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S&T POST

OCT- DEC 2021

Agham at Teknolohiya
TUGON SA HAMON NG PANAHON

Answering the call of the times

Traditionally the 4th quarter issue of the S&T Post chronicles the past achievements of the Department of Science and Technology as a year-ender, but this time we pushed the envelope further by devoting substantial space to the celebration of the 2021 National Science and Technology Week, the biggest annual S&T event, now being celebrated every 3rd week of November instead of July of every year.

Gearing away from the current mold, the last quarter issue for 2021 has about half of the stories devoted to the NSTW that carries the theme Agham at Teknolohiya: Tugon sa Hamon ng Panahon. Incidentally, we opted to carry the same slogan as this issue's theme as it is fitting to the current situation.

The NSTW stories offer a smorgasbord of various topics featuring the Regional Yarn Production and Innovation Center (RYPIC), Siargao's biodiversity, PHIVOLCS Talk series on the Big One, repurposing supplements and herbal drugs, the Hybrid Electric Road Train, nuclear applications on health and medicine, the future of R&D, best CEST communities, the DRRM Robotics competition, the MATDEV laboratory, and the 115th year of the Philippine Journal of Science.

To further add flavor to this issue, we included our staple of stories in different fields like the new R&D center for electric car batteries, prospects of Artificial Intelligence, greener bamboo textile, the Fresh Farm concept, DOST-PAGASA's SWERVE project, the inspiring tale of a janitor-turned-cosmetic manufacturer in CALABARZON through SETUP, and ICT-enabled products for the health sector, among others.

As we closed the year, we once again pay tribute to our scientists, researchers, engineers, innovators and entrepreneurs who faced the challenges of the pandemic head on, and as communicators, we never ceased to tell the stories of their triumphs, successes and wins in our publication.

It is our fervent wish that you find the "gems" in our stories and we wish that these bring a spark of hope for all of us to continue to believe in science as we welcome 2022 in higher spirit!

NORLY B. VILLAR
Executive Editor

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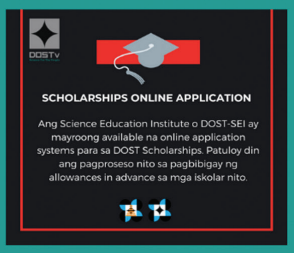

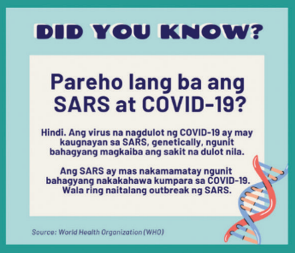

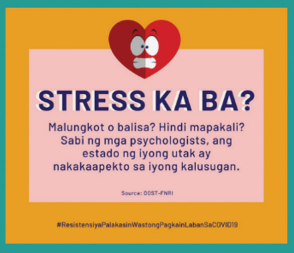

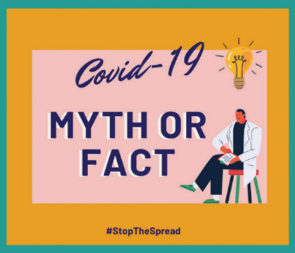

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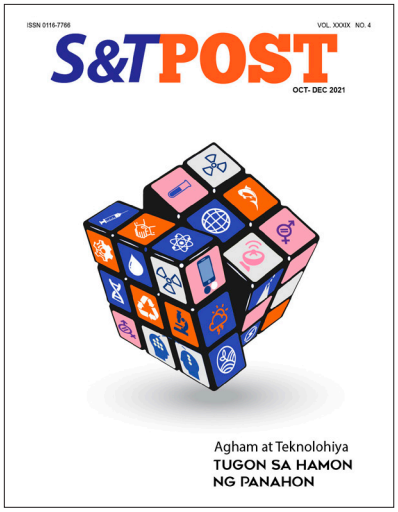


ABOUT THE COVER

With the lingering presence of the pandemic, the world of science was met with a challenge that has never been experienced before and the task of science communicators to convey the message that science, technology, and innovation play an important role in finding solutions to problems resulting from the COVID-19 virus became doubly hard. The cover design for the 4th Quarter issue of the S&T Post reflects the theme of the National Science and Technology Week, "Tugon sa Hamon ng Panahon", and represented by Rubik's cube, a 3-D combination puzzle invented in 1974 by Hungarian sculptor and professor of architecture Ernő Rubik. Superimposed on each tile in the cube is a graphic rendition of different S&T interventions that help solve the puzzle, in perfect combination and synergy.

Pretreated bamboo textile fiber

DOST-PTRI researchers develop greener bamboo textiles

Text and photos from DOST-PTRI Research and Development Division and the Technology Transfer, Information, and Promotions Staff

BAMBOO TEXTILES have become increasingly popular as part of a sustainable and eco-friendly solution to textile materials and manufacturing. It is along this line that the Department of Science and Technology (DOST), through the Philippine Textile Research Institute (PTRI), develops sustainable technologies to create greener bamboo textile materials.

The DOST-PTRI bamboo fiber extraction technology, already applied for intellectual property protection with the Intellectual Property Office of the Philippines, was first developed in 2015. It includes the mechanical, chemical, and biological processes to liberate the fibers from the bamboo culm. The extracted bamboo textile fiber is treated to obtain highly cellulosic textile fibers while preserving the inherent properties of bamboo such as antimicrobial and UV-blocking properties. The technology, applied to natural extraction of different bamboo species in the Philippines such as kawayan tinik (*Bambusa blumeana*), bolo (*Gigantochloa levis*), yellow bamboo (*Bambusa vulgaris*), and giant bamboo (*Dendrocalamus asper*), produces strong and fine bamboo fibers. The considerably mild and eco-friendly technology coupled with the simplicity of the extraction and treatment technique makes it highly suitable for textile fiber processing in remote bamboo-rich local areas, leading to economic gains for the bamboo textile industry.

A more popular commercial process of converting bamboo into textile material is through cellulose regeneration. In this process, bamboo culms are broken down into chips, dissolved, and extruded through spinnerets to produce fine staples or filaments. With this synthetic technique, new fiber properties are introduced, while the natural integrity of the bamboo textile fiber is not conserved. Also, the toxic and hazardous substances involved in the production of regenerated bamboo viscose fibers implicate the environmental downside of the process.

To promote the increased utilization of natural textile fiber processing from bamboo, the DOST-PTRI has moved towards sustainable and improved fiber extraction techniques for the bamboo species currently under study: laak *(Bambusa philippinensis),* anos *[Schizostachyum lima* (Blanco) merr.], and puser (*Cyrtocholoa puser s.* dransf.) The greener and milder conditions in the transformation of bamboo culms into natural textile materials promote an ecological and community-centered approach. This puts the initiative squarely on bamboo farmers, farm owners, and textile fiber producers, and it ensures that the socio-economic and environmental benefits of the bamboo textile fiber technology redound to the direct benefit of the many bamboo-rich rural communities.

This year, the Technical Working Group of Republic Act No. 9242 or the "Act Prescribing the Use of the Philippine Tropical Fabrics for Uniforms of Public Officials and Employees and for Other Purpose", has included in the proposed revised Implementing Rules and Regulation the inclusion of other natural textile fibers that include bamboo to help widen the scope of textile fiber sources and promote employment generation in the countryside. This market represents 635,000 kg of treated bamboo fiber input material for the production of spun yarns that will meet just 25% of the requirements for government uniforms. This represents a huge potential and market opportunity for bamboo producers in the country.

For more information on the bamboo fiber extraction technology and other innovations in using natural fibers, kindly email DOST-PTRI at rdd@ptri.dost.gov.ph or ptri.tips@ptri.dost.gov.ph.

Kawayan tinik (Bambusa blumeana) culms.

DOST launches new R&D centers in the regions

By Allan Mauro V. Marfal, *DOST-STII*

THE DEPARTMENT of Science and Technology (DOST), through its Science for Change Program (S4CP), introduced to the public 10 new research and development (R&D) centers in the regions through a virtual presser held on 08 October 2021.

Also known as "Niche Centers in the Regions for R&D" or NICER, these R&D centers will focus on sectors related to health and industry, energy, and emerging technology to allow the country's academic and R&D institutions to upgrade their research facilities, develop policies, transfer technologies, and ramp up regional initiatives and efforts toward a competitive innovation ecosystem.

"Through these R&D centers, the DOST cultivates the innovation landscape in various sectors to ensure no one is left behind in R&D progress despite the setbacks brought about by the COVID-19 pandemic," said Dr. Rowena Cristina L. Guevara, DOST undersecretary for R&D.

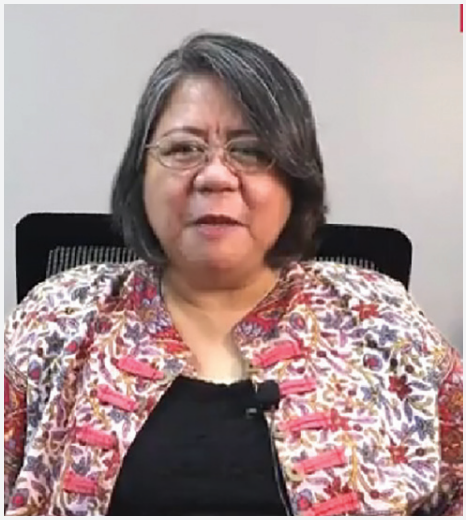
Usec. Guevara shared that the S4CP wants to accelerate innovation in the country and keep up with the global developments in science and technology (S&T).

"NICER, as one of the components of S4CP, has the goal to address the disparity in access to R&D funding among the regions and direct investments in S&T Human Resources Development and R&D through government, industry, academe collaboration," said Usec. Guevara.

Usec. Guevara also shared that the DOST is envisioning NICERs to become national R&D centers that would proactively innovate for the national industry; participate in policy-making; nurture the landscape of government, academe, industry collaboration; and empower the regions through science, technology, and innovation.

R&D centers for the environment

Among the NICERs showcased is the R&D Center for Advanced Batteries housed at the Technological Institute of the Philippines that aims to develop advanced batteries for renewable energy (RE) and electric vehicle applications. The Center will generate revenues through licensing its closest-to-market



In her message during the virtual presser, Usec. Guevara said that through these regional R&D centers, the DOST aims to cultivate the innovation landscape in various sectors to ensure no one is left behind in R&D progress despite the setbacks brought about by the COVID-19 pandemic.

innovations for lead-acid batteries (LABs). With a 25% extension in their cycle life, LABs will be more cost-effective RE storage than lithium-ion batteries, even if the latter's cost would decrease by 8% annually up to 2040.

Another R&D hub is the Center for Environmental Technologies and Compliance of the Polytechnic University of the Philippines that will provide innovations in environmental technology to help local industries comply with established environmental standards. It also aims to promote environmental compliance of micro, small, and medium enterprises in Metro Manila and realize the standard model for clean industrial cities in the region.

