

ECOSYSTEMS RESEARCH AND DEVELOPMENT

ENR Technologies Promoted

The Ecosystems Research and Development Bureau's (ERDB) extension activities for CY 2020 were re-strategized due to COVID-19 pandemic. Meetings were conducted to discuss the changes and adjustments to be implemented for the project. The Research Development and Extension Centers' (RDECs) technology transfer implementers were advised to revise their respective 2020 strategic communication plans to conform to the "new normal". A shortlist of alternative communication strategies was prepared for their guide.

ERDB resorted to online monitoring of the RDECs' extension activities through report review, online meetings, Short Message Service (SMS), and electronic mail coordination. Meetings were conducted for updates regarding the implementation of the RDECs' strategic communication plans. The project database is continuously updated to keep abreast with ERDB's extension services all over the Philippines.

Under this project, ERDB and RDECs worked out their initial strategic communication plan and activities planned for next year. Through initial coordination, the technologies to be promoted by the RDECs for 2021 were identified.

Table 18. Technologies identified per RDEC for CY 2021

RESEARCH DEVELOPMENT AND EXTENSION CENTER	TECHNOLOGY
Watershed and Water Resources Research Development and Extension Center (WWRDEC)	Bamboo propagation and science-based information on economically-important bamboo species and ornamental bamboos for watershed rehabilitation and riverbank stabilization
Urban and Biodiversity Research Development and Extension Center (UBRDEC)	Bamboo Propagation Technology and Charcoal Briquetting from Bamboo Waste; application of Mycorrhiza
(Toxic and Hazardous Wastes Research, Development and Extension Center (THWRDEC)	Pollutant-Absorbent Plant Species (PAPS) For Vertical Urban Planting and Floating Garden Phytoremediation
Coastal Resources and Ecotourism Research Development and Extension Center (CRERDEC)	Carrying Capacity Determination of Ecotourism Sites in Oslob, Cebu
Forest and Wetland Research Development and Extension Center (FWRDEC)	Use of Improved Seeds for the Establishment of Falcata Plantations
Agroforestry Research Development and Extension Center (ARDEC)	Contour Farming using lemon grass as vegetative strips



Figure 14.1 Techno Exhibit on Bamboo held at DENR-CAR grounds in celebration of World Bamboo Day

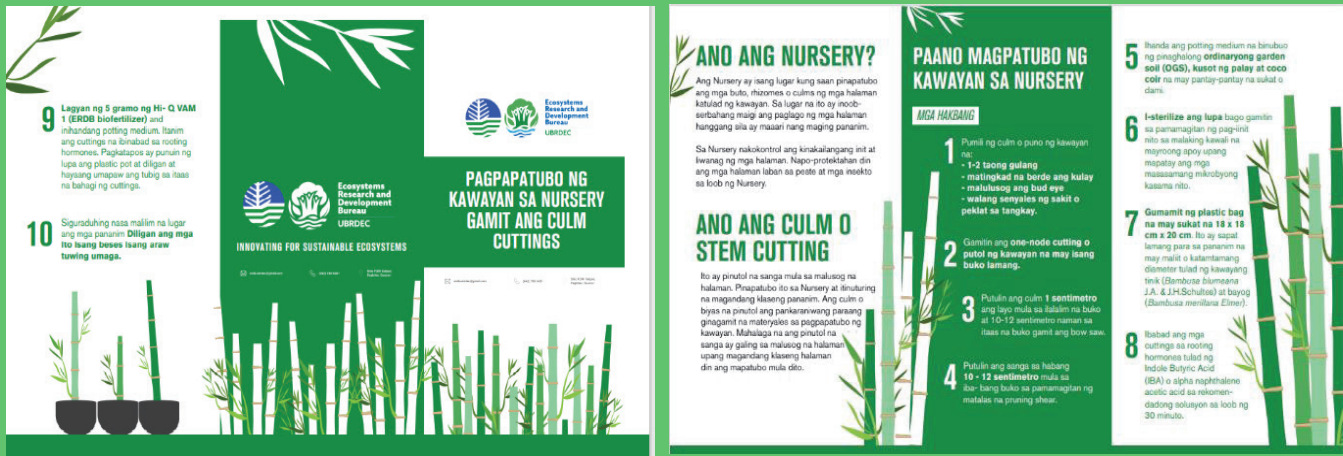


Figure 14.2 Photo of the bamboo brochure that was produced intended for training participants in Sampaloc, Quezon and other UBRDEC Clients

Technology Needs Assessment Activity



Figure 14.3 The participants of TNA in Barangay Malao-a, Tayabas City, Quezon



Figure 14.4 The participants of the conducted Technology Needs Assessment in Bula, Camarines Sur.



