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DENR

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Changing rules midstream

According to Environment Secretary Maria Antonio-Yulo Loyzaga, all 22 reclamation projects in Manila Bay are suspended and will be undergoing review.

Loyzaga explained that how long the projects would be suspended would depend on the results of the cumulative impact assessment to be conducted by a scientific team that will be engaged by the DENR.

The suspension includes the project being undertaken by Waterfront Manila Premier Development Inc. (WMPDI) which is the 318-hectare Manila Waterfront City Reclamation Project.

HIDDEN AGENDA



MARY ANN
LL. REYES

The US Embassy in Manila had earlier raised concerns over the project, not only because of its impact on the environment, specifically flooding and traffic, and possible national security risks due to its distance to the embassy, but also due to the involvement of China Communications Construction Co. which the World Bank and the Asian Development Bank said had been engaged in fraudulent business practices.

Some of these reclamation projects have all the requisite clearances while there are those that do not have environmental permits and other regular requirements. Some are ongoing while others have yet to begin. At least one started the works even before the notice to proceed has been given by the Philippine Reclamation Authority (PRA). Some are being undertaken by respected business groups while others are projects of companies without an established track record.

According to the DENR, three of these reclamation projects in Metro Manila are ongoing or were being implemented before the suspension order while the rest were either set for signing of memorandum of agreement or were still in the application stage.

The DENR chief pointed out that what happened here was that individual projects were somehow processed without taking into consideration the cumulative impact of all the projects together.

For one, there is the mandamus issued by the Supreme Court in 2008 ordering 13 agencies including the DENR to clean up, rehabilitate, and preserve Manila Bay and restore and maintain its waters to a level fit for commercial propagation of shellfish and milkfish, as well as for swimming, skin diving, and other forms of recreation. The areas covered by the mandamus encompass LGUs from Metro Manila, Rizal, Laguna, Cavite, Bulacan, Pampanga and Bataan/

For its part, PRA assistant general manager Joseph Literal said that the government had approved only 13 reclamation projects in Manila Bay and 22 projects nationwide. Only 15 of the reclamation projects are in Metro Manila while the rest are in Calabarzon.

But PRA data have revealed that 52 reclamation projects had been approved across the country, including the 22 projects in the Manila Bay area.

According to Literal, it is the PRA which has the authority to greenlight reclamation projects after making sure that all requirements have been obtained, most important of which are the environmental compliance certificate and the area clearance issued by the DENR.

The Manila Bay projects, he added, are all public-private partnership projects of the local government units so that it is the concerned LGU who applies for a reclamation permit for a project with the PRA. These LGUs include the cities of Manila, Navotas, Las Pinas, Paranaque and Pasay in Metro Manila, and the cities of Bacoor and Cavite in Calabarzon.

Literal said that the approved reclamation projects cover less than five percent of Manila Bay so it is not true that the Bay is disappearing. The 22 reclamation projects cover 6,780 hectares of the 200,000 hectare Bay area.

So let me get this clear... If the PRA only issues the green light for a reclamation project after all the requisite permits and clearances, and that includes those from the DENR, have been obtained by the proponent which is the LGU concerned, then it is actually government's fault if some of these 22 projects are non-compliant. Bottomline is some of these projects were not properly vetted by the government agencies tasked to do this.

But in fairness to the PRA, DENR and the different LGUs concerned, there was really no clear-cut policy on reclamation in the Manila Bay area by the government, until of course the US Embassy raised howl over the Waterfront project.



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Loyzaga herself acknowledges the fact that reclamation could serve a beneficial purpose, citing as successful examples much of the city of Rotterdam, new land for transportation infrastructure and urban expansion in Boston, and even the areas of Intramuros, Luneta and the CCP Complex in Manila and Pasay which are reclaimed. The DENR also noted that reclamation drives economic activities and generates revenues for the government.

Singapore itself has been reclaiming land since the colonial times. Its first reclamation took place in 1822 at the south bank of the Singapore River. Since then, Singapore's land has expanded by almost 25 percent because of reclamation. And no doubt that reclamation has played a huge part in achieving Singapore's economic success.