Meanwhile, in response to the need for disaster and risk reduction, there is the Coastal Engineering R&D Center of the Don Mariano Marcos State University that will provide an effective strategy for coastal protection and climate change mitigation to reduce agricultural losses due to coastal disasters with an estimate cost of around PHP 1 billion annually.

The Smart Water Infrastructure and Management or SWIM R&D Center located at the Isabela State University eyes to provide innovations in water management and promote disaster-resilient infrastructures. The center will target an increase in water availability for domestic water supply by up to 30%, increase in the population with access to safe water by up to 25%, and increase in adoption of water conservation technologies by up to 20% of households' population.

On the other hand, the Center for Lakes Sustainable Development project located at the Laguna State Polytechnic University will develop solutions and strategies for the effective management and sustainability of lakes envisioned to lead to the transformation of vulnerable communities to disaster-resilient communities capable of sustaining adaptation to climate change.

Also presented during the virtual presser is the Center for Sustainable Polymers located at the Mindanao State University–Iligan Institute of Technology seen to have the potential to generate value-added products such as polymer-infused concrete and foams from coconut processing by-products, plus nutraceutical and biomedical products from fish processing by-products.

R&D centers to strengthen health care initiatives and food security

Then there is the Center for Vector of Diseases of Public Health located at the De La Salle University–Laguna Campus that will spearhead the study of insecticide resistance of mosquitoes, formulation of biomosquitocide against mosquito larvae, and use of natural predators to control the mosquito population.

DOST Secretary Fortunato T. de la Peña said that they are envisioning a more efficient, supported, and developed innovation landscape for the Philippines that would cater to the needs of Filipinos nationwide.

Meanwhile, the Integrated Protein Research and Development Center (IPRDC) is a facility for product-centric contribution to the production of proteins used by the biomedical, agricultural, and food industries.

There is also the IPRDC—a biotechnology facility for health at Ateneo de Manila University. It aims to optimize its processes and protocols to cut the cost barriers in producing local reagents and become a viable, cost-effective alternative and complementary to imported reagents. More so, the Center will develop the necessary techniques and optimum processes to scale up the protein production to larger volumes at a lower cost.

Moreover, the Biomaterials for Diagnostics and Therapeutics Research and Development Center located at the Angeles University Foundation will be a key player in the development of local health technologies that address priority diseases. It will focus on the development and integration of biomaterials and nanomaterials for health applications that can be used in diagnostic and therapeutic health applications.

Lastly, the NeuRoTech, through the De La Salle University–IBEHT NICER, will serve as the premier venue for neurorobotic R&D in the Philippines that will enable, deliver, and provide innovative products, services, and solutions geared at bringing health care and other related fields to the next level.

"By optimizing these science and technology-related initiatives, we envision a more efficient, supported, and developed innovation landscape for the Philippines that would cater to the needs of Filipinos nationwide. These are one of our major strategies in our desire to have science and technology as a tool for inclusive and sustainable development," said DOST Secretary Fortunato T. de la Peña.

For his part, DOST Undersecretary for Regional Operations Sancho A. Mabborang described the establishment of the NICERs as the agency's major undertaking "which aims to expand the R&D network and level up the R&D capability of the higher education institutions and state universities and colleges in the regions to fuel innovation and invigorate the industry sectors that the center will support."

New DOST R&D Center to develop cheaper but longer life-cycle batteries for electric vehicles

By Joy M. Lazcano, *DOST-STII*

THE COUNTRY is now eyeing at developing economical lead-acid batteries with optimal performance capacity as a better alternative energy storage to lithium-ion that can eventually be used for electric vehicles.

The Center for Advanced Batteries is one of the featured new research and development (R&D) hubs under the Niche Centers for R&D in the Regions or NICER program that the Department of Science and Technology (DOST) will put up with host universities to build strong R&D capabilities in the regions.

The virtual presser held last 08 October 2021 presented the various NICER programs that the DOST is currently supporting.

DOST Undersecretary for R&D Rowena Cristina L. Guevara shared that these NICERS will allow the country's academic and R&D institutions to upgrade their research facilities, develop policies, transfer technologies, and ramp up regional initiatives and efforts towards a competitive innovation ecosystem.

"Through these R&D Centers," added Guevara, "the DOST cultivates the innovation landscape in various sectors to ensure that no one is left behind in the R&D progress despite the setbacks brought by the COVID-19 pandemic."

During the virtual presser, Dr. Drandreb Earl Juanico, the program leader of the Center for Advanced Batteries and Principal Researcher of CATALYST TechnoCoRe at the Technological Institute of the Philippines, pointed out that the Center is now on its final stages of confirmatory laboratory results on the lead-acid battery improvements. He revealed that by December this year, "we will do a pilot-scale test at the Philippine Batteries Inc.'s factory in Bulacan."

After this, by April next year, Dr. Juanico's group is hoping to have the initial batch of market-ready prototypes.

The Niche Center for Advanced Batteries likewise eyes to bridge the renewable energy infrastructure and wide-scale adoption to achieve sustainability energy initiatives for the country.

However, despite the purported positive environmental effects of using renewables in the country's energy mix, the high capital cost especially in installation plus energy storage and energy inefficiency were perceived to be stumbling blocks to its complete roll-out.

Dr. Juanico, however, dispelled this by saying that if their study succeeds in prolonging the cycle life of the lead-acid battery by at least 25%, "its life cycle cost will be below that of lithium-ion batteries even if the price of these batteries declines by 8% annually (assuming the likes of Tesla and other lithium-ion battery manufacturers achieve economies of scale) from the year 2025 up to 2040."

He estimated that the main contributor to this advantage is the lead-acid batteries' high level of recyclability compared to lithium-ion batteries.

There are also future plans to develop electric vehicles running on lead-acid batteries through the eMobility NICER. The country has local manufacturing of lead-acid batteries, and this will be used for the locally-developed electric vehicles—ranging from tricycles, jeepneys, and other modes of transport. "Localizing the advanced technologies that support lead-acid batteries will make our electric transport sector less dependent on imported lithium-ion batteries," Dr. Juanico said.

Looking beyond possibilities, Dr. Juanico added that his team is eyeing to innovate the mature battery technology in consideration of its manufacturability, but they are also looking at reviving the nickel-iron battery using nanoscience and materials science.

They hope to add value to the nickel and iron ores extracted in the country through the improved lead-acid battery technology. He shared that the country is a leading nickel producer with well-established mines in Mindanao with an annual average production of 300 thousand metric tons since 2010. "In addition, the northern coast of Luzon has abundant offshore reserves of iron-ore sands at around 600 million metric tons," added Dr. Juanico.

Similarly, the Center will look into new materials to develop components for future, portable battery products.

NICER is one of the various R&D programs under the Science for Change Program of the DOST that was created to capacitate higher education institutions in the regions and make significant improvement in regional research by integrating its development needs with the existing R&D capabilities and resources. It also provides institutional grants for HEIs in the regions for R&D capacity building to further improve their S&T infrastructure.

In total, there are currently 10 Centers under the NICER program, nine of which are the following: Center for Environmental Technologies and Compliance, Coastal Engineering Research (CoastER) Center, Smart Water Infrastructure and Management (SWIM) R&D Center, Center for Lakes Sustainable Development, Center for Sustainable Polymers R&D, Center for Vector of Diseases of Public Health, Integrated Protein Research and Development Center, Biomaterials for Diagnostics and Therapeutics Research and Development Center, and NeuRoTech.

Incidentally, the different NICER programs and projects were bannered at the virtual launch of the Big 21 in 2021 event of the DOST.

DOST-II to the scientific community:

"*Dapat yung* R&D output, genderized!"

By Jericho Fronda, *DOST-II*

Engr. Mark Gil Hizon and his team from the R&D Innovation Management Unit of DOST-II facilitated the webinar on integrating gender awareness and development on R&D initiatives participated in by researchers from the Cagayan Valley region..

DEPARTMENT OF Science and Technology (DOST) Undersecretary for Research and Development Dr. Rowena Cristina L. Guevarra highlighted that research and development (R&D) outputs should be "genderized", where both men and women can benefit from them.

"A gender lens will allow us to see the ways and processes from which gender issues and concerns stem. Not only the R&D community, but the entire Philippines science, technology, and innovation landscape can be identified and addressed through our collaborative efforts."

In line with this advocacy, the DOST Regional Office II (DOST-II) held a webinar on Integrating Gender Lens in R&D Projects last 12 October 2021 as a pre-event activity of its 2021 Regional Science and Technology Week.

With this year's theme, "Agham at Teknolohiya: Tugon sa Hamon ng Panahon", DOST-II introduced gender awareness and sensitivity to address gender and development (GAD) issues in society. Moreover, it aimed to aid researchers in understanding the need to pursue gender–sensitive and responsive R&D projects.

"The main concern today is how the R&D community can adapt to the changes in the society as it becomes more gender-responsive. We need to understand that these concepts are more intertwined than what we assumed to be. In fact, they should be lodged together and must be considered an important variable when conducting societal researches to avoid bias and promote inclusivity," said DOST Undersecretary for Regional Operations Engr. Sancho A. Mabborang in his opening remarks.

Dr. Jhamie Tetz-Infante Mateo, Director of the Gender Resource Research and Development Center of Isabela State University and National GAD Resource Pool Member of the Philippine Commission on Women, gave a comprehensive lecture. Her talk focused on legal basis and mandates, gender mainstreaming and the data, gender disaggregated data and harmonized gender and development guidelines (HGDG), and project development cycle and HGDG to integrate gender lens in R&D projects. She also included the topic on the importance of program and project implementation, management, and monitoring and evaluation or PIMME to measure the achievement of GAD or gender equality results.

Furthermore, she commended DOST-II's initiative of starting to "genderize" the DOST R&D community and also for continuously creating opportunities—allowing both women and men researchers, experts, and students, to meet and exchange inclusive innovation ideas towards Philippine development.

"Ito pong strategy at approach na ito ay isang napapanahong tugon sa hamon ng panahon," DOST-II Assistant Regional Director-TOS and Head of the GAD Unit of DOST-II, Dr. Teresita A. Tabaog, highlighted the organization's role in the Regional Gender and Development Committee that facilitates gender mainstreaming in R&D to prepare researchers for gender-based proposals.

On the other hand, Virginia G. Bilgera, Officer-In-Charge of the Office of the Regional Director, also expressed her gratitude for another milestone achieved for the R&D community.

"I hope, ito yung dapat magaya ng ibang region for them to be more gender-responsive. Ipapakita ng DOST Region II that this will really work so that the other regions will follow as well," said Dr. Diana L. Ignacio, DOST Assistant Secretary for HRMMSSC and DOST-wide GAD Focal Person.

The activity was participated by 340 researchers from the different academic institutions, research institutes, national government agencies, and regional line agencies nationwide.

