



Technical Capacity Building on the Use of DNA Barcoding Technology: Towards the Development of a multilateral Alien Invasive Species Biobank in Southern Africa’.

Workshop Report



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Annex 1 : Workshop Programme

Annex 2: Attendance registers

1 Introduction

The Government of Zimbabwe through the Bio-Bridge Initiative received a grant for a project titled '*Technical Capacity Building on the Use of DNA Barcoding Technology: Towards the Development of a multilateral Alien Invasive Species Biobank in Southern Africa*'. To this end the National Biotechnology Authority (NBA) offered a DNA barcoding training course on Alien Invasive species in Harare, Zimbabwe from 17 - 26 September 2018. Lectures were done in the NBA boardroom and laboratory practicals were conducted at the African Institute of Biomedical Science and Technology (AiBST).

The workshop was officially opened on the 17th of September 2018, by Mrs R.P. Karimanzira a Director within the Ministry of Higher and Tertiary Education, Science and Technology Development who was representing the Permanent Secretary for the Ministry. The lead trainers were:

- i. Ms Thulisile Jaca from the South African National Biodiversity Institute (SANBI).
- ii. Dr. Amogelang Segwagwe from the Botswana University of Agriculture and Natural Resources (BUAN).
- iii. Dr. Justen Manasa from the African Institute of Biomedical Science and Technology (AiBST) (Zimbabwe).
- iv. Dr. Ryman Shoko and Dr. Joice Ndlovu from the Chinhoyi University of Technology (Zimbabwe).

2 Activities Implemented During the Project

The following sections outline the different activities that were implemented during the project:

2.1 Informative Presentations and Discussions

Presentations followed by discussions on the following topics were done:

- i. Status quo of invasive alien species in Zimbabwe, challenges and plans to solve the challenges.
- ii. Role of the National Biotechnology Authority in Zimbabwe.
- iii. Introduction to conservation.
- iv. Introduction to invasive alien species and their impacts.
- v. Taxonomy: species identification and tools.
- vi. International agreements and regulations governing alien invasive species.
- vii. Introduction to molecular identification.
- viii. DNA barcoding molecular protocols.
- ix. BOLD System and DNA sequence alignment and analysis programmes including BioEdit, and MEGA7.

2.2 Country Presentations

Representatives of the countries present i.e. Botswana, Namibia, South Africa and Zimbabwe, made presentations on the status of alien invasive species in their respective countries. It was evident from the presentations, that alien invasive species are mostly being identified using conventional methods. There is a clear need to develop technical capacity for the employment of DNA technologies in the identification of invasive alien species.

2.3 Field work

The participants together with the trainers visited Lake Chivero, located southwest of Harare and collected specimens of water hyacinth for use during the DNA barcoding laboratory practicals. This hands-on exercise entailed demonstrations on sample collection i.e. morphological characterization, photographing the environment and the specimen, collecting GPS data, packaging and labelling. The visit also afforded the participants the opportunity to familiarize with how the water hyacinth invades and thrives in aquatic environments.

In order to provide the trainees with further hands-on experience in specimen collection, preservation and documentation, the group visited the National Herbarium and Botanic Garden. Participants were trained on collecting plant and insect specimens, preserving them as well as record keeping in electronic databases.

2.4 Laboratory Work

The laboratory work was conducted at AiBST, with participants taking part in 3 major activities namely DNA extraction, DNA amplification and DNA sequencing. The water hyacinth was the target plant with the *matK* and *rcbL* markers being used. The aforementioned practicals were aimed at imparting the requisite knowledge and technical skills needed for DNA barcoding. Notably, during these activities the trainees developed skills in basic micropipetting, weighing, centrifuging, vortexing, use of thermocyclers, gel electrophoresis machine and DNA sequencer.

2.5 Analysis of sequencing results

The final training exercise involved using:

- programmes such as BioEdit and Geneious for sequence editing and alignment.
- the National Center for Biotechnology Information's (NCBI) Basic Local Alignment Search Tool in comparing our sequence with other biological sequences in the database, including how to retrieve nucleotide sequences of interest.

2.6 Main Outcomes of the Project

The major outcomes of the project are as follows:

- i. The technical capacity of key stakeholders in Zimbabwe and participating representatives of SADC countries in the use of molecular information and DNA technologies in the identification of alien invasive species was vastly improved.
- ii. A network of professionals who are committed to establishing a Southern African biobank of alien invasive species was formed.

The project has mostly managed to do a training workshop for biodiversity stakeholders. It is envisaged that once the trained participants start implementing the skills and knowledge gained benefits such as improved identification of alien invasive species and their subsequent management will be realized. This will assist in biodiversity conservation efforts being made under the CBD.