Figure 14.5 Participants during Hands-on demo on Charcoal Briquetting Using Bamboo Wastes



Figure 14.6 Ms. Emerlinda Balce - LGU Sampaloc Municipal Agruculturist accepts 100 pieces of poster from Gregorio E. Santos Jr.- UBRDEC Center Head

Other ENR Technologies Promoted/Disseminated

With DENR as the host for the 16th National Biotechnology Week Celebration this year 2020 with the theme “Bioteknolohiya: Pagbangon at Pag-asa Tungo sa Matatag na Komunidad, Kapitaligiran, at Ekonomiya”, ERDB facilitated the celebration via online. As part of the event, ERDB has promoted seven technologies as follows.

1. Genetic Diversity of Forest Trees through DNA Analysis

In this episode, the application of genetic diversity in forest conservation was highlighted. Large variation among species allows the whole population to adapt to any form of environmental stress. Examples of environmental stress are global warming, climate change, and pollution. There are species that can tolerate and survive from this stress, however, not all species have the same abilities. This may cause them infertility or even death. Genetic uniformity makes the species/population vulnerable.

Through the genetic diversity studies conducted by the bureau, we are able to determine which populations are able to adapt to the changes in the environment. It was emphasized that the higher genetic variations, the more chance for species to survive and thrive in an ever-changing environment.

ERDB has already initiated genetic diversity studies of priority forest tree species in the Philippines. Ever since the establishment of the Forest Molecular Laboratory in 2005, the bureau has been active in conducting DNA analysis studies, including the ERDB genetic diversity study last 2015.

To date, there are seven species that were included in the ERDB genetic diversity study. Species include: Narra (*Pterocarpus indicus Willd.*), Molave (*Vitex parviflora Juss.*), Benguet pine (*Pinus kesiya Royle ex Gordon*), Bagalunga (*Meliadubia Cav.*), Yemane (*Gmelina arborea Roxb.*), Mangium (*Acacia mangium Willd.*) and Ipil (*Intsiabijuga*). Having the knowledge on how to identify genetically diverse species allows the implementation of proper and suitable measures to conserve the forest trees in the country, especially in highly degraded forests



The studies conducted have huge potential with regard to the preservation of forest ecosystems. These can be used for reforestation programs and monitor the unregulated deforestations.

2. Clonal Propagation of Indigenous Forest Trees

The third episode of the Enviotalk highlights clonal propagation. Clonal propagation is the production of planting materials using stem cuttings other than seeds. It is important that high quality planting materials are produced to ensure the survival of the plant species when planted out in the field, which is why there are continuous efforts in the development of clonal propagation of indigenous species protocols of the bureau. The steps of clonal propagation were also discussed.



As of now, the bureau has developed 50 species through clonal propagation. The main benefit of this technology is the increase of yields of endangered forest tree species and the reduction of impacts of known diseases.

3. Tissue Culture of Bamboo

Plant tissue culture is a propagation method that grows plant parts in an artificial medium under a microorganism-free and controlled environment. This method is widely used for large scale multiplication, disease elimination, plant improvement, and production of secondary metabolites which are used as components for medicines, flavorings, pigments, and recreational drugs. A single explant can be multiplied into several thousand plants in a relatively short time and space under controlled conditions all year-round. Tissue culture/micropropagation has also been successfully used for the conservation of rare, endangered, and threatened species.



4. Rehabilitation of Degraded Community-Based Forest Management (CBFM) Area using Indigenous Tree Species Treated with Hi-Q VAM1



In its continuing efforts to combat the effects of climate change, ERDB developed the Hi-Q VAM 1, a beneficial fungus that allows plants to survive even in the most hostile soil conditions. Hi-Q VAM 1 naturally attaches itself to the plant roots. It allows better absorption of water and nutrients in various soil conditions, even in highly degraded areas. Thus, it improves the growth, yield and survival rate of plants. Plus, Hi-Q VAM 1 is a product innovated with the species native here in the Philippines which is why it is truly suited in this environment.