AI's purpose is to help people, not to replace them—DOST expert

By Allan Mauro V. Marfal, *DOST-STII*

ARTIFICIAL INTELLIGENCE (AI) and its applications have been utilized by the government and industries in recent years to further improve its products and services to the people. This is proof that AI's main intention is not to take away job and livelihood opportunities from many Filipinos; instead, AI is there to help them to be more efficient and productive in achieving their tasks and delivering their respective services.

This was shared by Dr. Enrico C. Paringit—executive director of the Department of Science and Technology–Philippine Council for Industry, Energy, and Emerging Technology Research and Development (DOST–PCIEERD)—during the airing of the *Centrong AgTek (Agham at Teknolohiya)* episode last 15 October 2021. This program is co-produced by the DOST–Science and Technology Information Institute (STII) and Centro Escolar University (CEU).

"Ganyan din ang sinabi noong araw na ang computer ang papalit sa tao, hindi naman siya nangyari di ba? Wala namang napalitan, napaganda lang kalidad ng produkto o serbisyong nagagawa natin," said Dr. Paringit.

(That's what had been said before, computers will replace humans, but it did not happen. Nothing was replaced, instead, it improved the quality of the products and services.)

Dr. Paringit also emphasized that AI is a tool or technology that would guide us to have better decisions due to the data that humans provided in the system of AI, even the emotion or our being culturally sensitive.

"Ang importante ay mapasok natin kung ano gusto natin, higit sa lahat kung ano nasa isip natin. Kasi kung hindi natin ipapasok mga datos na ito sa Artificial Intelligence, hindi natin malalaman ito at magkakaroon siya ng bias. Ito ang kailangan natin maiwasan," Dr. Paringit explained.

(It is only important that we encode those data that we want, we need, and is on our mind because if we are unable to input those data in the system of artificial Intelligence, there will be biases that we want to avoid.)

Dr. Paringit further said that it is not a question anymore if our country needs AI to improve the way we live. He even said, "we may not be able to feel or notice sometimes, but the benefits of AI make our lives more efficient and convenient."

"Sa pagbili natin ng mga item sa online shopping sites, artificial intelligence nagpapaandar sa kanya. Bakit alam niya na ganyang uri ng makeup, shampoo, at gadgets ang gusto natin, gumagamit siya ng artificial intelligence sapagkat tayong mga tao ay nagpasok ng datos, nagsearch tayo, hinanap natin keyword, kaya pagbalik ng mga applications nito, alam na niya kung ano gusto natin," Dr. Paringit said.

(If we go to different online shopping sites, artificial intelligence exists on their platform. The reason these online shopping sites know what products we prefer because we shared with them some information by searching and typing keywords in their app or platform.)

Dr. Paringit reminded the public that we should first recognize the benefits of AI, especially if we integrate it into our system and infrastructure. Through AI, people can

DOST-PCIEERD Executive Director Enrico C. Paringit, (left) disclosed to Princess Jordan (right), the host of Centrong Agtek, that integrating AI in our businesses, platforms, and infrastructures is not a way to replace humans and take away job opportunities but instead to capacitate them more in performing their tasks.

save time and come up with better decisions in life, armed with the bulk of data. With AI, government offices can deliver an effective and efficient way of providing services to their respective clients. Additionally, industries could offer world-class quality products and be globally competitive because processes are more efficient. He also said that our education system could improve and help students adapt to the changes of the times through AI.

DOST-PCIEERD supports AI-related research projects

In his interview, Dr. Paringit shared the nine research projects related to AI developed by different universities that are supported by DOST-PCIEERD. Some of these include the following: AI for autonomous vehicles, AI for efficient processing of available big data, tremor sensors to monitor the structural health of infrastructures, a chatbot that monitors the health of students, towed camera system for marine litter monitoring, automated software for faster spectroscopy analysis, and an intelligent system for traffic control and management.

"We are very optimistic with how our AI applications would make our lives much better through the focus of these nine research projects. It covers all sectors where many of us have been relying upon," said Dr. Paringit.

The chief innovator also shared that aside from supporting our local researchers to develop game-changing AI products and applications, DOST-PCIEERD is also focusing on strengthening the capacity of the infrastructure of our AI industry players, as well as the deployment of their developed products.

But above all, Dr. Paringit said that the Council is helping in crafting policies related to the use of AI. He explained that we need to protect the public's rights when it comes to their personal data or protect them from possible hazards brought by various AI applications. He said that these policies will guide us on who will be accountable once an AI-enabled system is involved in certain issues or problems like accidents involving automated vehicles.

"May mga complications dala ang teknolohiyang ito na dapat nating matutunan at dapat nating intidihin, at dapat may karangpatang polisiya at batas na aalalay dito. Layunin ng polisiya na hindi masupil ito; bagkus ay magamit ito at ligtas na paraan," said Dr. Paringit.

(AI has a corresponding complications that we need to learn and understand. In establishing a policy, we are not preventing the people from using it; instead, we are encouraging them to utilize it in more appropriate ways.)

"I would like everyone to get inspiration from AI. Do not only feel it but also learn to embrace it because when you embrace it, you would not only know how to use it as an application but also learn how to develop solutions and systems from it," concluded Dr. Paringit.

Dr. Paringit was featured in the program called Centrong AgTek (Agham at Teknolohiya), an experimental online show of the DOST-STII and CEU Media and Communication Department. It seeks to deliver fresh, informative, relevant, and entertaining content that would enable primarily young Filipinos to appreciate and understand the practical benefits of science, technology, and innovation in various aspects of our lives. This initiative is part of the Science Journalism advocacy of DOST-STII with the aim of promoting an innovation ecosystem and of nurturing a culture of science in the country.

SCIENCE CHIEF PRESENTS DOST'S INITIATIVES TO UNIDO COUNTRY REPRESENTATIVE IN PH

By Karen Lou S. Mabagos, *DOST-ITCU*

DOST Secretary Fortunato T. de la Peña hands an appreciation token to UNIDO Country Representative Teddy G. Monroy.

SECRETARY FORTUNATO T. de la Peña of the Department of Science and Technology (DOST) met with Teddy G. Monroy, the Country Representative of the United Nations Industrial Development Organization (UNIDO) in the Philippines last 08 November 2021.

Secretary de la Peña was joined by DOST Assistant Secretary Leah J. Buendia and Dr. Annabelle V. Briones, Director of the DOST–Industrial Technology Development Institute (ITDI). The science chief presented the DOST's accomplishments and initiatives that included the Department's Science for Change Program, technology breakthroughs and local innovations, the establishment of state-of-the-art facilities and laboratories, human resources development programs, S&T legislative push, and scientific responses and research studies on COVID-19.

The Secretary also discussed how the DOST has been empowering the communities using S&T (science and technology) through its Small Enterprise Technology Upgrading Program or SETUP; the Community Empowerment through Science and Technology or CEST; and the Innovation, Science, and Technology for Accelerating Regional Technology-based Development (iSTART) Program.

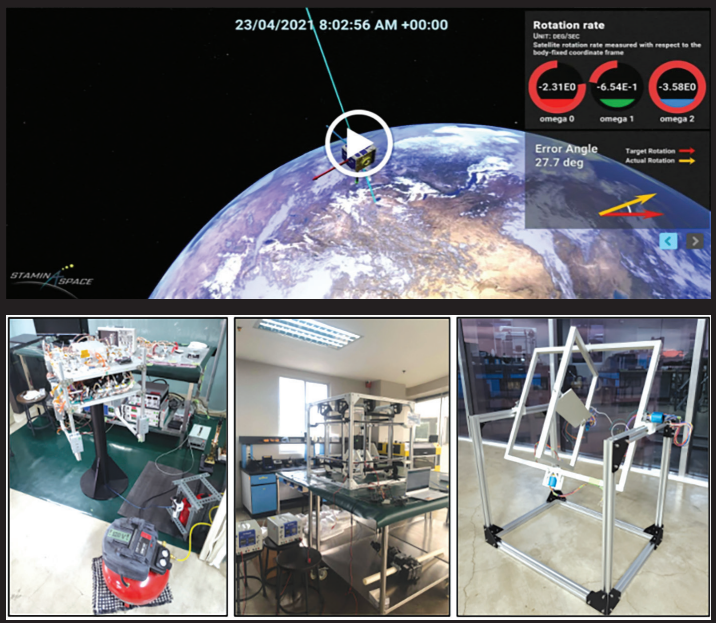
Monroy, affirmed that with the milestones achieved by the DOST, there are several areas that the DOST and UNIDO can explore for possible joint projects and activities. Secretary de la Peña and Monroy discussed the big possibility that the DOST and UNIDO can work together in various areas that include the research and development for MSMEs; science, technology, and innovation for the *Halal* industry; waste-to-energy innovations; and technopreneurship initiatives with local government units.

DOST Secretary Fortunato T. de la Peña discusses possible collaborations with UNIDO.

STAMINA4Space to trailblaze PH ascension in space R&D

By Allyster A. Endozo, *DOST-STII*
Photos from the STAMINA4Space program team

A flight test of the engineering model of Hypie, a push broom hyperspectral camera designed for drone platforms.



The visualization software for S4 or the Small Satellite Simulation System (top), which includes the hemispherical air bearing (lower-left), Helmholtz cage (lower-center), and motorized gimbal (lower-right).

Screenshot of the Maya-3 and Maya-4 CubeSats (bottom) being deployed from the International Space Station, as captured from the Japan Aerospace Exploration Agency livestream.

Space science, technology, and innovation in the Philippines are off to a milestone year with the launch of the Maya-2 cube satellite (CubeSat) in February and the Maya-3 and Maya-4 in August—almost three years after Diwata-2 in October 2018.

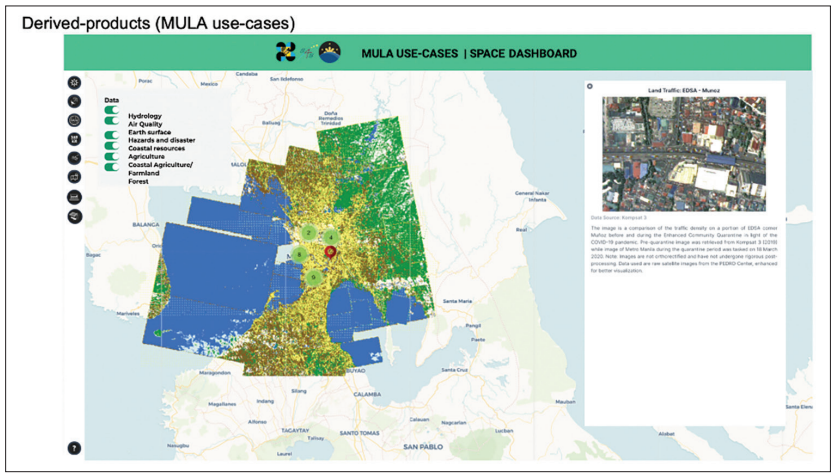
These historic feats were made possible by the STAMINA4Space research and development (R&D) program through the STeP-UP project, thus building upon the gains of the PHL-Microsat program that developed the Diwata-1 launched in March 2016.

