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ILLEGAL WILDLIFE TRADE AND COVID-19

WHAT GOES AROUND COMES AROUND

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ILLEGAL WILDLIFE TRADE AND COVID-19 WHAT GOES AROUND COMES AROUND

The year 2020 marks a historical decade as the coronavirus disease also referred to as the “COVID-19” pandemic has affected the countries around the globe. Usual routines and human activities of individuals from all sectors of the society including businesses, schools universities, factories, agriculture, and even private and government companies were significantly interrupted. Worldwide lockdowns were implemented by the respective national administrations.

This global catastrophe is similar to the past epidemics. For example, a disease called Ebola had emerged in 1976. It had been known to be transmitted “*through close contact with secretions, blood, organs or other bodily fluids of the many different infected animals.*” Aside from bats, a number of these animals include monkeys, chimpanzees, gorillas, forest antelope and porcupines, according to the World Health Organization. (Bradford 2016).

The COVID-19 was detected from a new strain of coronavirus. Reports say that the outbreak began in Wuhan, China last November 2019 which was transmitted worldwide, causing an outbreak. Although the exact source of the virus is yet to be identified, the disease is thought to be “*zoonotic*,” or “*harmful germs which will spread from animals to people and cause illness.*” (CDC 2017).

As stated in a study titled “*Severe Acute Respiratory Syndrome Coronavirus as an Agent of Emerging and Reemerging Infection*” in 2007, this brings back the enormous pool of SARS-CoV like viruses found in horseshoe bats and other exotic animals in southern China. They added that we should prepare for the possible reemergence of the virus from these animals.

The Department of Environment and Natural Resources (DENR) Secretary Roy A. Cimatu said that they will not be complacent regarding this crisis (denr.gov.ph.) As reports circulated that illegal

trade of wild animals has led to zoonotic diseases, the DENR will not stop in their operations in looking after criminals involved in illegal wildlife trade.

The unlawful business of selling wildlife seems to have been a good source of income for illegal traders. Relevant laws are existing in the Philippines, and penalties are in place. One of these is Republic Act No. 9147: An Act Providing For The Conservation And Protection Of Wildlife Resources And Their Habitats, Appropriating Funds Therefor And For Other Purposes. It was signed on July 30, 2001. With its strict implementation along with relevant laws, many have already been caught and penalized. And yet such environmental violations still persist. Probably the violators have an inadequate knowledge of the consequences of their actions. Could this current pandemic mark, for them, as a confirmation that whatever harsh action mankind inflicts on nature will be returned to them?

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COVID-19

IN THE EYES OF AN ENVIRONMENTALIST

Florentina D. Oliva



The above photographs show the changes in the atmosphere of Metro Manila before (left) and after (right) the many activities were stopped and business operations were closed due to the COVID-19 pandemic.

Coronavirus disease 2019 (COVID-19) is the official name given by the World Health Organization (WHO) to the disease caused by SARS-CoV-2, the new coronavirus that surfaced in Wuhan, China in 2019 (Yale Medicine, no date). They categorized the illness as a pandemic because it has infected a large population, which includes countries around the world.

In response to the COVID-19 pandemic, the Philippine government through the Interagency Task Force (IATF) on Emerging Infectious Diseases chaired by the Department of Health (DOH), the National Action Plan (NAP) was created to “contain the spread of COVID-19 and mitigate its socioeconomic impacts.” (WHO 2019)

Moreover, the Philippines took actions such as the implementation of the community quarantine in Metro Manila, Luzon and other parts of the country, addition of 23 testing labs aside from the Research Institute of Tropical Medicine and other preventive measures such as wearing of masks and face shields, regular washing of hands, disinfection and social distancing.

People were forced to stay in their homes to avoid the spread and contamination of the deadly virus. In doing so, transportation of all kinds stopped its operation. While the pandemic took lives and caused a lot of

change in economic and other human activities, there have been reports that it gave our ailing environment a chance to recuperate. For one, it decreased the very big source of environmental pollution and the atmospheric particles drastically dropped. The once smoggy sky in the metropolis became blue.

Looking back to 2019, the Philippines ranked 57th out of the 98 most populated countries in the world. In the same year, the concentration of tiny particulate matter in Manila increased from 14.6 $\mu\text{g}/\text{m}^3$ in 2018 to 17.6 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$), exceeding the World Health Organization’s (WHO) safety limit of 10 $\mu\text{g}/\text{m}^3$. The air pollution affected 98% of the National Capital Region’s 12.8 million people and responsible for more than 4,000 deaths annually. In 2018, air pollution was linked to between 11,000 and 27,000 deaths. When lockdown was implemented in Manila, the PM 2.5 or the concentrations of fine particulate matter have dropped to a third of their normal levels in some parts of the city as road transport was curbed, businesses shut, and personal mobility restricted (Mongabay 2020).

Secretary Roy Cimatu of the Department of Environment and Natural Resources (DENR) commented that “the major cause of climate change, air pollution, due mainly by mass transport energy emissions is being abated”. The presence of COVID-19 reduced the

number of activities that use vehicles. Reduction in the production activities in businesses around the world has allowed levels of air pollution to decline as global lockdowns and quarantines were implemented to inhibit the spread of COVID-19.

Although air pollution has decreased, marine life is at risk due to the disposable face masks that were found piled up in the ocean, as stated in an article by TheGuardian.com, wherein conservationists warned that the pandemic could lead to a greater risk of ocean pollution.

