
- Give the feed to the mother and observe the growth rate of the piglets

In the morning, weigh the piglets and let them suckle and weigh them again. The initial weight minus the current would give the quantity of the milk given by the mother.
### Herbal concoctions to control diseases in poultry

**Rebecca Uttua,**
Gwere luzira village, Moyo Sub County in Moyo district

**Trying out experimentation in poultry diseases in Moyo district – Use of herbal concoction**

Many families in Moyo have small flocks of local chickens. Usually, chickens are let out every morning and allowed to return to the shelter any time of the day but can easily get diseased. As with all poultry, pests and diseases control is very important. The most prevalent problem among chickens is the one where they become drowsy and they drop their wings, this is the one that really affects them. The chicks that you would expect to grow and become big; you find that they have died.” The District Veterinary Officer in Moyo advises, this disease where chickens become drowsy is called Newcastle disease. The Newcastle disease normally quickly wipes out an entire flock. Rebecca Uttua uses traditional remedies to help local chickens build up their immunity against these diseases.

Rebecca recalled and adopted the idea of using tobacco leaves to control poultry diseases from her parents. Outbreak of poultry diseases in her community usually occurs from July to August. When the outbreak occurs, she puts her flock on a treatment using a concoction from several herbs for about two weeks. She used to boil tobacco leaves and feed to the chicken but noticed no significant improvement in the birds. She developed an idea of adding Neem to tobacco leaves urging that Neem is being used widely in the village to controls diseases in animals.

During an informal visit and conversation about the innovation, a friend informed her that Aloe vera can be used to control poultry diseases. Since *Aloe vera* is accessible in the village, this motivated her to pick the advice; however, she didn’t stop only on using *Aloe vera*. Out of curiosity, she combined the other herbs with Moringa and a local herb called *Iti-itia* in Ma’di to her concoction. Still, one problem showed up, the birds were not freely drinking the concoction, and the chickens still looked weak. She realized the concoction was very bitter. Since Rebecca was very optimistic in treating her chicken, she decided to add silver fish (mukene) into the concoction to act as lure but also as a feed source in the medicinal solution. At this stage, Rebecca shared the idea with Environmental Alert team.

The Environmental Alert team encouraged Rebecca to share her innovation and observations extension workers. With encouragement and support from Environmental Alert, Rebecca attended training on Local Innovation and Participatory Innovation Development in 2014; as a result she now shares her innovation with other farmers.

Most locals do not treat diseases among their poultry. However since the visit, the farmer has tried out some of the ideas that had been presented and discussed. For example, Rebecca previously used to provide the concoction only when the birds are diseased (an approach that is more curative) but now provides the concoction on a routine basis. The new approach is much preventative as it allows her to continuously provide the concoction for the birds to drink *ad libitum*.

**Challenges**

Rebecca does not know which disease(s) her concoction helps to control as she gives a general dose when she sees her chickens are sick.

She does not know how to approach the Sub County extension workers about sharing her innovation.

Environmental Alert is creating an enabling environment that allows learning and sharing by the farmers. Visits by extension workers, researcher and field trips would be useful in generating ideas that the farmer can test and adapt to their own situations. By exposing other stakeholders to the concept of local innovation and farmer–led joint investigation through laboratory analysis, field trips and cross visits by farmers, these development processes can be promoted.
During the dry season, a lot of farm produce is brought home for simple processing and drying. In the process of drying cassava and sweet potato chips on tarpaulins on the ground, animals especially goats, chicken, pigs and even cattle eat and contaminate the chips with droppings thereby lowering quality. Korina Louga then resorted to drying chips and grains on the traditional palapala (2 metres high drying platform) but relied mainly on the children to climb on it. One of the innovations that Korina found particularly interesting was to improve the traditional palapala. She developed an idea which she shared with her spouse to construct a raised platform (about waist height) on which people can spread produce without climbing since the traditional palapala required climbing. Korina mentioned several challenges she is still trying to solve. The traditional palapala is 2 meters high; open at the top, specifically constructed to dry cereals. It had been developed over time as an improvement to drying cereals on poles still used in many other villages for this purpose.

On one occasion, Korina carried a mat with grains and placed on the raised platform. She discovered her challenge of poultry and livestock razing and contaminating the grains and produce was successfully addressed. Korina concluded, the improved raised platform is successful in controlling the quality of chips and grains.

In the process of drying cassava and sweet potato chips on tarpaulins on the ground, animals especially goats, poultry, pigs and even cattle eat and contaminate the chips with droppings hence lowering quality. She developed an idea and shared with her spouse to construct a raised platform (about waist height) for drying the chips. The husband was enthusiastic about this idea and together with his wife came up with suggestions to improve the structure. They jointly agreed to construct a short raised platform (1 Meters high) and cover the top with tarpaulin. The aim was to keep the chips off animals and also allow her to easily spread the produce since for the traditional palapala; she relied on children who had to climb up.