STAMINA4Space or the Space Technology and Applications Mastery, Innovation, and Advancement program received PHP 867.5 M in combined project funding from the Department of Science and Technology (DOST).

The DOST's Philippine Council for Industry, Energy, and Emerging Technology Research and Development monitors its joint implementation by the Advanced Science and Technology Institute (ASTI) and the University of the Philippines (UP) Diliman.

Steering the projects are UP's National Institute of Physics for OPTIKAL led by Dr. Maricor N. Soriano, plus the Electrical and Electronics Engineering Institute for PHL-50 led by Dr. Marc Caesar R. Talampas and for STeP-UP led by Engr. Paul Jason Co.

Teaming with DOST-ASTI is UP's Institute of Environmental Science and Meteorology for A-SatDev led by Dr. Gay Jane P. Perez and, together with UP's Training Center for Applied Geodesy and Photogrammetry, for GRASPED led by Engr. Alvin E. Retamar.

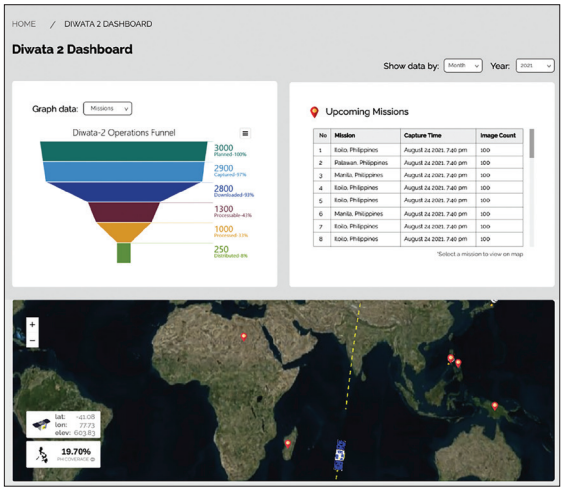


A proposed layout of data in the space data dashboard.

STAMINA4Space leads the design and development of the satellites' electromechanical and structural subsystems through the PHL-50 project, in addition to missions for their scientific and operational payloads via the OPTIKAL project.

The program also directs the Diwata microsatellite operations plus data management and dissemination through the GRASPED project, as well as the development of a new 100–150-kg satellite for industrial applications via the A-SatDev project.

Success in its implementation would expand the pool of scientists and engineers that could train their peers on space infrastructure and systems, as well as educate young students through promotional activities, the K-12 curriculum, and university courses.



A preview of the dashboard that will be used for monitoring the data acquisition and processing pipeline of Diwata satellites. The dashboard contains information on upcoming missions, images for processing, and image coverage.

The Maya-3 and Maya-4 flight models.

This could then be supported by a capable workforce by which satellite data can be translated to agricultural, disaster risk reduction, and other applications—even to local fabrication of satellite components and product testing in a space environment.

DOST Undersecretary for Research and Development Dr. Rowena Cristina L. Guevara (Photo from the Usec. Guevara's Facebook account).

DOST eyes more investments in human capital, increase in R&D budget

By Joy M. Lazcano, *DOST-STII*

THE DEPARTMENT of Science and Technology (DOST) Undersecretary for Research and Development (R&D) Dr. Rowena Cristina L. Guevara reiterated the need to invest in the country's human capital and increase the annual budget for R&D to help the country counter bigger challenges in the future.

In a video presentation for the 6th National Research and Development Conference (NRDC) held 10 November 2021, the Undersecretary presented various developmental programs that DOST has implemented in the last eight years. The virtual conference dubbed "Pananaliksik at Pagpapaunlad: Daan Tungo sa Pagbangon (Road to Recovery through R&D)" showcases programs and technologies in support of the government's whole-of-nation approach to recovery from the pandemic that are also in line with the Harmonized National Research and Development Agenda (HNRDA) priority areas.

The HNRDA aims to provide innovative solutions to the pressing challenges of the country. It focuses on the development areas of basic research; agriculture, aquatic, and natural resources; industry, energy, and emerging technology; disaster risk reduction and climate change adaptation; and health.

Guevara underscored the need to invest in the human capital. "Naniniwala kami na dapat tayong mamuhunan sa ating mga eksperto at innovators upang makamit ang mas matibay at matatag na tagumpay sa larangan ng siyensya."

(We believe that we have to invest in our experts and innovators to achieve victory through science and technology.)

Currently, DOST supports capacitating and strengthening the scientific community workforce by implementing various programs such as scholarship grants for undergraduate, graduate, and post-graduate studies in the field of science, technology, engineering, and mathematics (STEM).

"Sa nakalipas na limang taon ay meron na tayong halos 500 na MS at PhD graduates kada taon," elaborated Guevara. "Mahigit 10,000 na ang nabigyan ng M.S./Ph.D. scholarships sa buong bansa at mayroong 4,000 scholars naman ang nakatapos ng pag-aaral."

(In the last five years, we have approximately 500 MS and PhD graduates every year. More than 10,000 received MS./Ph.D. scholarships, while 4,000 scholars have already finished their studies).

She also mentioned the 16 Philippine Science High School (PSHS) campuses around the country that cater to high school students in different STEM tracks. The PSHS was established in 1963 and since then, it has been offering scholarships on secondary education, focusing on science to prepare students for a career in science. Its first campus was in Diliman, Quezon City.

Aside from this, the DOST maintains the Balik-Scientists program, which in 2018 was signed into law, and the Balik Scientists Act, which sets in place the benefits given to returning Filipino scientists who share their knowledge and expertise to increase the local pool of scientists. The Balik Scientists Act is DOST's answer to the prevailing "brain drain."

> **We believe that we have to invest in our experts and innovators to achieve victory through science and technology.**

Since 1975, we have 577 returning scientists who had 733 engagements and about 166 engagements and assistance to their host institutions—mostly state universities and colleges—across the country.

Although the pandemic has slowed down a bit the momentum of the *Balik Scientists* from performing their duties, DOST—however—has arranged limited, remote engagements through virtual platforms.

Additionally, Usec. Guevara—a product of the University of the Philippines Diliman—has mentioned the approval of the Science and Technology Fellows program. The program will integrate experts in several DOST institutions to be part of the development, conceptualization, policy development, and monitoring and evaluation of various DOST programs.

"Ang pagkakaroon ng S&T Fellows sa iba't-ibang ahensya ng DOST ay nakikita naming pangmatagalan at nais naming ma-institutionalize. Ito ang aming tugon sa hamon na masiguradong may sapat at kwalipikadong workforce ang Departamento at mapanatili natin sa bansa ang mga M.S. at Ph.D. graduate ng Science at Engineering," explained Usec. Guevara.

(We see the S&T Fellows as the long-term solution to address the challenges in ensuring that we have enough number of qualified workforce and make our M.S. and Ph.D. graduates in Science and Engineering stay in the country. We also hope to institutionalize this program.)

According to her, this model was adopted by the United States and Thailand, where experts and research fellows are hired to work in various R&D institutions.

Increased R&D budget makes sense

To make our dream of a robust innovation ecosystem in the country a reality, investment in R&D must also be given priority. Usec. Guevara expressed her hope to get additional budget allocations for its R&D programs to complement the R&D initiatives of the DOST and create strategic mechanisms that will ensure the increase in the number and capabilities of local experts and researchers in developing solutions to bigger challenges ahead.

It was also mentioned that for almost 30 years, the country had only allocated 0.14–0.18% from its gross domestic product (GDP) for R&D programs as compared to UNESCO's requirement of 2% R&D spending.

In recent years, the Philippines performed well when it improved the standing in the 2020 Global Innovation Index (GII) as it rose from rank 100 in 2014 to 50 in 2020 despite the meager budget allocated for R&D.

The GII is an insightful data published by the World Intellectual Property Organization to help countries evaluate the innovation performance each year and help stakeholders map out plans for economic improvements and developments. It ranks the innovation ecosystem performance based on 80 key development indicators as its metrics.

She said that the country, in fact, is considered an "innovation achiever," as evidenced by the rise of the country in the innovation index Report. "Napatunayan natin na kahit maliit ang pondong laan para sa agham at teknolohiya, kaya nating makipag-sabayan at manguna sa larangan ng innovation," declared Usec. Guevara.

(We have proven that we can be at par and ahead with other countries in the field of innovation even with the meager budget for science and technology.)

Likewise, in the latest United Nations Conference on Trade and Development Technology and Innovation Report 2021, the country is considered an "innovation overachiever" as it was able to surpass the rank 57 under India. The Technology and Innovation Report measures the country's readiness to frontier technologies such as artificial technology, 3D printing, and Internet of Things, among others.

Moreover, Usec. Guevara pointed out the need to increase the country's R&D enablers and support, especially in funding research in anticipation of difficult challenges ahead. "Sa ngayon ay umaasa ang DOST na magiging polisiya ang paglalaan ng 2% *ng* General Appropriations Act (GAA) para sa R&D," shared Usec. Guevara.

(Right now, we are hoping that it will be the policy to allocate 2% of the GAA for R&D)

This declaration was shared by DOST Secretary Fortunato T. de la Peña. "As mentioned earlier, the Filipino researcher is considered an efficient innovator—that is, we deliver more innovation output compared to what is expected given our innovation input," said Sec. de la Peña. He also added that these strengths could not be maximized. "Our potential will not be realized with a modest investment in R&D—averaging less than 0.20% of our GDP, still far below the UNESCO recommendation for a developing country," Sec. de la Peña lamented.

Sec. de la Peña hoped that the country can soon commit to invest more in R&D. He commended researchers for their efforts, thriving amidst the challenges in performing their duties. He, likewise, encouraged them to work hand-in-hand towards a better and safer future through R&D.

The NRDC promotes the latest results of the country's R&D programs and innovations organized by the DOST Office of the Undersecretary for Research and Development. It highlights some of the ongoing and completed R&D projects and programs aligned with the priority areas of HNRDA that are geared towards inclusive socio-economic development.

In commemorating the 125th year of martyrdom of our National Hero, the DOST formally unveiled to the public the 3D-printed monument of the Dr. Jose P. Rizal as a scientist located their compound in Bicutan, Taguig City. It is a 12.5-ft-high statue and considered as the first and tallest 3D-printed monument in the country. Its design is inspired by the studies and work of historians and artists of the DOST-NRCP then created by Professor Jose Manuel Sicat of UP Diliman College of Fine Arts. In the photo were Prof. Sicat, Taguig City Representative Lani Cayetano, DOST Secretary de la Peña, NHCP Chairperson Rene R. Escalante, DOST Undersecretary for R&D Dr. Rowena Cristina L. Guevera, Descendant of Dr. Rizal Ester Lopez Asurin, and Presidential Communications Operations Office Undersecretary Atty. Michel Kristian R. Ablan.

