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தேசிய தாவரவியல் பூங்கா திணைக்களம்
National Herbarium
Department of National Botanic Gardens

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த.பெ.14, பேராதனை, இலங்கை
P.O. Box 14, , Peradeniya, Sri Lanka

My No: NH/BOT/10/2019 2019.12.10

Through Director General, Dept. of National Botanic Gardens / forwarded A.
[signature] DG 12/12

Ms. Claire Parois
Bio Bridge Initiative Programme,
Secretariat of the Convention on Biological Diversity,
413,
Saint Jacques street West,
Suite 800,
Montreal Quebec HZY N9,
Canada

Final progress report under Bio Bridge Initiative Small grant project -2019

I am writing to bring your kind consideration to the attached final report of the progress of activities under Bio Bridge Initiative project 2019. Also I take this opportunity to express our sincere gratitude for offering your advice, continuous support and necessary funding that enabled us to accomplish the objectives and complete the project successfully.

[signature]
....
Dr. R.A.S.W. Ranasinghe
Deputy Director

Dr. R.A.S.W. RANASINGHE
Deputy Director - National Herbarium
Department of National Botanical Gardens
Peradeniya

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Annex 05

01. Outline in detail the activities implemented during the Project.

Activity 1: Preparation and conduct of an international workshop on molecular species delineation DNA barcoding, population genetics, sequencing and NGS approaches management of DNA bank.

Activity 2: International training of five Sri Lankan scientists on molecular techniques at laboratory facilities at Singapore Botanic Gardens.

Activity 3: Establishment of a DNA banking unit and reference collection at the National herbarium to strengthen and national capacity to contribute to regional and global research. The reference sequence database will be invaluable for identifying sterile specimen and commercially available plant products

Activity 4: Establishment of a regional collaborative network and preparation of the follow-up programme for the long-term objectives and outcomes

02. i. What are the main outcomes of the Project?

a. The workshop was attended of 30 this 29 were representing 06 Universities (University of Peradeniya, University of Jaffna, Uva Wellassa University, Eastern University, University of Colombo, Open University of Sri Lanka) and 09 Government Institutions (Ministry of Mahaweli Development and Environment, National Botanic Gardens Peradeniya, Department of Export Agriculture, Dept. of Agriculture, Industrial Technology Institute, Ayurveda Research Institute, Rice Research Institute, National Institute of Fundemental studies) and one freelance participation. One senior professor, senior lecturers senior research officers, research officers and different technical officers representing different departments and institutions, participated in the 3 day workshop. The workshop was successfully conducted with lectures and practical sessions, aimed at building capacity of academics, researchers and other related professionals in Sri Lanka to use appropriate molecular techniques in floristic research.

b. Fundamental understanding given on species boundaries, species origins, and species relationships. This was enhanced by providing practical exposure to newly developed methods for data gathering and analysis of phylogenetic relationships. Establishment of a DNA bank and a reference library of DNA sequences of the native plants of Sri Lanka. This was started with collecting and storing DNA material for a leading project on DNA barcoding, a combined morphological phylogenetic approach of genus *Syzygium* of family Myrtaceae and some other projects on genus *Cryptocoryne* of family Araceae and projects related to threatened plants in the National Botanical Survey.

c. A strong network was built between the local participants and the foreign experts. There was a great interaction of the participants with the expert team from RBGE, which enable local scientists to get feedback and advice on their future research plans.

2. ii. How these results impact the state of the biodiversity?

Participants gained updated knowledge on species delimitation, phylogenetic analysis, and interpretation of related data in application of biodiversity conservation.

Sri Lanka, a country well known for rich biodiversity, has studied the diversity in conventional taxonomic methods. However, so far there were few attempts to recognize true genetic diversity and assemble of this information in the picture of regional and global assembly of biodiversity which greatly hinders knowing actual diversity.

2. iii. How this Project generated social and economic benefits? Please annex any written relevant document.

This project enabled us to bring together scientists working on same discipline from different institutions across the country to a central place in the National Herbarium. They discussed widely their current research and future plans in terms of institutional aims and goals. Understanding national priorities in systematic research helped them to streamline research for sustainable application of biodiversity, especially those participants of Traditional medicine related institutions and Industrial technology Institute of Sri Lanka shared their interests of application of plant diversity in more applied research aimed at national economy.

3. Describe how the Project enhanced the Technical and Scientific Cooperation (TSC) between the Parties and organizations involved in it.

Especially the meeting held at the end of the workshop on 12th of September 2019 was successful. It was a good forum to know what is happening outside the country. Several recommendations have been put forward on the topics,

- ✓ Importance of identification of the current state of mainstreaming efforts in the country as well as defining the specific biodiversity development problems that needs to be addressed.
- ✓ Necessity of strengthening the molecular research
- ✓ Proposing to initiate a taxonomic group in parallel to national red list group and conduct meetings at regular time slots
- ✓ Discussions on national and global activities necessary to address conservation of biodiversity. For example taxa to be prioritized, need attention etc.,
- ✓ Identification of important species, habitats, ecosystems, ecosystem services or genetic diversity that are under threat and ought to be included in development plans and measures

04. Which activity or approach efficiently succeeded to foster sustained TSC and why?

All four activities mentioned above

ii. Which activities or approaches would be done differently, now that you have experienced them, and why?