She also discovered, produce spread on the improved platform can be left over night especially during the dry season to facilitate quick drying. This proved to be a success in maintaining the quality of the chips. Additional, drying of grains on the ground became a challenge also from birds, goats and pigs. One day a mat with grains was carried and placed on the raised platform to the grains and it was also successful. The improved raised drying platform appeared to bring benefits to both women and children in the community and could be easily reproduced by other farmers, but also had potential for improvement.
3.0 Illustrative presentation of selected innovations described in Table 1.

**Figure 1.** A transitional bee hive developed by Fred Matalocu of Moyo district. Photo by Sekate Moses.

**Figure 2.** Dried mango peels used as supplement feed for bees. Photo by Sekate Moses.

**Figure 3.** A re-molded cook stove and the mold used for making it. Innovation by Environmental Conservation Group in Nakitooma sub-county. Photo by Mosses Sekate.

**Figure 4.** Tree seedlings in a raised nursery bed. Photo by Harriet Ndagire.

**Figure 5.** Harvesting runoff water for irrigation during the dry season. Innovation by Robert Kajura in Nakasongola district. Photo by Harriet Ndagire.
The booklet innovations for climate change adaptation and mitigation demonstrates that farmer innovations for climate change adaptation exist out there. Thus a lot of innovations have not been identified, evaluated, documented and disseminated for upscaling beyond the points of origin. However, the process of documenting of the innovations was an empowering one for all the stakeholders involved. Thus, each benefit in one way or another. For instance through information exchange and learning. Furthermore, it resulted in strengthened collaboration with the researchers, development workers and extension during joint experimentation. Relatedly, the farmer innovators can now easily access researchers and local government agricultural extension staff.

The innovators have expressed that their innovations have played a significant role in enhancing their ability to cope with climate change. In addition the innovations have diversified their economic activities. Farmer innovators need to be supported to market and commercialise their innovations for great benefit. The Innovations have also contributed to increased production for both consumption and market. This has directly contributed to improved livelihoods of the farmer innovators and their family members.
5.0 References


IPCC. (2001a). Inter-Governmental Panel on Climate Change. Third assessment report.

Box 2. About Prolinnova Uganda

PROLINNOVA Uganda is an NGO-led multistakeholder initiative to build a national learning network on promoting local innovation in ecologically oriented agriculture and natural resource management (NRM). PROLINNOVA—Uganda envisions, ‘a world in which women and men farmers play decisive roles in agriculture and NRM innovation processes for sustainable livelihoods.’

The mission is to, ‘stimulate a culture of mutual learning and synergy among diverse stakeholder groups to actively support and promote local innovation processes in agriculture and NRM.’

The goal of Prolinnova Uganda is to, ‘contribute to equitable and inclusive development of resilient and sustainable farming communities.’

Prolinnova Uganda is governed by the following Institutional structures

Prolinnova International Support Team (IST)
Supports PROLINNOVA activities at national and regional level through overall coordination, fundraising, capacity strengthening, coaching, web-based knowledge management, policy dialogue, networking, publishing and other activities to raise the profile of PROLINNOVA and inform the world about approaches and outcomes in supporting farmer innovation and PID.

The International Secretariat
This is now hosted by KIT (Netherlands), and is responsible for overall administrative and financial management of projects that are funded through the international PROLINNOVA network.

Prolinnova Uganda National Steering Committee.
This comprises of 10 members including: Ministry of Agriculture, Animal Industries and Fisheries; National Agricultural Research Organization; National Agricultural Advisory Services; Development Network of Indigenous Voluntary Associations; International Centre for Tropical Agriculture; Uganda National Farmers Federation; Uganda National Council for Science and Technology; Faculty of Forestry and Nature Conservation-- Makerere University; Africa 2000 Network; and Environmental Alert, the Prolinnova Uganda Secretariat. It provides overall oversight and strategic guidance in implementation of the country program.

Core Team
This comprises of PELUM-Uganda; KULIKA Uganda; Kikandwa Environment Association; Mukono Agricultural Research and Development Institute; and Environmental Alert, the Prolinnova Uganda Secretariat. They provide technical backstopping to the Secretariat and members in respect to advancing participatory innovation development.

The Secretariat for Prolinnova Uganda
This coordinates Prolinnova members and partners in the implementation of Prolinnova Uganda Country Program. Environmental Alert hosts the secretariat for Prolinnova Uganda.

Members of Prolinnova Uganda
These participate in networking, information exchange and implementation of PROLINNOVA Uganda program activities.

Partners of Prolinnova Uganda
These share similar goals and aspirations as PROLINNOVA Uganda and hence, collaborate in the implementation of PROLINNOVA Network strategic plan and related country programs.
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