Rizal the Filipino Scientist 3D-printed monument inaugurated at the DOST

By Allan Mauro V. Marfal, *DOST-STII*

For many of us, it is common knowledge that aside from being a great novelist and poet, Dr. Jose P. Rizal was also a well-known ophthalmologist, agriculturist, engineer, and surveyor during the Spanish colonial period. In commemoration of the 125th year of his martyrdom, the Department of Science and Technology (DOST) aims to highlight his significant contributions in the field of science and use it to improve the lives of many Filipinos.

On 30 December 2021, the DOST—in partnership with the National Historical Commission of the Philippines (NHCP)—formally unveiled to the public the Rizal the Filipino Scientist 3D-printed monument and the historical marker inside the DOST Compound in Bicutan, Taguig City.

It is a 12.5-ft-high statue and is considered the first and tallest 3D-printed monument in the country. Additionally, it can withstand winds of up to 330 kph and an M7.0 earthquake. Its design is inspired by the studies and work of historians and artists of the DOST-National Research Council of the Philippines (NRCP) and was then created by Professor Jose Manuel Sicat of the University of the Philippines (UP) Diliman College of Fine Arts.

DOST Secretary Fortunato T. de la Peña said that the establishment of this 3D-printed monument of Dr. Jose P. Rizal will immortalize his patriotic deeds and symbolize how science, history, and arts can work together to produce meaningful products for the benefit of every Filipino.

"It is my hope that our Filipino youth will look up to this monument and will say gusto ko maging katulad ni Jose Rizal, matalino at may pagmamahal sa bayan. As I said Dr. Rizal did not do science for his own sake and to receive recognition, he did it for the sake of others. He did Science for the People," said Secretary de la Peña.

Meanwhile, in her message, DOST Undersecretary for Research and Development (R&D) Dr. Rowena Cristina L. Guevara said that it is our fervent hope that Jose Rizal's life as a model Filipino scientist—embodied in the largest 3D-printed monument in the country—will be a reminder that scientists are heroes just like Dr. Rizal.

"We, at DOST, honor the life of Dr. Jose Rizal for his exemplary dedication to science, his advocacy for the truth, and the lives of the Filipino people. Tunay nating masasabi na si Dr. Jose Rizal ay para sa agham, katotohanan, at buhay," said Usec. Guevara.

The said statue was 3D-scanned and 3D-printed at the Advanced Manufacturing Center (AMCen) of the DOST–Metals Industry Research and Development Center (MIRDC). It was made only in less than two months to show AMCen's capability to produce world-class products in less time, as well as its ability to develop disaster resilient materials and structures through the 3D-printing technology.

On the other hand, in a virtual presser held two days earlier, DOST-MIRDC Executive Director Engr. Roberto O. Dizon said that they are proud to be able to have this opportunity to honor our National Hero.

"We hope this statue will inspire the new generation of young scientists to aim high and reach their dreams and help contribute to nation-building to bring the truth to the famous quotation of Dr. Jose P. Rizal: Kabataan and Pag-asa ng Bayan," said Executive Director Dizon.

Prof. Jose Manuel Sicat—the creator of the Rizal the Filipino Scientist monument—shared that the entire sculpture does not only feature the contributions of Dr. Jose P. Rizal in the field of science and technology, but it also sends a message that all scientific discoveries should be shared and used by every Filipino.

In his message, National Historical Commission of the Philippines (NHCP) Chairperson Rene R. Escalante said that with the guidance of Rizal's memory, he encouraged everyone to become victorious from the challenges of the present.

"Let us join forces in promoting science, truth, and life. Please accept our heartfelt thanks and congratulations to the DOST on the unveiling of the historical marker and 3D monument," said Chairperson Escalante.

Witnessing the historic moment was Taguig City 2nd District Representative Maria Laarni "Lani" Cayetano. In her message, she expressed her amazement at how science and technology can immortalize our national hero in the most artistic way possible.

"We are so proud that Taguig is home to the men and women who made this innovation possible. Having the 3D printing technology available in the country proves the competence and foresight of DOST," said Representative Cayetano.

Rizal's 3D statue is a tribute by the DOST to the life and legacy of Rizal and his contributions to the country, especially in the field of science. The project to commemorate Rizal on his 125th martyrdom anniversary is a joint undertaking of the DOST–MIRDC, the DOST–NRCP, and the DOST-Science and Technology Information Institute (STII).

DOST-Isabela trains Dinapigue farmers in organic fertilizer production

By Angelo Capurian, *DOST-II*
Photos from DOST-II

THE DEPARTMENT of Science and Technology (DOST) in Isabela—in partnership with the National Irrigation Administration (NIA) Isabela Irrigation Management Office— trained farmers of Barangay Dibulo, Dinapigue, Isabela on "Organic Fertilizer and Production of Natural Farm Inputs." This initiative supports the Organic Agriculture Act 10068, an act providing for the development and promotion of organic agriculture in the Philippines and other purposes.

Organic fertilizers are fertilizers that are naturally produced and contain carbon. For its function, fertilizers are materials that can be added to soil or plants to provide more nutrients and sustain growth.

A total of 25 participants from Barangay Dibulo received technology training on vermicomposting (by using earthworms) and production of natural farm inputs.

The participants were allowed to participate in lectures that provided the technical know-how on producing organic fertilizer to lessen the use of synthetic fertilizer and chemicals that can be harmful to plants and animals in the long run.

Furthermore, during the activity, Provincial Director Lucio G. Calimag shared the rationale and additional lectures in adopting organic agriculture to provide safe food for their families. To sum it all up, the activity was deemed successful, and the participants expressed their gratitude to DOST-II and NIA Isabela for sharing their expertise during the duration of the technology training.

The training was very appropriate for Dinapigue since farming is one of its main economic activities that provides livelihood opportunities for the farmers and their families. Dinapigue is the southernmost coastal town of the province of Isabela and is one of the four remote and isolated coastal towns facing the Philippine Sea in the east and is separated from the rest of the province by the Sierra Madre Mountains.

FRESH FARMS:
Ensuring food safety free from contaminants

By David Matthew C. Gopilan, *DOST-STII*

SAFE AND healthy food is a basic human need and right. It is needed to sustain overall health and economic development in light of the recent pandemic.

With this, a research program called FRESH FARMS or Food Risk and Safety Analysis in Agricultural Farms towards Improvement of Control Strategies for Food Safety is currently implemented to ensure that the food from farms is free from any contaminations.

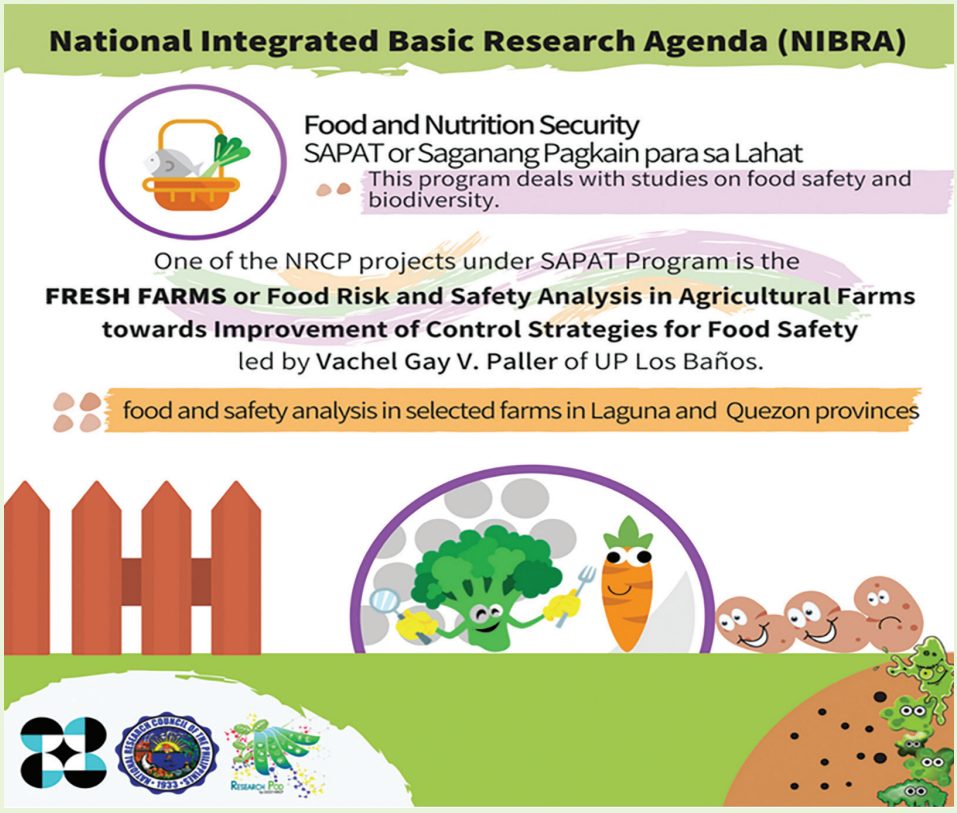
This is funded by the Department of Science and Technology (DOST) through the Saganang Pagkain Para sa Lahat or SAPAT Program of the DOST–National Research Council of the Philippines' National Integrated Basic Research Agenda.

Divided into three project components, FRESH FARMS aims to detect parasites, potentially harmful bacteria, and heavy metals from fresh farm produce and environmental samples in select farms in the provinces of Laguna and Quezon.

The program is led by Dr. Vachel Gay V. Paller of the University of the Philippines Los Baños–Institute of Biological Sciences (UPLB-IBS). She also handles the FRESH FARMS first project component—Parasite Contamination and Transmission in Selected Agricultural Farms in Laguna and Quezon Provinces Towards the Improvement of Control Strategies for Food Safety.

Joining her are Dr. Bernadette Mendoza, also from UPLB-IBS, and Assistant Professor Christian de la Cruz of Laguna State Polytechnic University. Dr. Mendoza handles the project detecting bacterial pathogen contamination in farms, while Asst. Prof. Mendoza takes the heavy metal contamination.

They will also visit the existing practices of farms and know how these practices increase the chances of contamination of their produce.



Preliminary results

Dr. Paller cautioned the public from eating raw leafy vegetables since they have direct contact to soil, animals, and water that may be contaminated.

According to her, vegetables that are eaten raw are not subjected to heat, which could possibly destroy harmful parasites and pathogens.

Leafy vegetables, particularly the red ruby lettuce, have "uneven crevices" or corners where eggs of parasites could be hiding. If left uncleaned, it poses danger to human health.

Dr. Paller detected hookworm eggs and other parasitic, worm-like species in samples of leafy vegetables in organic and conventional farms. Possible causes are the use of manure as fertilizer, presence of farm and feral animals, as well as rodents and pests.

Meanwhile, Asst. Prof. de la Cruz found that selected samples of soil and irrigation waters from farms are contaminated with heavy metals, particularly arsenic and lead.