Further, The Manila Times reported that “face masks (not to mention face shields) and personal protective equipment (PPE) often contain plastics such as polypropylene. Expert opinion places the lifespan of masks at 450 years, enough to mark these as ecological time bombs.” (Aberia 2020)

Cabinet Secretary and Inter-Agency Task Force for the Management of Emerging Infectious Diseases (IATF-EID) spokesperson Karlo Nograles urged the LGUs to strengthen their campaigns on proper waste management and segregation. They were also requested to “observe existing protocol under the Infection Control of healthcare facilities.”

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A STUDY OF TWO COASTLINES IN PERIL

Annieraj G. Antong • Jose Isidro Michael T. Padin • Mariche B. Natividad
Jenilyn C. Regondola • Glady Mae V. Vijandre • Lyndley M. de Torres

The havoc caused by Super Typhoon Yolanda (internationally known as “Typhoon Haiyan”) brought lessons and knowledge on the climate change impacts. The fact that the Philippines is an archipelagic country makes it obvious that many coastal communities are in need of assistance as they respond, recover, and adapt to climate change. Adaptation strategies in such communities are the gaps that need to be aptly filled in existing environmental laws and current disaster reduction tools.

Studying vulnerable coasts

Vulnerability is a function of exposure, sensitivity and adaptive capacity. The final vulnerability of areas exposed to the same type and degree of hazard can vary based on the adaptive capacities of covered localities. Adaptive capacity, the ability of the system to adjust to climate change, to moderate potential damages, to take advantage of opportunities, or to cope with the consequences (IPCC 2001) may influence overall vulnerability.

The dynamic characteristics of coastlines through the action of bio-physical factors coupled with the adaptive measures of coastal communities can provide vital information on specific assets that are most vulnerable to climate change-induced hazards such as coastal erosion. Climate change impacts, continuing coastal resource degradation, and habitat destruction pose serious risks to Philippine

coastal zones (Sales, 2009). Salient findings from the research conducted by ERDB-CZFERD revealed that adaptive capacity indicators such as setback zone implementation, coastal resources management program compliance, and livelihood options influence the vulnerability to coastal erosion of two coastal communities, one in Malatgao, Narra, Palawan in Luzon and another in Villanueva, Misamis Oriental in Mindanao.

classification of dryland parcels (i.e. forest lands, residential, commercial, or agricultural in nature).

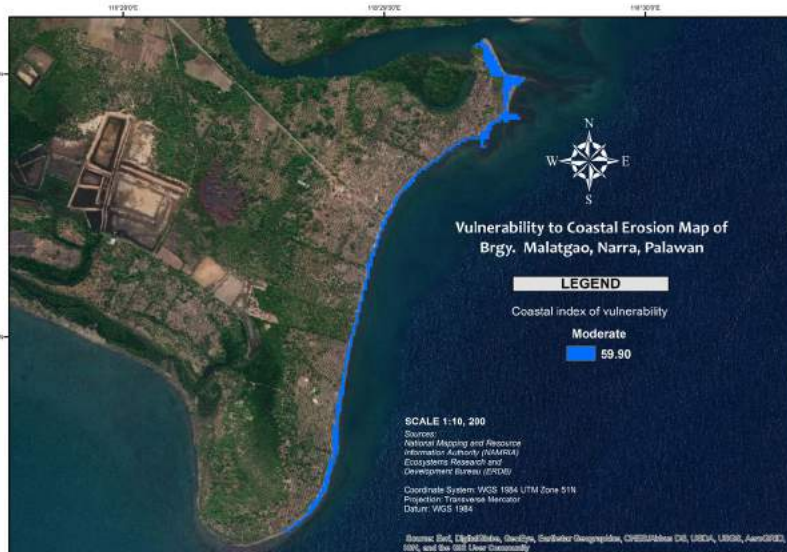
In the Philippines, the most important rule governing the shore lands adjacent to the foreshore is in Article 51 of the Water Code (PD 1067), which states that “the banks of rivers and streams and the shores of the seas throughout their entire length and within a zone of three meters in urban areas, 20 m in agricultural areas and 40 m in forest areas, along their

margins are subject to the easement of public use in the interest of recreation, navigation, floatage, fishing and salvage”. No person shall be allowed to stay in this zone longer than what is necessary for the cited purposes.

But in some local communities, the coastal inhabitants of Villanueva, Misamis Oriental had low awareness about the government’s policy on setback zones. The proximity of settlement from this coastline was

less than 20 m at the time of the survey. To mitigate inundation during high tide, some households resorted to stilt houses, while the others placed sand bags, cement-filled vehicle tires, and improvised riprap to avoid inundation and reduce the wave impact.

On the other hand, most of the coastal communities of Malatgao, Narra, Palawan (with very high awareness on setback zones) were situated approximately 700-1000 m away from the coastline as a compliance to the policy.



Vulnerability to coastal erosion map of Malatgao, Narra, Palawan

What is setback zone?