This blanket suspension of all reclamation projects in Manila Bay once again dampened our country's hopes of attracting more investments to revitalize our economy.

And why is that?

We cannot just change our rules midstream. Investors make their plans, build their businesses around a given set of rules and assumptions, and that includes government policies and regulations in the host country. Uncertainty in terms of government regulations and changing rules midstream has always been a complaint raised by the investment community against the Philippines.

Just take a look at our investors and locators in Clark who have been promised a given set of business incentives and perks when they invested here and who are now complaining because while the CREATE Act provided for a 10-year sunset provision, the BIR and the implementing rules of the law have effectively immediately stopped the enjoyment of these tax incentives and other fiscal perks.

Another good example is our policy on open-pit mining. One moment it's banned nationwide by the DENR, then here comes the next administration saying that the ban is lifted. The ban is of course due to bad practices by unscrupulous small miners.

The DENR cannot make all these investments and investors wait. Our government cannot change the rules just like that without taking into account the impact on our business environment. I haven't even started discussing the contractual breaches that will be committed due to this suspension of reclamation activities in Manila Bay.

For comments, e-mail at mareyes@philstarmedia.com



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NEWS

Namria: Sea level rising fast in Metro

CITY OF BATAAC—The sea level in Metro Manila has risen at an average of 8.4 millimeters (mm) a year from 1901 until 2022, almost three times the global average of 3.4 mm/year during that period, according to a report of the National Mapping and Resource Information Authority (Namria). Scientists also raised the alarm over the trend at a coastal engineering conference held here earlier this week. —STORY BY KRIXIA SUBINGSUBING

A3

Sea level rise in PH capital exceeds global norm—Namria



EXPECT THE WORST With a recent government report showing that the rate of sea level rise in Metro Manila has exceeded the global average, expect flooding, like this scene on Taft Avenue in Manila after a heavy downpour on July 30, to worsen. —RICHARD A. REYES



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Sea level rise

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By Krixia Subingsubing
@krixiasINQ

CITY OF BATAC—Sea level rise in Metro Manila is now almost three times the global average, highlighting anew the need to secure the Philippine capital region from the frequent flooding and displacement often associated with this phenomenon.

This was among the findings of the National Mapping and Resource Information Authority's (Namria) physical oceanography division, which presented its report during the coastal engineering summit at Mariano Marcos State University in this city in Ilocos Norte province on Tuesday.

Among others, the agency found that sea level in Metro Manila has risen at an average of 8.4 millimeters a year from 1901 until 2022, almost three times the global average of 3.4 mm/year during that period.

Excluding the gap years when Namria did not have historical data (this data set covers 1947 to 2022), Metro Manila's sea levels rose at a rate of 13.2 mm/year.

But when computations are pegged during the start of urbanization in Manila (this data set covers 1965 to 2022), sea levels rose at a higher rate, at 14.2 mm/year.

'Coupling effect'

Dennis Bringas, division chief, said this was in part because of the "coupling effect" of land subsidence, or the gradual sinking of the Earth's surface, and sea level rise.

In the case of Metro Manila, he said, man-made activities like excessive groundwater extraction, deforestation and land reclamation may have greatly contributed to these high rates of sea level rise.

However, it was "still too early to say" whether the ongoing reclamation activities across Manila Bay could have made it worse, he told the Inquirer.

Many of the dump-and-fill

projects in the bay intensified only in the past six years, where at least three projects were already under way before President Marcos ordered the suspension of all reclamation activities there.

Fernando Siringan, marine scientist and geologist from the University of the Philippines' Marine Science Institute, said reclamation and seabed mining activities in the bay could cause coastal erosion around the areas.

This would leave communities even more vulnerable to flooding, he added.

How other cities fare

Apart from Metro Manila, the Namria also measured the monthly mean sea level trends across 12 other coastal areas in the country.

Legazpi City, the provincial capital of Albay, is second to the capital region with a sea level rise average of 6 mm/year over a 76-year period. This was followed by Surigao and Puerto Princesa cities (4.8 mm/year); and Davao City and Real, Quezon (3.6 mm/year), all of which posted rates higher than the global average.