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05. Describe the in-kind contribution of the different stakeholders involved in the Project and how this type of contribution could be increased in future projects.

Although BBI provides the fundamental approach for the project, in kind contribution also developed mainly through the trust fund of the Department of National Botanic Gardens which involved:

- Upgrading the new mini molecular laboratory,
- Purchasing of equipments and chemicals for the laboratory function
- Allocating nearly 100 million Sri Lankan rupees for the construction of proposed molecular laboratory to be built in 2020.
- Funding support on training programs and workshops relevant to the training of national herbarium staff and the department staff and upgrading the services

06. If the Project included a participation of major groups like business, sub national and local authorities, NGOs, youth, women, indigenous peoples and local communities, what would be your advice to engage efficiently this specific group?

Participants were mainly from government and semi government institutions and also some

leading professionals in Botany. It was clearly recognized necessity of upgrading knowledge of these participants with current trends in related fields, especially on application of DNA Barcoding and species delineation studies on native flora. It was also well understood that the rich diversity of country's flora is outdated without comprehensive taxonomic revisions based on modern molecular methods. It is an important aspect to give more training opportunities for this group of professionals in the field of molecular plant science in future.

07. Any other lessons learned to share with the Bio-Bridge team?

- Although we are practicing to a certain extent, it is necessary to focus more on local authorities, NGOs, youth, women, indigenous peoples and local communities for giving them opportunities to learn the value of biodiversity conservation by making available related training programmes.

- Reduced data for modeling and other analyses can already be seen in the tropics, where collections are generally not digitized and available for various studies .To maintain herbaria as the treasure we need continued and consistent collection world-wide is essential, especially because they have recently revealed themselves as a browsable repository of genetic variation and diversity. The National Herbarium in Sri Lanka will be

further upgraded with understanding the value and application of these data repositories especially through expanding National Botanical Survey project and digitization of herbarium collections.

- It requires upgrading updated information, sharing with other collaborative stake holder institutions to get the international standards in research.

08. How this Project could be pursued to maintain or scale up the positive results obtained? How this Project could be replicated in another region?

- This persuade specially to learn strong fundamentals on molecular research
- Understanding given for better use of technology for surveillance, assessing biodiversity, collective action for data collection , need of and data sharing
- Communicate scientific findings more effectively through international collaborations
- Capacity building and Innovation concepts among participants
- Basically training of staff members will have active participation in future collaborations in native flora. It is the platform to start the molecular research center in the national herbarium with modern technical standards and facilities in two years time period.

09. What would be your vision for future, longer term cooperation between the Parties and organizations involved in the Project? Describe any roadmap that was discussed among relevant stakeholders to achieve this.

Vision

- With the a strong support from the stake holder institutes that generate the needed data as well as multidisciplinary teams to conduct research and documents on the many dimensions related to plant conservation.

- To expand repositories and facilities in the National Herbarium for acting as the main data hub for flora of Sri Lanka with well-equipped laboratory facilities for national and international collaborative research.

Longer term cooperation between the Parties

- Streamline long term research goals to meet and implementation of national biodiversity strategies and action plan (NBSAP 2016-2022) targets. For example DNBG present and future research plan equipped with targets set in NBSAP such as Establish a national list of species and ecosystem types with annual updating, national Botanical Survey and national Red Listing of Flora .....as primary focuses of national research.

- Arranging regional and sub-regional meetings during the next intercessional period and in collaboration with relevant regional and sub-regional organizations to exchange information on activities and progress made in implementing the Strategic Plan for

Biodiversity and to identify associated needs with the aim of facilitating the effective implementation of the Strategic Plan. For example a collaborative research programme already established with SBG which contributes to regional and global knowledge update of relevant flora. This practice aimed at active contribution to regional and global taxonomic and systematics research in future.

- Assisting relevant institutions through organizing and conducting courses and programmes to address specific education and training needs for the implementation of the Convention prioritizing topics that have not been adequately covered to date and considering, as appropriate, for example introducing phylogeny and systematic courses including practical sessions on laboratory applications and bioinformatics in annual training plan of the National Herbarium.

- A strong collaboration established among academic, research and other relevant institutions with specific expertise to share technical and scientific knowledge and expertise more broadly, It was discussed and planned to conduct annual/biannual national symposium on Plant Systematic Research in Sri Lanka.

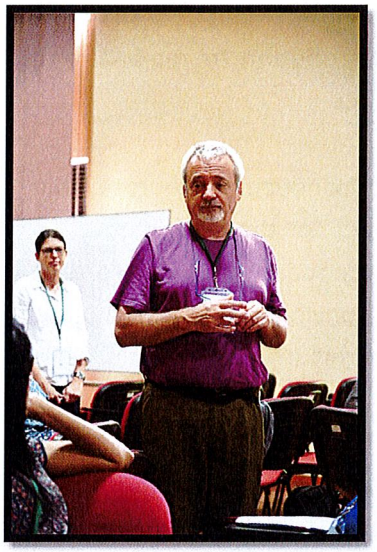
10. Please compile and attach links to or copies of any media/ video/ articles on the Project.