Among the coverage of the vulnerability assessment was on the awareness of communities on setback zone. Setback zone refers to the prescribed distance to a coastal feature (Cambers, 1998). It provides buffer between a hazard area and coastal development (Fenster, 2005) and serves to be an alternative to seawalls and dikes in minimizing damages incurred from coastal flooding and erosion. The same zone is part of the shore lands - which are ordinary parcels of land with similar

The role of CRMP

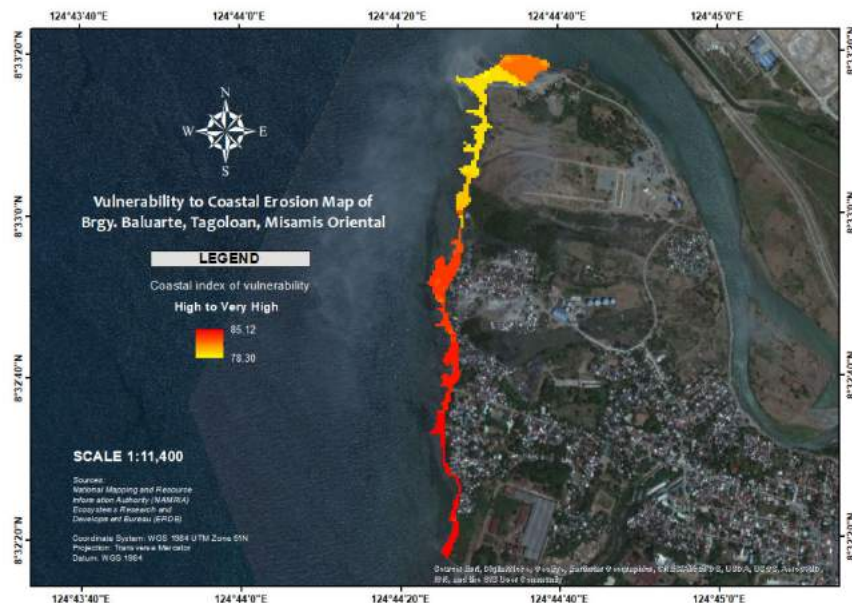
The Coastal Resources Management Program (CRMP) addresses the conservation of seagrass, mangrove, coral reef, estuaries, and beach ecosystems. Its implementation includes local legislation, municipal water delineation, coastal zoning, fisheries management, coastal law enforcement, marine protected areas, mangrove management, solid waste management, upland/ watershed management, coastal environment-friendly enterprise development, revenue generation and multi-institutional collaboration of CRM. The study found out that the existing CRMP efforts in the sites are mangrove planting, beach flora planting, coastal clean-up, regulated fishing (e.g., implementation of Republic Act No. 10654) declaration and maintenance of marine sanctuaries.

LGU's knowledge of geo-hazard maps

In Villanueva, knowledge on geological-hazard maps was cascaded to the local communities. Barangay officials and community leaders were able to prepare their risk maps on storm surge and flood. Their background on map preparation was acquired through training on disaster risk reduction management, which was co-sponsored by the local government and private sector. Meanwhile, the barangay chairperson and constituents of Malatgao have limited knowledge on geo-hazard map due to lack of trainings on disaster risk reduction management.

Reliance on coastal livelihood

Local communities in the areas still consider fishing as their main livelihood. Other existing livelihood strategies were small-scale entrepreneurship, general labor jobs in construction, carpentry, mechanics, employment from local or private institutions, and farming. The very low to moderate ratings on alternative livelihood of surveyed areas may suggest the heavy reliance of these communities to coastal resources. Thus, livelihood projects anchored on the improvement of management of our coastal resources (e.g., no exploitation of coastal resources and unsustainable practices) can be launched as a way to enhance the adaptive capacities of vulnerable communities.



Vulnerability to coastal erosion map of Baluarte, Tagoloan, Misamis Oriental

Towards resilient coastal communities

The two study sites which are coastal areas of Palawan and Misamis Oriental have high vulnerability to coastal erosion. The adaptive capacities of these coastal communities are important determinants of their overall vulnerabilities. Their awareness on the prescribed guidelines and environmental management must be enhanced through a more effective information dissemination approach (e.g. audio-visual presentations (AVP) and infographics). This will enhance their understanding on the hazards associated with their proximity to the shoreline. The skills and knowledge of the communities and local government units on geo-hazard must be improved as part of the disaster risk reduction initiatives in the coastal areas. Furthermore, translating vulnerability assessment into local context may facilitate the development of site-specific adaptation strategies.

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WILL BIOTECHNOLOGY HELP ENHANCE GUGO SEED GERMINATION?

Janine C. Baguhin



Gugo (*Entada phaseoloides* (Linn.) Merr.) is a medicinal plant found in warm tropical Asian countries. In the Philippines, it can be found in the forests at low and medium altitudes, from Northern Luzon (Cagayan) to Mindanao and Palawan. The species is renowned and extensively used for its several medicinal and cosmetic values. This forest vine is also used as raw material for cordage, net, and handicraft-making.

The conventional way to propagate gugo is by seeds. The seeds may be collected from January to April. The seeds are largest among angiosperms with diameter of 6-8 centimeters. The seedpod is 1.5-2 m long and 10-12 cm broad. Seed coat is very thick and hard. The dormancy period of seeds prolongs up to five years.

One of the significant technologies developed by the Ecosystems Research and Development Bureau (ERDB) in early 2000 was the rapid gugo germination technology. This technology reduced the germination of the gugo seeds from more than a year to 15 days. The procedure involved soaking of the seeds in tap water for

24 hours, scraping the hilum, placing the seeds on wet jute sack until radicle emergence, and lastly, transferring the germinants in plastic bags with pure sawdust. This simple technology was easily adopted by upland farmers which aid their livelihood.

In spite of the initial efforts of ERDB to save the natural stands and industry of gugo, Dr. Ranier B. Villanueva, a gugo entrepreneur, stated in the Gugo Technology Forum last 2013 that there is a continuous and growing market for gugo but the supply is still insufficient.