But there are outliers. Some cities, like Cebu, were only seeing 1.2 mm/year sea level rise over the past 75 years, while others like San Fernando City in La Union and Zamboanga City were

seeing a decline in sea levels.

Bringas said that while climate change research was not part of Namria's mandate, its historical records and modeling on sea level were critical to understanding and predicting the impacts of this phenomenon.

Engineering needs

Enrico Paringit, executive director of the Department of Science and Technology's Philippine Council for Industry, Energy and Emerging Industries Research and Development, said the threat of sea level rise highlights the need to invest in more coastal engineering infrastructure and monitoring.

However, achieving coastal resilience was "still quite difficult," he said, "because we're only just starting in this field (coastal engineering)."

The phenomenon, which is caused by the melting of glaciers and the expansion of ocean water due to rising temperatures, place coastal megacities around the world at grave risk of flooding and, at worst, going underwater.

In Metro Manila alone, coastal flooding events are predicted to occur between 18 to 96 times more often by 2100, according to a study led by the French National Center for Scientific Research published in March this year. INQ



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TALK OF THE TOWN

Comments on "The insane reclamation projects in Manila Bay" (Flea Market of Ideas by Joel Butuyan, 8/17/23) via www.inquirer.net:

Big picture: Manila is a primate city that attracts people from all over the Philippines just looking to work

and prosper. For there to be less polluting development in the Manila area, there must be new cities created outside Manila. This could be helped with extensive rail and road bridges joining the major islands, which would encourage development outside Manila, and even Luzon.

Walt Peterson

The issue is clear enough. The reclamation has been proven the immediate cause of the effect, which is the continuous flooding of many parts of Bulacan, Pampanga, and North NCR localities. And all because of govt ineptitude, nay, corruption.

Banquo



EVERYMAN

Flooding solutions

By Melandrew T. Velasco

MANY people have thrown in their two cents worth on the flooding that occurred in the aftermath of Typhoons Egay and Falcon.

Flood-prone Bulacan and Pampanga were among the provinces badly inundated, both being catch basins of water from the Sierra Madre mountain range.

There are allegations the flooding, particularly in Bulacañ, has been the result of the ongoing construction of the New Manila International Airport in the province.

The New Manila International Airport is one of the big-ticket infrastructure projects of the government started during the administration of President Rodrigo Duterte and it is now part of President Ferdinand Marcos Jr.'s BBM (Build, Build More).

It is envisioned as a world-class airport that will decongest the existing international airports in Metro Manila. Its project proponent is San Miguel Corporation (SMC).

Amid all the allegations dismissed by SMC, its President and Chief Executive Officer Ramon S. Ang (RSA) has offered to help solve the problem of flooding in the area.

SMC is committed to assist the local government of Bulacan in solving the flooding problem in the province.

than one million tons of silt and waste.

It is also desilting and extracting waste from the Meycauayan and Maycapiz/Talipitip rivers as components of the plan to rehabilitate the Bulakan-Obando-Meycauayan-Marilao-Bocaué-Guiguinto river system.

Out of the initial 13-kilometer target along the Meycauayan and Maycapiz/Talipitip rivers, SMC has cleaned up about 4.45 kilometers with 543, 266 metric tons of silt and solid waste extracted.

The flood mitigation project of SMC in Bulacan at the onset was limited to rivers surrounding the site of the New Manila International Airport. It was however expanded to include other tributaries in Bulacan.

The flood mitigation project of SMC is reinforced by its mangrove planting initiative, part of the strategy to address flooding in Bulacan.

Mangroves provide shield to those living along the coastal areas from flooding and provide natural habitat for marine species.

It was in 2020 when SMC began its mangrove planting initiative.

The initiative calls for the planting of 190,000 mangrove seedlings in 76 hectares in Bulacan and identified areas in Central Luzon.

Its launch in Hagonoy, Bulacañ saw the planting of 8,000 mangrove seedlings in an area of more than three hectares. A total of 25,000 mangrove seedlings were earmarked for planting in 10 hectares for 2020.