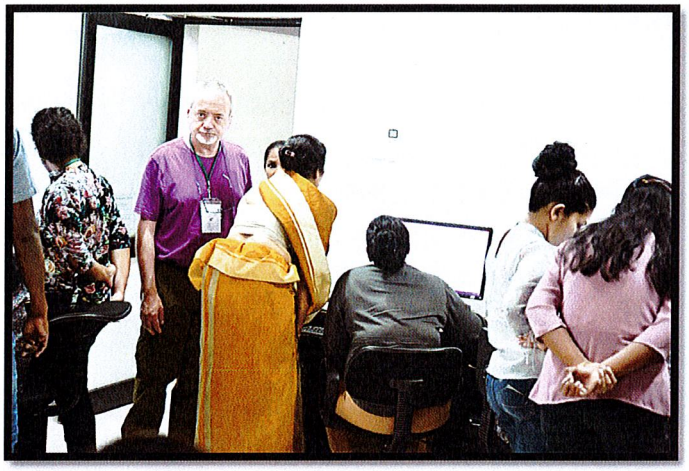
Activity 1: International workshop on molecular species delineation, DNA barcoding, Population genetics, population genetics, sequencing and NGS approaches management of DNA

bank.

Inaugural ceremony of the Workshop & Lectures

Practical session of the workshop

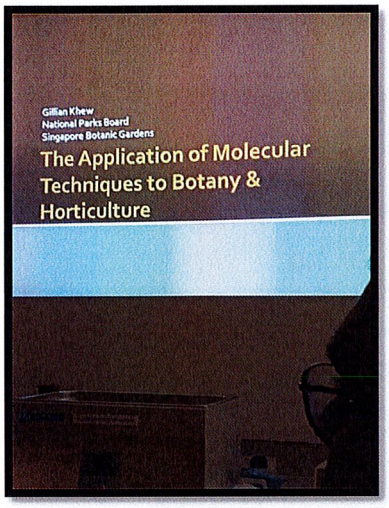




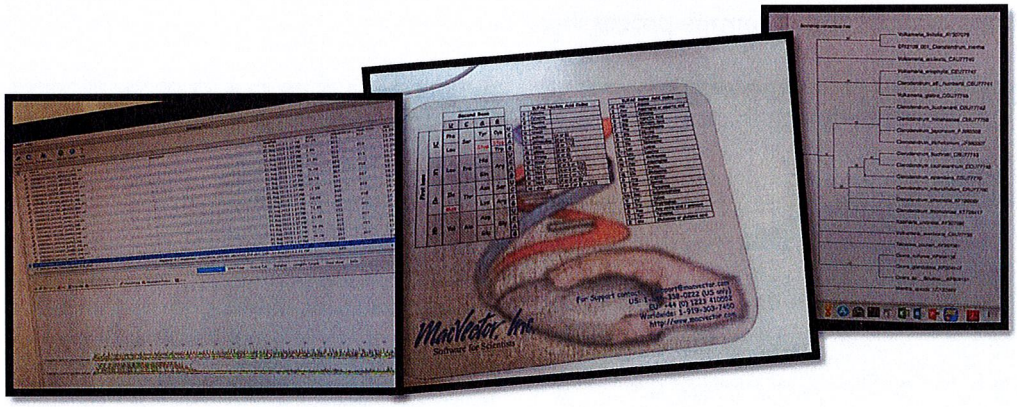
Final discussion at the end of the workshop

Activity 2: International training of five Sri Lankan scientists on molecular techniques at laboratory facilities at Singapore Gardens.

Lectures from the relevant officers /Scientists



Collections management, sample processing


MacVector, Inc.
Software for Scientists

Activity 4: Establishment of a regional collaborative network and preparation of the follow-up Programme for the long-term objectives and outcomes

Mr. H.D. Jayasinghe - research assistant from National Institute of Fundamental studies who is working on **'phylogenetic position of all Sri Lankan taxa of genus *Syzygium* in the updated phylogeny of the genus, using whole genome data'** with the support of NSR funding (NSR 19061) under the supervision of Dr. Subhani Ranasinghe (Deputy Director, National Herbarium), Dr. Hashendra Kathriarachchi (Senior lecturer, University of colombo) and Prof. Siril Wijesundara (Plant taxonomy and Conservation Project at NIFS), Dr. David Middleton (Coordinating Director /R&C & Keeper of Herbarium, Singapore Botanic Gardens), Dr. Gillian KHEW Su-Wen(Deputy Director-Molecular Biology & Micropropagation, Singapore Botanic Gardens).

- 30 samples were collected and 8 species were selected from them and the DNA extractions were done. They were already sent for whole genome sequencing with the collaboration of Singapore Botanic gardens.

Sample collection

Collected samples for DNA extractions