Alternative techniques need to be developed for mass propagation and conservation of this valuable medicinal plant species. Tissue culture techniques or micropropagation offer an important tool for multiplication and propagation of several medicinal plants. This is the growing of plant cell, tissue or organ on artificial medium with all the necessary nutrients required for plant growth under a microorganism-free environment and controlled conditions. In this method, production of quality gugo planting materials all year round is possible. To date, there are

no known studies that have been conducted about the micropropagation of gugo in the Philippines.

In 2018, ERDB started a study to micropropagate gugo using cotyledonary nodes. The experiment was done at the Tissue Culture Laboratory of the Laboratory Service Section (LSS) under the Laboratory and Experimental Services Division (LESD). Although the micropropagation protocol for the species was not completed due to existing *in vitro* tissue culture problems such as browning of tissues, researchers were able to reduce the germination period of gugo from 15 days to only 10 days and induce multiple shoot buds from gugo cotyledonary nodes. Appropriate type of explant and surface disinfection procedure were also determined for the *in vitro* establishment of gugo. Culture conditions including required light intensity, temperature and supply of nutrients and supplements to improve shoot development were also enhanced during the protocol development. This information can be used for further biotechnological research on this valuable medicinal plant.

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INSECT RESISTANCE MANAGEMENT STRATEGIES

IN THE PHILIPPINES

Alexa Rae B. Advincula

The Department of Environment and Natural Resources (DENR) is one of the primary agencies, together with The Department of Agriculture (DA), Department of Science and Technology (DOST), Department of Health (DOH), and Department of Interior and Local Government (DILG), responsible for assessing the risk and impact of the use of Genetically Modified (GM) crops to ensure its safe and responsible utilization in the Philippines. One of the crucial considerations in assessing the risks of Bt crops or Bt plant-incorporated protectants (PIPs) is the strategy in mitigating the possible development of resistance of the insects to the toxin. Insects have the capability to be immune to toxins, and the risk may be heightened if the Insect Resistance Management (IRM) strategies are not employed.

The goal of IRM is to delay the evolution of resistance in pest populations exposed to pest management tools such as chemical, biological, and chemical controls. Hence, continuous effort in monitoring the insects for changes in susceptibility to the Bt protein and monitoring the fields for signs of unexpected levels of damage due to target pest must be regularly conducted.

It was discussed that in developing a robust Integrated Pest Management (IPM) Plan, the information on the biology and ecology of the major pests is necessary. Also, the primary target pests specific for the region should be identified because the IRM plan must be tailored to the particular local needs.

The general policy of the approved IRM in the Philippines states that the combined high-dose should target not less than 99% targeted pests and 10% refuge system (Bag-in-a-bag) as a source of Bt-susceptible system. It was also emphasized that the role of the technology developers to conduct seminars, trainings, and briefings to the end-users, to collaborate with BPI, DA Regional Field Offices, and to conduct nationwide surveys during the IRM implementation and monitoring.



Therefore, the insect susceptibility monitoring and other measures with regards to pest susceptibility and insect protected crop, and communicating and educating the end-users of IRM stewardship guidelines and requirements must always be done regularly in preserving the efficacy of Bt crops.

As an example, the recent finding of Dr. Edwin Alcantara, UPLB Biotech on his study on the resistance development of Asian corn borer (ACB) in the Philippines concludes that after 16 years, major resistance allele is still absent from corn borer populations exposed to Bt corn expressing MON810 cry1Ab. It means that the IRM strategy employed over the years is still effective in delaying the onset of resistance of the insect pests. However, it is also important to note that it may not be

possible to entirely prevent the resistance from evolving. Hence, DA frequently sought the advice of the Insect Resistance Management Team (IRMAT), the scientists who have expertise in resistance management that provides their feedback and recommendation on how to best manage the resistance concerns.

On part of the DENR, looking into these factors greatly affect decision-making; thus, being updated on research findings and results of monitoring are necessary for regulators. Consequently, the DENR Biosafety Committee is always involved and participative in every opportunity like seminars, workshops, and capacity building that concerns Insect Resistance Management. It is part of the Department's commitment to ensure safety of the country's environment and natural resources for the Filipino people.

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PANGUIL RIVER ECO-PARK

EXPLORING A BIRD SANCTUARY

For. Ma. Kristina P. Orpia • Veronica M. Mercado

An ecological park (eco-park) caters to one of the valuable ecosystem services which is sustaining the habitat for wildlife, particularly birds. Birds are considered as good indicators of the ecosystem's health. In fact, birds are regarded as excellent barometers for the health of the environment (Carignan and Villard, 2002 cited in Mekonen, 2017). They are highly sensitive to well-known environmental strain factors and able to show the effects of these on biota and the effect of the response on a subset of other taxa present in the habitat (King, 2002 cited in Egwumah, et. al., 2017).

Established for a number of purposes (environmental, recreational, educational and research), eco-parks can be found in both urban and natural landscapes in many different countries. It is where wildlife habitat is introduced to a city for self-maintenance in accordance to ecological principles such as species diversity, ecological soundness, sustainability and others (Elnokaly, et al., 2016). It is likewise beneficial to wetlands intersecting or of close proximity since it helps enhance the biodiversity and natural beauty of the area by offering more ecosystem services. One of these include supporting of habitat services which is very important for sustaining vital ecosystem functions and the production of other ecosystem services (Clarkson, et al. 2013). In the Philippines, there are a number of eco-parks established and maintained by the government to make sure that the environment is well-taken care of. An example of these is the Panguil River Eco-Park.