Although he did not report if the levels of contamination pose danger to human health, he explained that heavy metals can be toxic even at very low concentrations.

To reduce the chances of heavy metal contamination, he suggested using organic pesticides rather than synthetic pesticides.

Toxic heavy metals usually come from agrochemical applications, industrial discharges, car exhausts, and mining.

"We are the problem but worry not, we are also the solution," Asst. Prof. de la Cruz concluded.

FRESH FARMS is one of the research programs featured in the 6th National Research and Development Conference held on 10 and 17 November 2021. Webinars during the 6th NRDC can still be accessed through the NRDC Facebook page at https://www.facebook.com/dostnrdc and Twitter account at https://twitter.com/nrdc_dost.

Dr. Barba and the mango tree—the object of his scientific breakthrough—over the years (photos from DOST-NAST).

Reaping the fruits of benevolence: the legacy of Dr. Ramon C. Barba (1939–2021)

By Allyster A. Endozo, *DOST-STII*

> **"It takes a dream to create a new technology . . . .**

AND A new technology creates new dreams!" These were the words spoken by a Filipino hero who, having recently passed on 10 October 2021 at the age of 82, has been granted the honor of a state burial at the *Libingan ng mga Bayani*. This hero of ours wielded neither a sword nor a pistol, no, but he did carry in his hands the glass tubes from which the hope for a better future flourished for millions across the world.

Dr. Ramon Cabanos Barba was born on 31 Aug 1939 in the rustic town of San Nicolas in Ilocos Norte as the youngest among the four children of Lourdes Cabanos and Juan Madamba Barba, whose father once worked for the Bureau of Plant and Industry. He had an elder brother, Efren, plus two elder sisters, Aida and Rachel. Despite his untimely departure, his illustrious lineage lives on with his grandson, Carlitos—the fruit of his marriage with Corazon Veron Cruz through their son, Ricky.

Dr. Barba's venture into academic excellence began in 1951 when he graduated with the third honor at the elementary level from Sta. Rosa Academy in San Nicolas, and in 1954 from the University of the Philippines (UP) High School in Quezon City. In 1958, he earned his bachelor's degree in agriculture from the UP College of Agriculture (UPCA) after completing his thesis on smudging of mango trees under Dr. Leon G. Gonzales, the "father of Philippine horticulture."

In 1962, Dr. Barba graduated with distinction from the University of Georgia with a master's degree in horticulture, having finished his thesis on the chemical-induced flowering of azalea under Dr. Franklin Pokorny. In 1967, he obtained his doctorate degree in plant physiology from the University of Hawaii after accomplishing his dissertation on the mechanism of the herbicide ametrine in banana under Dr. Roman R. Romanowski, who replaced the renowned Dr. Toshio Murashige.

After working as a senior technician for the Hawaiian Sugar Planters' Association on sugarcane regeneration through single-cell cloning from 1967–1968, Dr. Barba returned to UPCA and was thereafter appointed as an assistant professor in 1969 and, eventually, as a professor in 1981. Within those years, he served as the first program leader of UPCA's Tissue Culture Laboratory from 1975 until the late 1980s—doing so in his personal capacity even without compensation.

Upon his return, Dr. Barba used PHP 500 from his very own savings to fund exploratory tests with the help of his friends Jose and Rita Quimson at Quimara Farm in San Jose del Monte, Bulacan. By spraying a 1% solution of potassium nitrate or salitre, they succeeded in making 100 advanced-age mango trees produce flowers within two weeks and abundant fruits within four months. His game-changing breakthrough began to be adopted by farmers not long after.

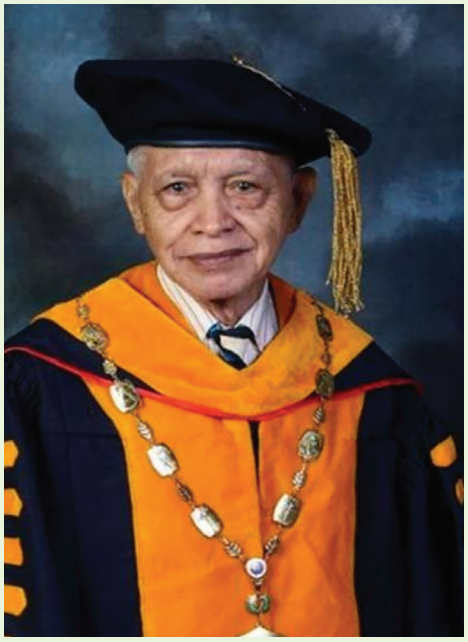
Callously, a former research assistant of Dr. Barba divulged the information to the department chairperson—with whom the technology was tested, the discovery was claimed, and the results were published. Dr. Barba, who wanted farmers to freely use his technique, responded by filing royalty-free patents not only here in the Philippines but in five other countries. From there, in 1980, he developed FLUSH as a product that enables year-round fruit-bearing of mango trees.

Thanks to Dr. Barba's ingenious discovery, the once-neglected tree grown for shade has thrived into a profitable cash crop. Compared to 1970 levels, mango yield has nearly tripled nationwide to 9.6 tons/ha by 1980 and even rose 15-fold in Western Visayas to 22.6 tons/ha by 1985. From 1995–1997, nationwide gains were also reported in production value (from PHP 7,342 M to PHP 10,338 M) and farmgate prices (from PHP 7.48/kg to PHP 17.65/kg)—yet the payoff kept rising.

By 1995, the Philippine mango industry had expanded to PHP 7 B in gross value and hauled in USD 43 M in foreign exchange—built on a network of nearly 20 growers' associations, at least 174 professional contractors, plus 105 "dried" and other processed products. Mango cultivation as pioneered by Dr. Barba eventually spread to a number of countries across Asia, Australia, Africa, and Latin America—including Mexico whose global share even reached as high as 41%.

Possessing "green thumbs" in the true sense of the term, Dr. Barba led his team at the Institute of Plant Breeding of UP Los Baños to even more agricultural breakthroughs for other crops. His group developed tissue protocols that enabled the production of robust and disease-free sugarcane and banana in large quantities and at rapid pace. These protocols eventually became the standard practice of vast farms operating in countries across Asia, Africa, and Latin America.

Dr. Barba working on the tissue culture of sugar cane from 1968–1969 (photos from DOST-NAST).

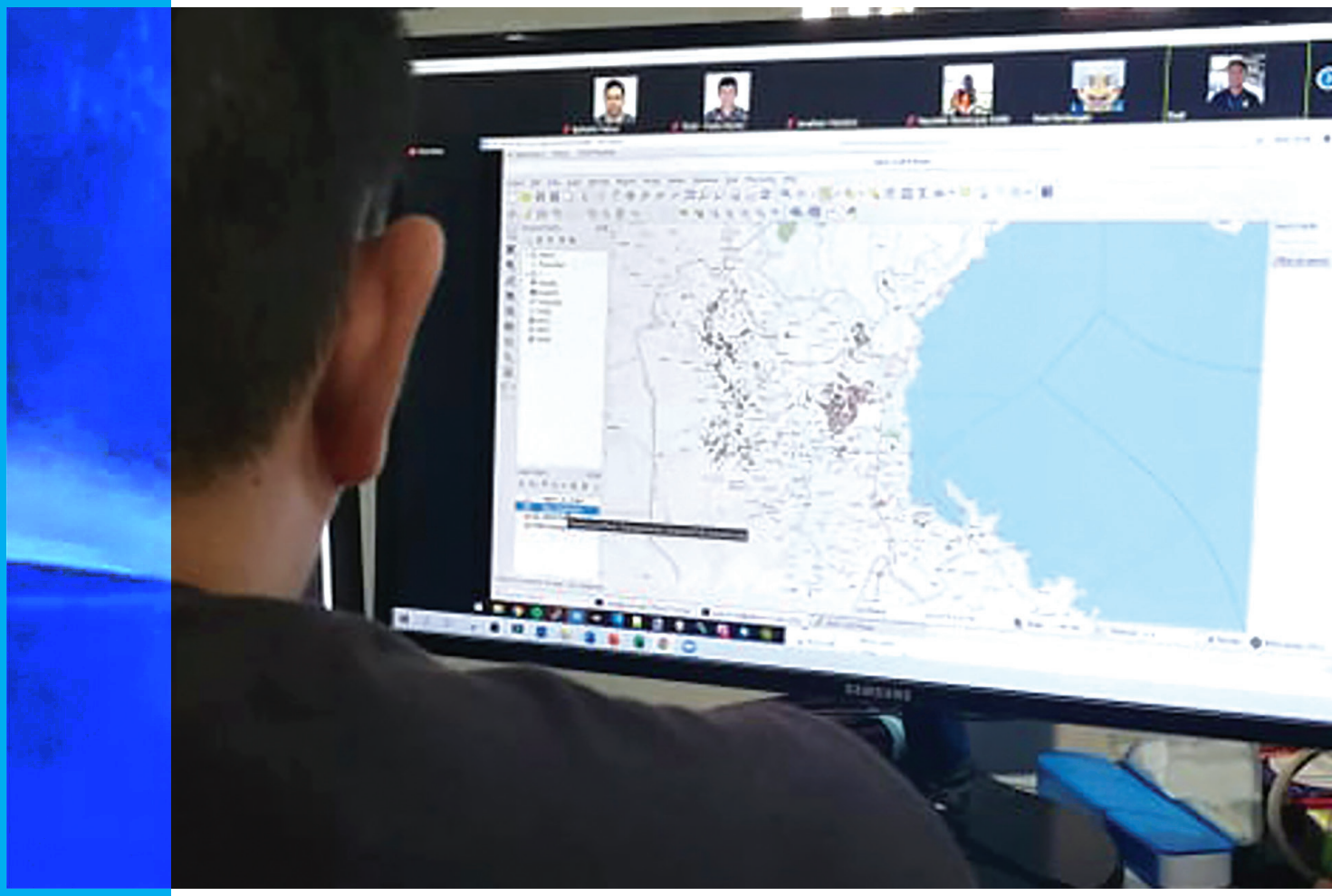


Dr. Ramon Cabanos Barba (1939–2021) (photo from DOST-NAST).

Dr. Barba's team at UP Los Baños didn't stop there, as they also developed micropropagation protocols that imparted major changes in the production schemes of more than 40 important crop species. These include bamboo, *calamansi*, cassava, derris, garlic, ramie, *rattan*, shallot, and white potato—crops with significant agricultural value in developing nations as they serve as everyday sources of not only food but also ornamental and construction materials to many.

It is for his benevolence that Dr. Barba reaped the fruits of his lifelong service: the Outstanding Young Men Award for Agriculture in 1974, the Rizal *Pro Patria* Presidential Award in 1980, the UP Most Distinguished Alumni Award in 2004, and the Dioscoro L. Umali Achievement Award in 2011. He was also granted membership to the National Academy of Science and Technology in 2004, the Order of National Scientist in 2014, and the Top 100 Asian Scientist prestige in 2016.