It has also collaborated with the Department of Environment and Natural Resources and planted 6,000 mangrove propagules at the 24.5-hectare Bulakan Mangrove Ecopark.

Aside from mangrove planting, SMC is also undertaking reforestation in many provinces. Its tree-planting activities are being carried out by its subsidiaries.

We are grateful for organizations like SMC.

For over a century, it remains steadfast as a partner in the country's sustainable development.

“As our nation
nears the celebration
of National Heroes
Day this month, I
am reminded of our
heroes who sacrificed
and worked in the
service and welfare of
our nation and future
generations”



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Flooding solutions

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It also plans to extend the desilting and clean-up of rivers outside Bulacan to include critical tributaries throughout Central Luzon.

Like earlier river clean-up by SMC, this extensive clean-up of rivers and waterways will be undertaken at no cost to the government.

RSA asserted there are many contributing factors to the flooding in Bulacan. "Degradation, siltation, and pollution of our rivers are of course major causes of flooding," he said.

"Because of these, rivers become shallow and their flood carrying capacity is severely diminished, resulting in river overflow and floods. The proliferation of fish ponds in coastal areas has also contributed to severe flooding in the province," he added.

SMC is an active partner of government in river rehabilitation.

With its heavy equipment and technical know-how, it has cleaned up the Tullahan-Tinajeros River spending P1 billion without cost to government.

The clean-up involved extraction of over 1.12 million metric tons of silt and solid wastes.

This effort from SMC has greatly helped residents in nearby areas, giving them respite from flooding that used to occur every year when the rainy season sets in.

At present, SMC is undertaking the clean-up of Pasig River and has removed more

Its infrastructure projects are engines for economic development; and as it pursues these projects, it does not relinquish its responsibility to protect the environment.

I often wonder if heavy precipitation can be controlled.

I am not aware if there is already a solution to prevent this.

But we can find ways to minimize if not totally prevent flooding that comes with heavy rains.

As responsible citizens, we can do our share.

We can help in the task of caring for our environment, including flood mitigation by managing our waste, properly disposing of our garbage and refraining from making our bodies of water as trash bins.

As our nation nears the celebration of National Heroes Day this month, I am reminded of our heroes who sacrificed and worked in the service and welfare of our nation and future generations.

Let us work for the betterment of our nation. Let us recall one of our heroes, Dr. Jose Rizal who said in one of his speeches "if a Filipino wills, he can."

We can do it!

(The author is president and executive director of the Million Trees Foundation Inc., a non-profit group advocating tree planting and watershed protection. He is also a book author and publisher of biographical and historical coffee-table books through his outfit, Media Touchstone Ventures, Inc.)



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The Manila Times
www.manilatimes.net

Green Industries

EDITOR: Cora Llamas

SATURDAY August 19, 2023



Palau Island covers 8,048 hectares with 1,008-hectare coral reefs, 472-hectare seagrasses and 102-hectare mangroves. PHOTO BY LEANDER C. DOMINGO

Palau Island's marine protection tightens

BY LEANDER C. DOMINGO

THE Protected Area Management Board (PAMB) of the Department of Environment and Natural Resources (DENR) in Region 2 (Cagayan Valley) has resolved stricter marine resources protection on Palau Island.

According to Carolyn Annang-Tumamao, DENR Region 2 information officer, the move is in response to the recent use of the Palau Island Protected Landscape and Seascape (PIPLS) by vessels and crew as a sheltering area due to the recent onslaught of a strong typhoon.

Covering some 8,048 hectares with 1,008-hectare coral reefs, 472-hectare seagrasses and 102-hectare mangroves, the PIPLS gained recognition as an outstanding marine protected area showcasing the best management practices.

In a recent committee meeting,

Tumamao said the governing body of PIPLS has "resolved stringent measures for coastal and marine resources protection following the ship-grounding incident in the marine protected area."

She noted that the meeting initiated and chaired by DENR Regional Executive Director Gwendolyn Bambalan discussed the various requirements of concerned government agencies involved in the offshore mining operations.

Marine damage

The DENR team's monitoring ef-

orts on July 27, 2023 within the PIPLS discovered two shipping vessels grounded within the protected waters of Palau Island.