Getting to know Panguil River Eco-Park

The Panguil River Eco-Park is a 12-hectare ecological park that lies at the heart of Panguil, Laguna. It was established in June 2010 and is currently being managed and operated by the Pangil Municipal Office. It offers various nature escapades for its tourists including camping, swimming, trekking to Ambon-Ambon Falls, and river tubing. It highlights its clean and clear waters surrounded by abundant vegetation.

The abundance of birds is an attraction in the area among other things. To further explore the species present, a two-day assessment was undertaken through ocular and aural observation of birds while traversing the Ecopark's campsite and trail going to Ambon-Ambon Falls. Identifying marks such as bill and wings shape, plumage and voice calls were noted. Photographs of the species were observed. Distribution and conservation status of the species were recorded based on the International Union for Conservation of Nature (IUCN) Red List of Threatened Species. DENR Administrative Order no. 2019-09 or "Establishing the List of Terrestrial Threatened Species and Other Categories, and the List of Other Wildlife Species pursuant to Republic Act No. 9147," and the Convention on Trade in Endangered Species of Flora and Fauna (CITES).



Scale-feathered Malkoha (*Lepidogrammus cumingi*) Photo by For. Ma. Kristina P. Orpia

Exploring bird diversity

Fourteen (14) species of avifauna belonging to 12 families were recorded in the Ecopark (Table 1). Among these species, majority (8) were identified to be endemic species or sub-species which is naturally occurring and found only within specific areas in the country (RA 9147, 2001). The most observed species is the Philippine Bulbul (*Hypsipetes philippinus* Forster), which is one of the endemic species in the country. This bird can be found throughout the Philippines except in the islands of Palawan, Mindoro, Gigantes, Guimaras, Masbate, Negros and Panay. It feeds on fruiting trees and has a variety of calls (Tañedo, et al., 2015).



Entrance of Panguil Eco-Park
Photo by For. Ma. Kristina P. Orpia

One migratory species, the Brown Shrike (*Lanius Cristatus* Linnaeus) was among the birds recorded in the area. The species is a common and abundant migrant seen in all types of habitat, including beaches, mountains, forests, forest edges, parks, gardens and city centers. (Tañedo, et al., 2015).

In terms of conservation status, the Philippine Hanging- Parrot / Colasisi (*Loriculus philippensis* Müller) and Indigo banded kingfisher (*Ceyx cyanopectus*) are listed as Critically Endangered in

DENR Administrative Order no. 2019- 09 “Updated National List Of Threatened Philippine Fauna And Their Categories”. The Philippine Serpent Eagle (*Spilornis holospilus* Vigors) and *L. philippensis* are listed in

the Appendix II of CITES. This implies that these species are not necessarily threatened with extinction, but in which trade must be controlled in order to avoid utilization incompatible with their survival (CITES, 2019). On the other hand, all species are categorized as Least Concern in the IUCN Red List of Threatened Species.

Exploring possibilities

The baseline information demonstrates the value and importance of the eco-park and the role it plays in the ecosystem. The eco-park serves to promote Information, Education and Communication campaign emphasizing biodiversity and its connection to people as well as the need to conserve and protect them.

It is, therefore, recommended to conduct: 1.) Regular survey in the eco-park, involving the local people, not only to have baseline data of the flora and fauna in the site but also to strengthen the

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Family Name	Species Name	Common Name	Distribution Status	Conservation Status (IUCN, DAO 2019-08, CITES)
Accipitridae	<i>Spilornis holospilus</i>	Philippine Serpent Eagle	Endemic	Least Concern
Alcedinidae	<i>Ceyx cyanopectus</i>	Indigo-banded Kingfisher	Endemic	Critically Endangered
	<i>Halcyon smymensis</i>	White-breasted Kingfisher	Resident	Least Concern
	<i>Todiramphus chloris</i>	Collared Kingfisher	Resident	Least Concern
Apodidae		Swiftlet		
Cisticolidae	<i>Orthotomus castaneiceps</i>	Philippine Tailorbird	Endemic	Least Concern
Cuculidae	<i>Lepidogrammus cumingi</i>	Scale-feathered Malkoha	Endemic	Least Concern
Lanidae	<i>Lanius cristatus</i>	Brown Shrike	Migrant	Least Concern
Nectariniidae	<i>Leptocoma speista</i>	Purple-throated sunbird	Resident	Least Concern
Megabimidae	<i>Psittipogon haemacephalus</i>	Coppersmith Barbet	Resident	Least Concern
Muscicapidae	<i>Copsychus mindanensis</i>	Philippine Magpie-Robin	Endemic	Least Concern
Paridae	<i>Pardaliparus elegans</i>	Elegant Tit	Endemic	Least Concern
Psittaculidae	<i>Loriculus philippensis</i>	Philippine Hanging Parrot/Colasisi	Endemic	Critically Endangered/ CITES Appendix II
Pycnonotidae	<i>Hypsipetes philippinus</i>	Philippine Bulbul	Endemic	Least Concern/ CITES Appendix II

Annona squamosa: **A PROMISING SUSTAINABLE CROP IN MY HOMETOWN**

For. Ricky M. Florindo

I hail from a small coastal town named Lobo located in the southern part of the province of Batangas and approximately 132 km in south of Manila. This year, the town will be celebrating its 148 years since it officially became a municipality back in September 27, 1871. Aside from fishing, farming is one of the main sources of livelihood there through propagation and production of agricultural crops such as rice, corn, coconut, banana, mango and atis (sugar apple), among others. The richness of the soil and favorable climatic condition made my hometown suitable for growing those variety of cash crops.