Dr. Barba, in so many ways, was an embodiment of the iconic UP Oblation statue of his *alma mater*. Like the Oblation, he stood firm on the rustic surface of his native land. Like the Oblation, he remained grounded by an ever-growing plant despite lucrative opportunities abroad. Like the Oblation, he opened his heart and soul in selfless service to his people. And, like the Oblation, he closed his eyes in his final moment of glory. *Paalam at maraming salamat sa'yo*, Dr. Barba!



DOST-XI's DRRM team, first to be trained in DOST-ASTI's flood mapping technology

Text and photo from DOST-XI S&T Promotion

THE INFORMATION and Communications Technology–Disaster Risk Reduction and Management (ICT-DRRM) Section of the Department of Science and Technology Region XI (DOST-XI) successfully completed the three-day virtual Flood Mapping Training Series in 12–14 October 2021.

DOST-XI's ICT-DRRM Section—composed of ICT practitioners Jonathan Victolero, John Paolo Boniel, Ephraim Franco, Rey Suarez, and Sukarno Sukarno—was the first DOST regional office to be trained in the use of the flood mapping methodology developed by the DOST–Advanced Science and Technology Institute (ASTI).

Experts from the DOST-ASTI Remote Sensing and Data Science: DATOS Project Help Desk conducted the training that was composed of lectures, discussions, and hands-on training on the processes, system requirements, and technologies for the said methodology.

DATOS capitalizes on the current advancements of computing technology and applies it in the fields of geographic information systems, remote sensing, artificial intelligence, and data science to provide maps and other information for disaster risk reduction applications. One of its products is the flood map, a visualization tool that can show potential and actual flooded areas of a calamity-stricken place. This allows government and other stakeholders to assess hazards and actual impacts of weather events and serves as a guide in their rescue operations and rehabilitation efforts.

According to DOST-XI's ICT-DRRM Section, the regional office will now assist the DOST-ASTI in producing flood impact maps in the region on flood disasters. The utilization of maps will be a contribution to the Regional Disaster Risk Reduction and Management (DRRM) Council XI in strategizing and responding to flood-related disasters.

"Our next step is to enhance the skills that we have learned by constant practice in generating maps. We also aim to introduce this to the Regional DRRM Council XI—which includes the national government agencies, local government units, and other stakeholders for utilization," Boniel said.

PhiGO, a website for groundwater monitoring in Pampanga and Iloilo City, featured in the 6th NRDC

By David Matthew C. Gopilan, *DOST-STII*

Screenshot of the homepage of PhiGO website.

THE QUALITY of surface water in rivers, lakes, and oceans may be easy to see. But for the waters that are way deep in the ground under our feet, not very much.

To monitor the dynamics of groundwater in Pampanga and Iloilo City, a website called Philippine Groundwater Outlook (PhiGO) was developed and launched by researchers from the Ateneo de Manila University and the British Geographical Survey (BGS).

The PhiGo website allows stakeholders, the general public, and local government units to get real-time information based on groundwater monitoring systems. Information from these systems can help generate models that would describe the groundwater dynamics and give long-term forecast on its quality and quantity.

For example, the PhiGO website can report the static water level or the water level in the monitoring well under undisturbed and no pumping conditions. Basically, it says how much water is present in the well. By looking at various data of static water level, one can see if a water crisis is about to come, thus providing an opportunity to make solutions or policies ahead of time.

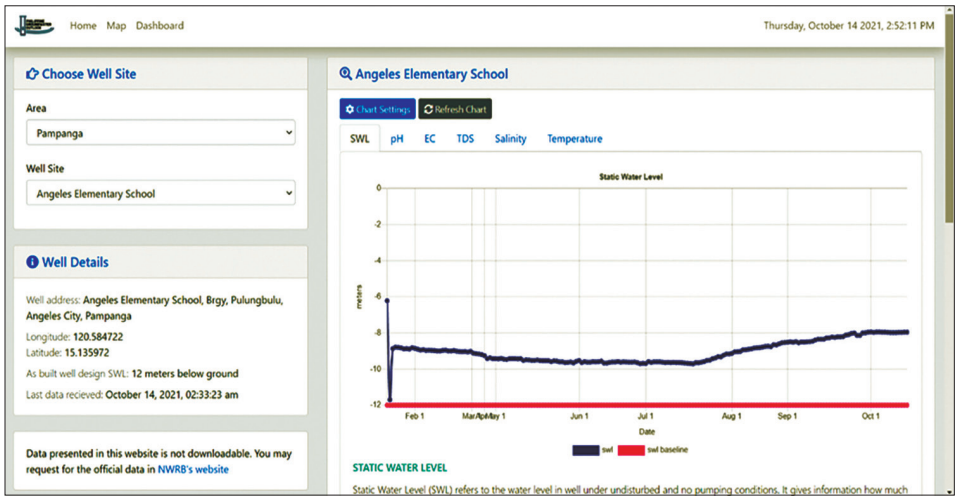
According to PhiGO, Pampanga and Iloilo City are two of the nine highly urbanized areas in the country with groundwater level criticalities. This means that these areas could deplete their groundwater or erode its quality in the coming years.

These two areas were identified by a previous study conducted by the National Water Resources Board and Japan International Cooperation Agency.

The PhiGo website is only one of the outputs of the three-year collaborative project between Ateneo's Dr. Ma. Aileen Leah G. Guzman and Dr. Andrew Barkwith of BGS. They have also launched groundwater monitoring systems that will put relevant data on the PhiGo website. Their team also generated models on groundwater recharge and other factors involved in water quality.

The project is jointly funded by the Department of Science and Technology–Philippine Council for Industry, Energy, and Emerging Technology Research and Development and the Natural Environment Research Council of the United Kingdom.

The PhiGo website was one of the featured innovations during the 6th National Research and Development Conference (NRDC) held on 10 and 17 November 2021. Webinars can still be accessed through their Facebook page, https://www.facebook.com/dostnrdc or Twitter account, https://twitter.com/nrdc_dost.



Screenshot of the PhiGO dashboard showing near real-time static water level in Pampanga based on a well located in Angeles Elementary School in Barangay Pulungbulu, Angeles City. Based on the dashboard, there are three other well sites in Pampanga.

6 LGUs to have earthquake–resilient structural designs using atlases developed by DOST-PHIVOLCS

By Allan Mauro V. Marfal, *DOST-STII*

DOST Secretary Fortunato T. de la Peña poses with the atlases that were turned over to six local government units—namely, Pangasinan, Tarlac, Metro Iloilo-Guimaras, Cauayan City, Butuan City, and Mati City (photo by Enrico C. Belga, Office of the Secretary).

SIX LOCAL government units (LGUs) received their Specific Earthquake Response Atlases from the Department of Science and Technology–Philippine Institute of Volcanology and Seismology (DOST-PHIVOLCS) to be used for decision-making in building safer structures and facilities, as well as for strengthening disaster resiliency of the respective communities.

Each atlas is a compilation of maps that provides information on the characteristics of the subsurface soil and rock layers in the study areas or LGUs and the resulting site response to a specific earthquake ground motion. This can serve as a guide in seismic load design to increase the resiliency of buildings and infrastructures in the event of a large earthquake.

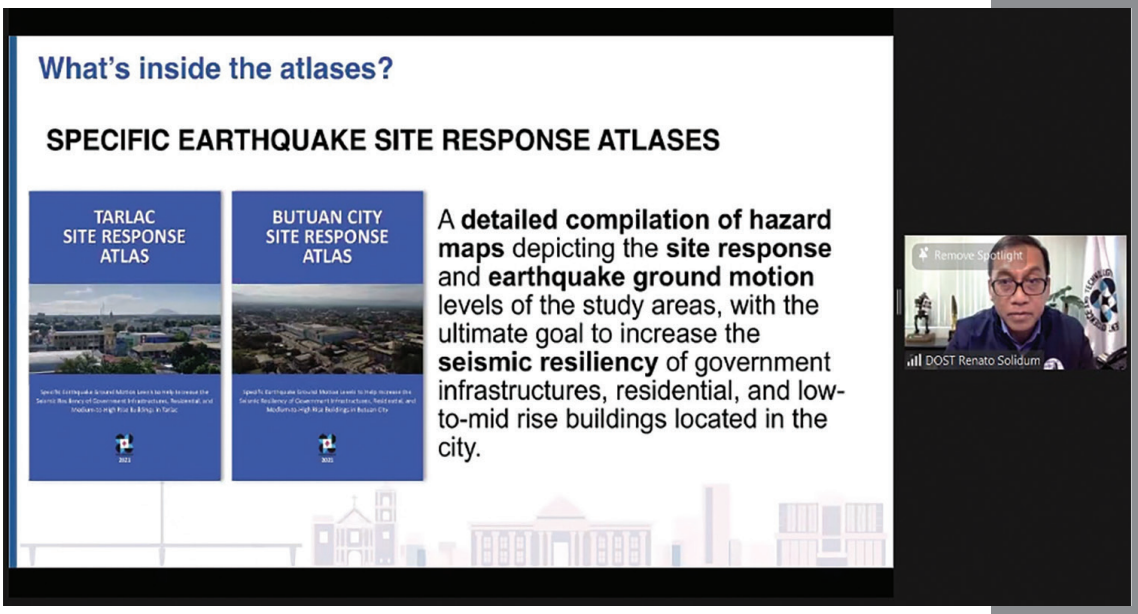
These atlases can be a significant reference for LGUs—as well as for the Department of Public Works and Highways (DPWH)—to appropriately design earthquake-resilient government infrastructures, residential houses, and medium-to-high rise buildings in Pangasinan, Tarlac, Metro Iloilo-Guimaras, Cauayan City, Butuan City, and Mati City.

"Our country has learned many lessons during large damaging earthquakes. One is the construction of earthquake-resistant structures. Urban planners should have a wider perspective of the engineering challenges faced by property developers before crafting their comprehensive land-use and development plans," DOST Secretary Fortunato T. de la Peña said during the launching and turnover ceremony held on 22 October 2021.