3 Role of the National Focal Points of the CBD

The National Focal Points for the CBD in the different countries played different roles which include:

- i. Circulating the workshop call.
- ii. Providing information for country presentations on the status of alien invasive species.
- iii. Resource mobilization to augment the project budget.

4 Benefits of the project: Technical and Scientific Cooperation

The project enhanced Technical and Scientific Co-operation between Parties and organizations involved in the project in that trainers were drawn from three countries i.e. Botswana, South Africa and Zimbabwe. Trainers from Botswana and South Africa imparted expertise learnt during the 2015-2016, Global taxonomy Initiative training course to the participants. Whereas, trainers from Zimbabwe from AiBST and CUT offered molecular training i.e. DNA extraction, amplification, sequencing and editing.

Since the trainees were drawn from institutions involved in various biodiversity conservation activities, they also shared knowledge and experiences amongst themselves.

5 Fostering TSC: Activities and approaches

The discussion sessions efficiently succeeded to foster sustained TSC because they enabled participants to share knowledge, experiences, challenges and as such identify

common needs, interests and priorities setting the stage for future technical and scientific cooperation. Overall, the project enabled representatives of the participating SADC member states to network and identify how to tap into each other's strengths and expertise going forward.

6 Comments on how activities or approaches would have been done differently

There is need to increase the budget for such projects so that as many stakeholders as possible can be trained. For example, some SADC member state officials failed to attend the training course because the project only covered local costs, so foreign participants had to meet their own airfare costs.

7 Maintaining or scaling up the project

Given the shared need for capacity building, technical and scientific cooperation, it is imperative that another training workshop with other SADC countries that were not part of the training workshop be done. After this, a consultative workshop for SADC member states on the formation of a Southern African biobank of alien invasive species needs to be done. Centres of excellence for DNA barcoding in the respective SADC countries need to be identified and equipped if necessary.

8 How this project could be replicated in another region

The starting point would probably be to share the lessons learnt, experiences and benefits so that the value of doing such projects are clear to target region(s). As such, it becomes important to ensure that the positive results of this project are at least maintained. It is also important that pre-project processes be fully participative so as to garner the support and input of all stakeholders from government agencies to the private sector and citizenry in general.

9 In-Kind Contribution

Different stakeholders provided in kind contribution and these include:

- i. Namibia and South Africa Governments, provided trainers for free.
- ii. The National Herbarium and Botanic Gardens allowed participants to tour its facility and receive training on specimen collection in their Garden.
- iii. The Ministry of Environment, Water and Climate made presentations on selected topics.
- iv. The NBA provided its boardroom, ICT equipment, support staff and vehicles.

Maintenance of relations with stakeholders involved and also implementation of project resolutions will help to increase in kind contribution in future projects.

10 Participating Groups

Participants were drawn from government agencies and universities whose line of work involves dealing with alien invasive species. In order to engage efficiently with this particular group, the following approaches/strategies are proposed:

- i. Engage them in drafting of the post project proposal.
- ii. Involve them in the post project activities.
- iii. Maintain contact and gather feedback from them.
- iv. Review and refine approach if necessary.

11 Summary of the Project

The project entitled “*Technical Capacity Building on the Use of DNA Barcoding Technology: Towards the Development of a multilateral Alien Invasive Species Biobank in Southern Africa*” was conducted in Harare, Zimbabwe, from 17th to the 26th of September 2018. The National Biotechnology Authority of Zimbabwe, facilitated the training using a grant received from the Convention on Biological Diversity - Bio-Bridge Initiative. The training had trainees from government institutions in Zimbabwe and the University of Namibia. Training was delivered by experts from the South African National Biodiversity Institute (SANBI), Botswana University of Agriculture and Natural Resources (BUAN), African Institute of Biomedical Science and Technology (AiBST) (Zimbabwe), and Chinhoyi University of Technology (Zimbabwe). The training sought to develop the capacities of key stakeholders on use of molecular information and DNA technologies in the identification of alien invasive species. As such the training included lectures, discussions, field work (collecting plant specimens), laboratory work (DNA extraction, amplification, sequencing) and computer based sequence editing and alignment. The workshop laid the groundwork for future collaborations and coordinated efforts between relevant institutions from the SADC region aimed at the establishment of the first ever multilateral Alien Invasive Species Biobank in the Southern African region.

12 Lessons Learnt

In terms of lessons learnt we would like to give a perspective which reflects the situation in Zimbabwe. The training had a fair representation of Zimbabwe’s key biodiversity stakeholders. Though due diligence was done in the selection process for trainees, we noted that they had challenges in laboratory work since they are mostly doing morphological characterization. We therefore recommend that in all the SADC countries centres of excellence in DNA barcoding be established for use by conservation agencies. This would also assist to reduce cost of setting up infrastructure and also promote technical and scientific co-operation.