Atis, scientifically known as *Annona squamosa* Linn. which belongs to family of plants called Annonaceae is the most in-demand to travelers and famous crop produced in our town among the aforementioned crops. In fact, on September 27, 2011, Lobo was declared as the “Atis Capital of the Philippines” through Resolution No. 2011-61 authored by a member of its Sangguniang Bayan. This strengthened the move for Lobo to officially achieve the said coveted title. The event was held simultaneous with the launching of Agro-Ecotourism Industry of the town which uplifts four components such as biodiversity, history and cultural heritage, agricultural products, and beach resorts. The then Department of Agriculture Regional Director (Region IV-A) Abelardo R. Bargas shared that Lobo earns an average of 2.5 M per year from the town’s harvest of this main produce (www.batangas.com). The town also has an annual festival called “Anihan” which is a thanksgiving festivity to celebrate a bountiful harvest.

The area of the farmland in Lobo planted with sweet sugar apple is said to be approximately over 500 hectares. However, despite the recognition of this crop in Lobo, the town started out with less progressive farming system.

Development and improvement of the farming system would mean improvement in the yield and income of the crop. Other issues and concerns are the low production, cheap cost and pests. In line with this, the Department of Agriculture- Regional Office 4A, Southern Tagalog Integrated Agricultural Research Center, funded by the Bureau of Agricultural Research (BAR) implemented a project called “Community-based Participatory Action Research (CPAR) on Sugar Apple + Vegetables + Legume Farming System in Lobo, Batangas”. CPAR found out that a single tree of Atis can potentially produce 5 kilograms of fruit. Unfortunately, the current average production in Lobo is only 1 kilogram per tree sold at only 45 Php per kilogram, giving low income among atis farmers. These situation raised concerns to improve the municipality’s farming systems.

Prior to the implementation of the CPAR project, the Office of the Municipal Agriculture of Lobo conducted a Participatory Rural Appraisals (PRA) among atis farmers with the general objective of improving their yield and income through equipping smallholders with efficient irrigation technology, intercropping new plants, improving cultural practices and creating an organized association for atis farmers (Gestupa 2015).



The freshly picked/harvested fruits of Atis are properly sorted and packed in fruit baskets by the farmers of Lobo according to its size and quality. Photo by Epektibo Bayanihan Dito FB page

On the other hand, insect pests and diseases are some of the major causes of low production for the said crop aside from natural disasters such as typhoons and the like. In Lobo, the identified pests are mealybugs, small insect pests feeding on plant sap and leaving a sticky substance on the fruit and leaves which later makes room for fungi to develop such as sooty molds. Infestation period of mealybugs is during summer due to scarce amount of rainfall and unstable irrigation. Thus, watering or proper irrigation was identified as the simple solution for this mealybug infestation. However, due to wide land area coverage and canopy of the said crop to be sprayed, chemical pesticides application was

observed to be not feasible, aside from not being an eco-friendly solution. The implementation of new irrigation system provided significant development in the quality and quantity in their yield. Increase in the production of the atis fruit from 5 to 9 kilos per tree became attainable. What more, two harvest seasons are now possible. The regular harvesting season is from August to October while off-season harvest runs from May to July (The Philippine Star 2015).

The following are some of the significant information regarding the said valuable crop as cited in the publication of the Ecosystems Research and Development Bureau (ERDB) called Research Information Series on Ecosystems (RISE) with the title Insecticidal Pesticidal Plants. Vol. Nos. 2, May-August 2015.

In establishing the atis plantation, the following information may be considered. A seedling of about 6-8 months old is suitable for transplanting. On the other hand, budded plants are ready for planting in the field eight months after budding. Onset of the rainy season is the best time to plant this crop. Spacing of about 4-6 m apart following either the triangular or square system of planting is recommended. During the dry season, mulching is recommended to reduce water loss from the soil and minimize weed growth.

Pests and diseases are also important to watch out for. For pest, moth borer (*Heterographis bengalella* Raq.) highly infects the fruit of atis. It is also said to be the most destructive insect pest in the Philippines. The larvae eat and tunnel into the interior of the fruits. The surface of attached fruit development in severe cases, fail totally. The larvae make cocoons near the skin where they pupate. The moths emerge 12 days after pupation. Infected fruits should be collected and burned. For diseases, inflorescence rot, pink disease and rhizoctonia thread blight may infect atis. These can be controlled by removing infected parts and spraying the trees with appropriate fungicides.



Transport/hauling of newly harvested atis fruits from plantations to sorting area for packaging is done either manually or through horses. Photo by Epektibo Bayanihan FB page

In conclusion, I could say that Atis is really a promising valuable and sustainable crop in my hometown that could really help contribute not only in increasing the income of the farmers but also the municipality. Through providing new irrigation and intercropping systems, sound marketing strategies, enhanced yield and productivity is significantly feasible. Continuous support from both government and private sectors along with strengthened association of Atis farmers, this crop will surely be a sustainable source of livelihood to the people of Lobo.