The DENR reported that the ships were contracted by JDVC Resources Inc., a large-scale offshore mining company with an approved Mineral Production Sharing Agreement.

These vessels were identified as Tug Sedar 7 and MB Siphon I, which were reportedly pushed toward the shallow waters and run aground due to the "successive heavy freak waves" at the peak of Typhoon "Egay" at midnight of July 26, according to the DENR.

Immediately, a ship-grounding team from the DENR, Bureau of Fisheries and Aquatic Resources (BFAR), Philippine Coast Guard (PCG), Environmental Management Bureau, Cagayan Economic Zone Authority and the local government unit of Santa Ana, Cagayan was deployed to assess

the possible damages to corals and other marine resources of the protected area.

The team conducted degrounding, ocular inspection, rapid assessment and in-depth underwater assessment. According to their initial report, a total of 1,422 square meters of corals were damaged.

The report also noted that different species of hard corals and lime rocks were found cracked and detached or removed from the base. It also inferred that red-painted marks in the coral reef and hard bottom habitat were believed to be from the hull of the Tug boat Sedar 7.

In light of this incident, Bambalan said the PAMB approved in a recent meeting the proposal to install a floating dock to avoid coral destruction and free the beach area from boats.

Bambalan, who is also the chairman of PAMB, pointed out that the Palau Island as a protected area "should as much as possible not

be used as a sheltering area, but we understand the plight of the vessels and crew at that time."

Interagency mandate

While recognizing that the ships and their crew "needed protection from the strong typhoon," Bambalan added that the DENR "will have to initiate a meeting with concerned government agencies to discuss about whose mandate is to define the area for [the] sheltering of vessels" during similar calamities.

These agencies include the BFAR, PCG, Philippine National Police Maritime Group, Philippine Ports Authority and the Philippine Navy.

Bambalan also said that the protected area incidentally is located adjacent to the Babuyan Channel, where international vessels usually pass through.

Bambalan also noted that the

interagency conference is necessary to review the response plan for Palau Island and "as an avenue to tackle policy gaps and to determine the computation of cost of damage to ecosystem services including restoration cost."

As per their agreement, the PAMB through the DENR will submit a report to and will request guidance from the Biodiversity Management Bureau on the value and the fines to be collected for the damages incurred based on the conditions of the corals.

Regional Director Mario Ancheta of the Mines and Geosciences Bureau in Region 2 said the Mine Rehabilitation Fund Committee of Region 2, which he also heads, held a meeting with JDVC Resources Inc. for a smooth operation in the waters off Cagayan province.

According to the DENR, JDVC gave assurance that it would address the damage.



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IBALOY ANCESTRAL DOMAIN

BCDA ASKS BAGUIO TO DEFER PROTECTION RULE FOR IP LAND

By Vincent Cabreza
@InqNational

BAGUIO CITY—The Bases Conversion and Development Authority (BCDA) has urged the city council to defer a proposed ordinance that would designate Baguio's only Ibaloy ancestral domain as a historical, cultural and heritage zone, citing a pending case seeking its nullification.

BCDA respects the city's initiative to preserve Ibaloy historical and cultural heritage, said Allen Garcia, president of BCDA estate manager John Hay Management Corp. (JHMC), in a July 13 letter to the council that was cited in its session on Monday.

But the agency tasked with overseeing former American baselands expressed its opposition to the draft ordinance because designating Happy Hallow as a heritage community may "unduly influence the adjudication of the rights and interests of both BCDA and Barangay Happy Hallow," Garcia said in the letter.

He informed the council that BCDA, through the Office of the Solicitor General, had petitioned the Supreme Court to cancel the Certificate of Ancestral Domain Title or CADT (now registered as Original Certificate of Title No. o-CALT-58) that was issued to Baguio Ibaloy in 2006.

The CADT recognizes 146.4 hectares of indigenous communal lands occupied by Ibaloy and Kankanaeys "since time immemorial" at Barangay Happy Hallow, which has a population of 2,674 residents, most of whom are farmers.

worship areas, bodies of water, mineral and other natural resources, and lands which may no longer be exclusively occupied by [indigenous peoples or IPs] but from which they traditionally had access for their subsistence and traditional activities."