Hi-Q VAM 1 has helped in rehabilitating forest and farms. One example highlighted in this episode was the treatment of Dao and Molave trees in Davao del Norte. Low crop production of farmers because of soil erosion and kaingin was solved through the conduct of rehabilitation of degraded Community-Based Forest Management (CBFM) Area using Indigenous Tree Species Treated with Hi-Q VAM1 from 2015 until 2019. Agroforestry, on the other hand, is a land-use management system. This is the process of planting trees in between and around farm areas along with the planting of agricultural crops and shrubs, and the integration of animals to prevent soil degradation, erosion, leakage of chemicals to surface water and others.



Figure 14.7 The established Agri-Ecological Techno Demo Center in Mt. Kitanglad, Bukidnon was highlighted in this episode for its notable impact in the community. Through agroforestry, this Demo Center is now considered a tourist attraction not only for tourists and students but also for researchers.

5. Mindanao Tree Seed Center (MTSC)'s Technology on Production and Use of Quality Seeds for Industrial Tree Plantations

“Quality seed doesn’t cost, it pays.” The Mindanao Tree Seed Center started in 2007, with the CSIRO public linkage program that includes the creation of tree seed center in the Philippines because it has been recognized that while greening is DENR’s major program and yet there was no existing facility that caters the need for quality seeds or planting materials. Part of the project is the seed collection and management of Mindanao Tree Seed Center cum Production of Quality Seedlings. Part of the responsibility of the project is to make the center a self-sustaining facility and that the center will be dispatching quality planting materials at a reasonable price for tree farmers and other interested entities.



Also, MTSC supports the implementation of the National Greening Program in terms of reforestation and tree plantation. For the past 12 years, MTSC produced quality seeds of different industrial tree plantation species and indigenous tree species. In addition, the center developed different protocols on the production of some indigenous tree species that are risk for extinction and categorized as threatened and endangered species. As part of the endeavor to supply quality seeds to support the timber corridor of the Philippines, MTSC is trying to supply quality seeds not only to LGUs but also to other tree farmers and stakeholders throughout the country.

6. Phytoremediation of Mined-out Areas using Bamboo



Phytoremediation is the use of plants to clean up soil, air, and water contaminated with various chemicals. The plants absorb the hazardous chemicals and store them. In this episode, bamboo was highlighted as the new gold in rehabilitating mined-out areas. Bamboo is considered to be one of the most effective plants for phytoremediation mainly because it has thousands of roots—its root system can effectively absorb more contaminants from the soil. Also, bamboo grows very fast—it can grow as high as 100 cm within 24 hours.

7. Microplastic Contamination on Selected Major Water Bodies of the Philippines

Microplastics are debris of large plastics degraded to microscopic scale at sizes ranging from 20-5000 μm (0.002 – 0.5 cm) due to different environmental factors such as biological degradation, UV light exposure, ocean waves, water salinity. Because of this, it can penetrate and deposit itself to animal and other living tissue once ingested.



Human dependence on plastics opted us to use plastic materials on things we use every day; from food packaging materials, clothing, and even cosmetic products such as facial wash and even toothpastes. The problem in microplastics, or in PLASTIC in particular is a problem of everyone. The current study on the microplastics in Philippine Marine waters showed that microplastics are already abundant in tourist destinations such as Boracay Island and even on marine protected areas like Tañon Strait Protected Seascape in Cebu and Taklong Island National Marine Reserve in Guimaras. On the marine waters of these areas we, collected water samples at depths of 5, 15, and 30 m of the water column as well as in the shoreline area, and these water samples were then

taken to the laboratory for analysis. The initial results showed that most of the microplastics are found in the shoreline area. However, microplastics were also found in the water column and most are concentrated at 30 m. Through these kinds of studies, it is possible to identify which Philippine water body has the highest microplastic; determine whether the inshore/ shoreline or offshore/ open ocean has the highest microplastic contamination and pollution; compare microplastic contamination and pollution between surface water of the open ocean, underwater including coral reef areas and shoreline areas; and identify the common microplastic pollutants in the major water bodies of the Philippines.

(Source: ERDB)