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A TRIO OF CRITTERS

IN YOUR BATHROOM

Kevin Philip M. Olaya

The great outdoors has always been the haven of wildlife and biodiversity. From the humid forests up the mountains down to the cool streams and rivers flowing from it, flora and fauna flourish. Even the harshest environments support a variety of life forms. Antarctica supports more than a million penguins despite freezing temperatures, and the sandy deserts of Africa is home to a number of mammals and reptiles despite its dry and arid state. Life always finds its way, it has been said a thousand times, and it has also found its way inside your homes, specifically in your bathrooms. While going about your business sitting upon that lovely ceramic toilet or taking a nice warm bath, take time to look around, you might just notice a few insects and spiders which have probably been there for quite some time. This is not about gross cockroaches or big scary spiders, that warrant a lot of attention. This is about small creatures that you have surely taken notice of at some point but did not warrant your curiosity.

1. Drain Flies

These insects are classified under the family Psychodidae, under the order Diptera, thus making them close cousins of house flies and mosquitoes. There are around 2500 species under the family Psychodidae (Resh & Cardé 2003), however, the drain flies being referred to in this case are those belonging to the genus Clogmia which are probably hanging out in your bathroom. They are dull-looking, black to dark brown in color, and quite small, around the size of a round pin head. Upon closer inspection, adult drain flies possess hairs all over their body and thus have a fuzzy appearance. They also possess a pair of feather-like antenna. This overall look of being hairy and fuzzy makes an



adult drain fly appear more like a tiny moth than a fly.

The reason why drain flies are often found in bathrooms is not exactly a mystery. Simply take look at its name and you can already deduce that they thrive in household drainages. The larvae of drain flies feed on the organic matter that accumulate in the interior of domestic drainage pipes (Resh & Cardé 2003), these include algae, fungi, and other microorganisms (Drees & Owens 1982).

Due to this fact, they are considered beneficial because they assist in the breaking down of wastes into water-soluble materials (Drees & Owens 1982).

As a result of drain fly larvae feeding within drainages, they are rarely seen. However, this brings up the question on how they are able to survive such a seemingly inhospitable place. With that,

drain fly larvae are quite resilient and have been observed to be able to withstand extreme temperatures and low levels of oxygen (Drees & Owens 1982). After some time of feeding, the larvae then pupate and finally emerge as an adult drain fly.

Flight is not the forte of adult drain flies and they are almost always found motionless on the walls of bathrooms. When flying, they appear to be hopping or jumping (Drees & Owens 1982), in contrast to the quick and agile flight of their cousin flies and mosquitoes. They are more active in the night during which they fulfill their reproductive duties (Drees & Owens 1982) by seeking out potential mates. It is worth mentioning that these insects are generally harmless to humans (Resh & Cardé 2003) so there is no need to swat them when you see one.

2. Cellar Spiders

A quick glance at the corner of your bathroom and you may notice a mess of a web, a closer look and you have just come across one of the eight-legged creatures commonly encountered by humans. Cellar spiders belong to the family Pholcidae, a diverse group of spiders with around 1700 species around the globe (World Spider Catalog 2020). They are quite easy to identify as most cellar spiders, or Pholcids for that matter, have small



bodies and long slender legs. As such, they are often mistaken for the daddy-long-legs, its close cousin, because of their long and slender appendages. The “*real*” daddy-long-legs, also called harvestmen, belong to the order Opiliones and never make webs.

Pholcids inhabit a variety of locations and it is not uncommon to find them outdoors hiding under leaf litter, behind the foliage of various plants, and in rock crevices (Mondejar & Nuñez 2016). In this case, the pholcids of interest are those found within human habitations.

Their messy webs are ever present in unkempt ceilings, unlike the webs of other spiders, cellar spiders make no effort in making theirs a work of art. In fact, they continuously add strands of silk in their web, resulting to extensive, loose, and irregularly-shaped webs (Jones, 2004). When cellar spiders sense a disturbance in their web which they perceive as a threat, they often

bob their bodies up and down as some sort of defense. The vibrating or whirling motion serves to confuse the predator by making it difficult for them to focus on the cellar spider (Roig-Juñent et al. 2014). This defensive behavior, alongside the dull or cryptic coloration of most cellar spiders, suggests that they are common prey of visually-hunting predators (Roig-Juñent et al. 2014).

Speaking of predator-prey relationships, certain species of cellar spiders have been documented to feed on other spiders by hunting them down. They do this by invading the web of a certain spider and then mimicking the vibrations of an insect caught within the said web, as the prey-spider approaches its “catch,” the cellar spider strikes and then feeds (Jackson & Brassington 1987).

Cellar spiders do not wrap their eggs in protective silk, the female carries her egg clutch with her chelicerae or mouthparts and only sets them aside when feeding (Roig-Juñent et al. 2014). You can reliably identify males and females by the size of their bodies, specifically the abdomen. Females generally have bigger and rounder abdomens compared to males.

3. Household Casebearer

Things are rarely what they seem. Often mistaken for lizard droppings, those small grey boat-shaped things found all over your house, including your bathroom, are actually the silk case of the larvae of moths belonging to the genus *Phereoeca*, commonly known as the household casebearers. The larvae themselves are inside and rarely seen by most. *Phereoeca* is classified under the family Tineidae, a group of moths with around 3000 species (Resh & Cardé 2003). Their diminutive size and the sheer number of species makes identification rather challenging.

Phereoeca silk cases are flat, lined with silk on the inside, and covered with small particles on the outside (Aiello, 1979). The appearance of the silk case varies depending on the particles used by the larva, it may be covered with soil, sand, iron filings,

insect droppings, or any combination of the aforementioned. The larva moves about using its three pairs of legs, dragging its case along the way. The silk case is identical on both sides and is also open on both ends. If you happen come across one that is currently inhabited by a larva, you may notice that it exposes its head on either end of the boat-shaped case. When threatened, the larva retreats inside its case as a defense mechanism. Whatever happens, though, the larva never exposes its posterior end.