Inside reservation

But Happy Hallow is within the 600-ha Camp John Hay reservation.

The draft ordinance sponsored by Councilor Isabelo Cosalan Jr. would allocate funds to protect and maintain Happy Hallow which it would declare a "historical, heritage and ecological district."

Cosalan, an Ibaloy, said Happy Hallow would also be recognized as a National Historical, Heritage and Ecological Site, and would be entitled to the conservation rules and legal protection of the National Historical Commission of the Philippines.

Because the nullification case, docketed as G.R. Mo. 211889, remained pending with the high court, Garcia appealed for the Baguio government's "utmost patience and understanding in deferring the passage of [Proposed Ordinance No. PO 0040-23]... in the interest of justice and to facilitate the alignment and implementation of policies in line with our respective mandates consistent with good governance for the benefit of the Baguio community."

Details about the BCDA petition have not been made public.

But during the council's April 5, 2021 session, BCDA and JHMC officials disclosed that the agency could not recognize ancestral land rights within Camp John Hay where BCDA has "vested rights."

The Indigenous Peoples Rights Act of 1997 (Ipra or Republic Act No. 8371) defines ancestral domains as communal lands settled by indigenous communities "since time immemorial except when interrupted by war, force majeure or displacement by force, deceit, stealth or as a consequence of government projects or any other voluntary dealings entered into by government and private individuals/corporations, and which are necessary to ensure their economic, social and cultural welfare."

Ipra encompasses "ancestral lands, forests, pasture, residential, agricultural, and other lands individually owned, whether alienable and disposable or otherwise, hunting grounds, burial grounds,

BCDA assured the council that it would fulfill all its obligations to Baguio "for as long as they do not contradict laws," such as RA 7227 or the BCDA law.

This was a reference to the 19 conditions set by the Baguio City Council through Resolution No. 362 series of 1994, which BCDA accepted. In exchange, the city endorsed a master development plan that commercialized 246.97 ha of the former American rest and recreation baseland.

The fifth condition recognizes IP land claims inside Camp John Hay, which was the subject of a 1909 US Supreme Court ruling that legitimized the concept of the "Native Title." INQ



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MMSU's tree planting project creates microclimate zones

AS part of its long-term goal of creating a microclimate zone in the future, the Mariano Marcos State University (MMSU) community is creating wider green areas by planting more trees around the Sunken Garden and University Library.

Shirley Agrupis, MMSU president, recently led the planting of 150 flowering and fruit-bearing species in the 1,350-square-meter vicinity, accompanied by university administrators, faculty, staff and students.

Joselito Rosario, MMSU campus executive director, gave another purpose for the activity: "This is to further increase [the chosen areas'] number of native species to enhance their biodiversity and to provide shades and windbreaks which will benefit the whole MMSU community."

According to Daniel Tapaoan Jr., MMSU information officer, the trees collected from phenotypi-

cally superior mother trees from the wild were raised and carefully taken care of in the Clonal Nursery at the MMSU College of Agriculture, Food and Sustainable Development.

Tapaoan also noted that earlier this year, native tree and bamboo species were also planted at the Biodiversity Conservation Learning Center and Leisure Park to start establishing a health and wellness tourism hub on the main campus.

This year's planting activity, which was also an immediate response to the effects of Typhoon "Egay," coincided with the MMSU president's first day of her seventh year as the university president.

Thanking the MMSU constituents for "sustaining our tradition of promoting sustainable campus areas through tree planting,"

Agrupis said the tree planting is one aspect of her Achieve agenda, which is a



To create more green areas, MMSU plants more trees around the Sunken Garden and University Library. CONTRIBUTED PHOTO

significant part of creating a vibrant and engaging, culturally focused university campus.

Tapaoan described the MMSU president's Achieve agenda: A stands for academic quality and relevance; C for creative and relevant research programs;

H for high-impact extension and outreach programs; I for improved revenue generation and resource management; E for external linkages and partnerships; V for vibrant and nurturing learning environment; and another E for effective and efficient management

system.