Household casebearers are quite unusual in its feeding behavior, they feed on dead insects and hair (Aiello 1979), not on plants. They also often feed on spider silk (Hetrick 1957) which is why they are commonly found in places where cellar spiders reside.

Phereoeca larvae construct and bear their cases as soon as they hatch, which is then made larger by the larvae as they grow (Aiello 1979). This means that the larva uses the same case it made since its birth for the duration of its larval stage up until the time they emerge as an adult, marking the only time they leave the case.

This discussion so far shows that household casebearers come off as too attached to their silk cases. As such, consider the experiment of Aiello (1979) wherein it was revealed that *Phereoeca* larvae, when extracted or removed from its silk case, do not re-enter it.



The larvae only wandered around, neither eating nor making a new one, and then dies.

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Pangil River Eco-park... *continued from page 9*

network between the locals and nature, further promoting awareness in valuing and conserving the biodiversity in the area; and 2.) further research on other taxa in the eco-park in order to formulate management plan for its conservation.

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Pangil River Photo by Veronica Mercado

Gugo Seed Germination... *continued from page 7*

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Gugo Seed

Illegal Wildlife Trade and COVID-19... *continued from page 13*

The current global pandemic is a moment in history that will always be remembered. As if climate change and other human-induced environmental catastrophes were not enough to teach us a lesson in environmental stewardship. We humans had to be reminded to take environmentalism, environmental protection and conservation, sustainable natural resources management, and what-have-you seriously.

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COVID-19 in The Eyes of An Environmentalist... *continued from page 3*

As solutions are being crafted to finally flatten the curve, we must be vigilant for our environment - because our survival is not only about people's health but also the well-being of our mother earth. We must take a holistic approach to this pandemic for us to live in a sustainable planet that the future generations can enjoy.

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EARTHWATCH

Maureen V. Cambay

Global oil demand could hit record growth rate next year, IEA warns

The world's oil demand could climb at its fastest rate in the history of the market next year, and may reach pre-crisis levels within years, unless new green policies are adopted, according to the International Energy Agency (IEA).

The global energy watchdog has forecast that the world's daily oil demand may climb by 5.7 m barrels next year, the fastest annual climb on record, to an average of 97m barrels of oil a day in 2021.

Source:

Jillian Ambrose, June 16, 2020 <https://www.theguardian.com/business/2020/jun/16/global-oil-demand-could-hit-record-rate-next-year-iea-warns>

Tropical cyclones have become more destructive over past 40 years

Tropical cyclones have become more intense around the globe in the past four decades, with more destructive storms forming more often, according to a study that further confirms the theory that warming oceans would drive more dangerous cyclones.

Analysis of satellite records from 1979 to 2017 found a clear rise in the most destructive cyclones – also known as hurricanes or typhoons – that deliver sustained winds in excess of about 185km/h. While climate scientists have long-predicted that global heating would deliver stronger cyclones, a

trend that was statistically significant has been challenging to identify in part due to the natural swings in the world's climate masking changes.

Source:

Graham Readfearn, May 20, 2020, <https://www.theguardian.com/environment/2020/may/20/tropical-cyclones-have-become-more-destructive-over-past-40-years-data-shows>

Coronavirus: lockdown's effect on air pollution provides rare glimpse of low-carbon future

Two weeks after the nationwide lockdown was announced on March 23 in the UK, NO₂ pollution in some cities fell by as much as 60% compared to the same period in 2019. NASA revealed that NO₂ pollution over New York and other major metropolitan areas in north-eastern USA was 30% lower in March 2020, compared to the monthly average from 2015 to 2019.

The recent improvements in air quality could be made permanent by replacing fossil fuel generation with renewable energy and other low-carbon sources. Reducing monthly NO₂ emissions from electricity generation by 10% would be the equivalent of turning off 500 coal power stations for a year.

Source:

Paul Monks, April 15, 2020, <https://theconversation.com/coronavirus-lockdowns-effect-on-air-pollution-provides-rare-glimpse-of-low-carbon-future-134685>

Tropical forests losing their ability to absorb carbon, study finds

Tropical forests are taking up less carbon dioxide from the air, reducing their ability to act as "carbon sinks" and bringing closer the prospect of accelerating climate breakdown. The Amazon could turn into a source of carbon in the atmosphere, instead of one of the biggest absorbers of the gas, as soon as the next decade, owing to the damage caused by loggers and farming interests and the impacts of the climate crisis, new research has found.

Source:

Fiona Harvey, March 4, 2020 <https://www.theguardian.com/environment/2020/mar/04/tropical-forests-losing-their-ability-to-absorb-carbon-study-finds>

Deep-sea mining may damage underwater ecosystems for decades

Microbe communities living in the seafloor off Peru haven't bounced back from a deep-sea mining experiment 26 years ago. The populations are still reduced by 30 percent in this part of the South Pacific Ocean, researchers report April 29 in Science Advances. Due to slow accumulation of sediment in the deep sea, regions disturbed by mining could take more than 50 years to fully recover, the team says.

Source:

Carolyn Gramling, May 4, 2020, <https://www.sciencenews.org/article/deep-sea-mining-may-damage-underwater-ecosystems-decades>

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