He said the university president also expressed high hopes that this advocacy would continue to attain the long-term goal of the university to create a microclimate zone in the future.

Tapaoan said these activi-

ties serve as the university's contribution to the provincial government's project called "Green Wall of Ilocos Norte" and the National Greening Program of the government led by the Department of Environment and Natural Resources.

LEANDER C. DOMINGO



As glaciers melt, study seeks protection of ecosystems that emerge in their place

GENEVA—A new scientific study published Thursday suggests the world should start preparing to protect the ecosystems that emerge from under the disappearing ice, as a warming planet is inevitably causing glaciers to melt.

If nothing is done to stop global warming, the world could lose glaciers totaling the size of Finland by 2100. Even a best-case scenario—if the targets of the Paris Agreement to stop climate change are met—foresees glacier shrinkage the size of Nepal, according to the study published in the scientific journal Nature.

The analysis from Swiss and French scientists adds to worries about glacier melt and a growing

call to step up efforts to protect the planet from climate change.

In their research, the scientists say humans have grown to live with glaciers for millennia, and the worrying retreat of the ice cover—currently amounting to 10 percent of the Earth's land surface—will require both action to stop it and adaptation for its impact.

Glaciers play a key role on the planet, by reflecting sunlight or providing fresh water for irrigation, power generation and consumption, says study co-author Jean-Baptiste Bosson, a French-Swiss glacier expert with the National Council for the Protection of Nature in Annecy, France.

He said work is being done to

slow down the retreat of glaciers, though it won't be "decisive" in saving them.

"But after the glaciers (melt) not everything is lost," Bosson said in an interview. "We especially need to protect the nature that will follow the glaciers; we need to protect the forests of tomorrow, the great lakes of tomorrow, the great fjords of tomorrow."

The areas where glaciers once were will be "degraded" when the ice melts, Bosson said, adding that nature should be left to do its work: "There is a chance for ecosystems to rebound if we leave them space and time...nature itself will find solutions: It will capture carbon, purify fresh water, create habitats for biodiversity."

Glacier retreat hit unprecedented high levels in Europe last year, especially in Switzerland.

The team behind the Nature study analyzed some 210,000 glaciers on Earth, not including the gigantic Greenland and Antarctic ice sheets, and found that glaciers covered some 665,000 square kilometers (257,000 square miles), about the size of Afghanistan, in 2020.

Depending on the different scenarios, which the experts slice up from worst-case to best-case, the world could lose between roughly 149,000 square kilometers (58,000 square miles) to some 339,000 square kilometers (131,000 square miles), by 2100. The team accounts for possible

statistical variance. The loss could be much larger.

"Melting glaciers have become icons of climate change. People are mostly worried about the impact glacier melt will have on sea-level rise, seasonal water availability, and geohazards," said Prof. Ben Marzeion, of the Institute of Geography at Germany's University of Bremen.

"This study shows that there is more we need to be prepared for. It also shows that we are still in the process of uncovering the multitude of impacts climate change will have," said Marzeion, who was not involved in the research.

Twila Moon, deputy lead scientist at the US National Snow and Ice Center, laid out the challenges that policymakers will face as landscapes change with glacier retreat.

"There is no question that ice loss around the world is a serious issue, from influencing water availability to raising our sea lev-

els," Moon, who wasn't involved in the study, said in an email.

"This research highlights another impact—the uncovering of new land as glaciers shrink."

"Glacier retreat can cause increasing hazards, like the outburst flood that destroyed homes in Juneau earlier this summer, or change water availability for drinking and crops," Moon wrote. "We must plan ahead while also work hard to reduce heat-trapping gas emissions and limit future damage."

Bosson says that record high temperatures reached this year in the northern hemisphere are producing worrisome outcomes that could have an even greater impact in the future—though not all data is in yet.

"We try to tell the story of the future of the surfaces today occupied by glaciers on Earth," he said in a video call from the French Alpine town of Annecy. "Then we ask: Will tomorrow still see big glaciers, or smaller glaciers depending on the climate scenarios?" AP