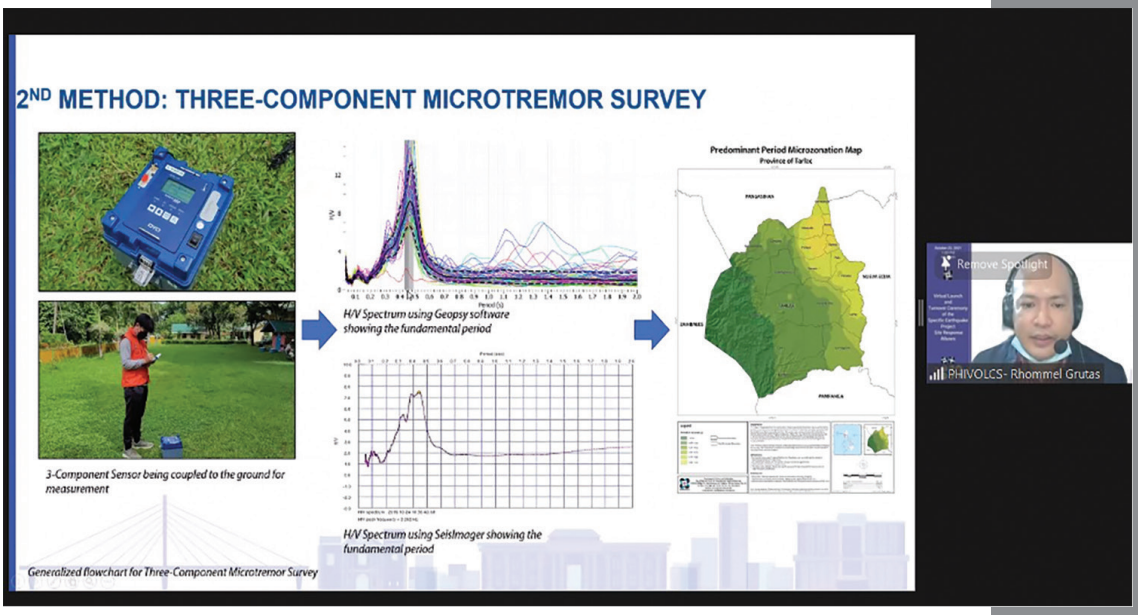
He said that they approved and funded the proposals of Dr. Rhommel N. Grutas from DOST-PHIVOLCS for the team to come up with the necessary surveys and data collection, analyses and interpretation, and mapping of the final results that can be used by engineers to properly design buildings to withstand the effects of ground shaking due to earthquakes.

"Urban communities are prone to ground shaking hazards due to the rapid development of medium to high–rise infrastructures proximal to earthquake generators. Seismic micronization maps are useful in the development of comprehensive land use plans for major cities. These allow government agencies to develop better disaster response programs and (to have) more resilient communities and infrastructures," said Dr. Grutas, the project leader of Specific Site Response Atlases.

According to DOST Undersecretary for Scientific and Technical Services (STS) and Officer-in-Charge (OIC) of DOST-PHIVOLCS Dr. Renato U. Solidum Jr., these atlases pertain to a detailed compilation of hazard maps depicting the site response and earthquake ground motion levels of the study areas with the goal to increase the seismic resiliency of government structures, residential, and low-to-mid-rise buildings located in the city.



DOST Undersecretary for STS and DOST-PHIVOLCS OIC Dr. Renato U. Solidum Jr. shared with the attendees the information inside the atlases that were turned over to the six LGUs. (photo from DOST-PHIVOLCS).



Dr. Rhommel Grutas, Supervising Science Research Specialist from the DOST-PHIVOLCS and the project leader, said that these Specific Site Response Atlases will enable government agencies to develop better disaster response programs and create more resilient communities and infrastructures (photo from DOST-PHIVOLCS Facebook Page).

In his message, Pangasinan Governor Amado I. Espino III shared his appreciation and gratitude to DOST-PHIVOLCS and DOST-PCIEERD (Philippine Council for Industry, Energy, and Emerging Technology Research and Development) for developing the atlas intended for the province of Pangasinan as it would greatly help in their mission to make their province responsive and resilient during the occurrence of natural calamities such as earthquakes.

The project was funded by DOST-PCIEERD, one of the three sectoral councils of the department.

Incidentally, more knowledge products and innovations of DOST-PHIVOLCS were featured during the celebration of the 2021 National Science and Technology Week (NSTW) held from 22-28 Nov 2021 through the virtual platform. The various technologies, innovations, activities, forums, and webinars of the other DOST agencies and regional offices showcased in the 2021 NSTW can still be accessed through http://nstw.dost.gov.ph/ and via Facebook page at https://www.facebook.com/nstwdost.

PHIVOLCS, DOST-NCR team up to make MSMEs tsunami-ready

By Eunice A. Narvadez, *DOST-STII*

The Philippine Institute of Volcanology and Seismology of the Department of Science and Technology (DOST-PHIVOLCS) marked this year's World Tsunami Awareness Day (WTAD) through the culmination of Tsunami Disaster Risk Reduction (DRR) initiatives for micro, small, and medium enterprises (MSMEs) in Metro Manila last 5 November 2021.

In the observance of the 2021 WTAD, DOST-PHIVOLCS recently inked a memorandum of understanding with DOST–National Capital Region (NCR) to work together for the conduct of tsunami preparedness and response planning of MSMEs in Metro Manila.

With the risks posed by a tsunami and its possible significant interruption in the economic activities of the country, the program was designed to facilitate tsunami preparedness and response planning of MSMEs, whose business offices and facilities are situated within the tsunami hazard zone in Metro Manila.

In 2019, the Philippine Statistics Authority recorded over a million business enterprises in the country, and 99.5% of these belong to the MSME category while 20.2% of the MSMEs are located in NCR.

Some 140 MSMEs from the nine identified tsunami-prone cities in Metro Manila participated in the program and are primarily the "adoptors" of the Small Enterprise Technology Upgrading Program (SETUP) implemented by DOST-NCR.

In June, a series of planning workshops and development of individual tsunami risk reduction guides were put together by the partnering agencies for the participating MSMEs to aid them in preparing their businesses against the negative impact of tsunamis.

"The business sector needs to continue their critical operations immediately after disasters," DOST Undersecretary for Disaster Risk Reduction and Climate Change Renato U. Solidum Jr. said, reiterating the need for the anticipation and preparation for rare but possible extreme events such as tsunamis and the COVID-19 pandemic.

A.S. Rivera Corp. and Samurai Foods Inc. were the two piloting companies who have collaborated with DOST-PHIVOLCS and DOST-NCR for the completion of their very own tsunami preparedness and response planning guides.

DOST-PHIVOLCS eyes to conduct similar activities for other DOST regional SETUP adoptors plus additional community-based tsunami DRR activities by local government units, and forge collaborations with occupational safety organizations, especially with private sectors in the years to come.

Furthermore, the agency aims to scale up the support given to industry players that would similarly improve their DRR efforts for business continuity—not only during the event of a tsunami but also during other disasters by providing sustainable and adequate support to their businesses.

"Building tsunami-ready communities in this new normal is challenging, but key in this effort is partnership," Usec. Solidum concluded.

6th NRDC features DOST-PAGASA's SWERVE project on wind hazard

By Jerossa J. Dizon, *DOST-STII*

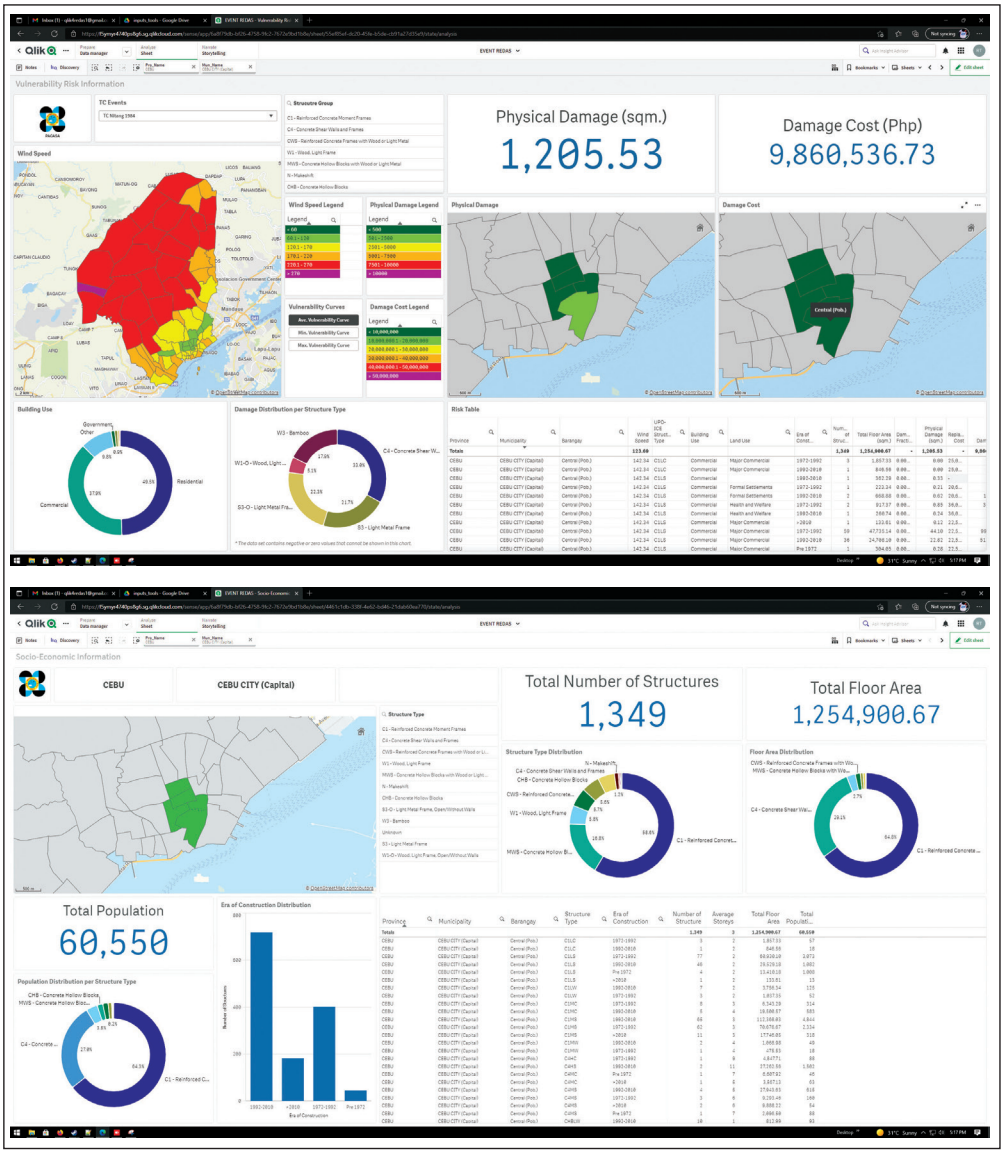
THE PHILIPPINE Atmospheric, Geophysical, and Astronomical Services Administration (PAGASA) of the Department of Science and Technology (DOST) plans on expanding the access of Severe Wind Estimation of Risk Using Vulnerability and Exposure (SWERVE) tool nationwide to save lives during a typhoon.

According to Karlo J. Timbal from the Impact Assessment and Application Section of the Climatology and Agrometeorology Division of DOST-PAGASA, at present, the tool is being used for certain local government units (LGUs) that have the surveyed exposure data and the agency is now working on making the SWERVE tool available to everyone.

SWERVE is a tool developed by DOST-PAGASA under the program Severe Wind Hazard and Risk Assessment for Cebu City in collaboration with the Philippine Institute of Volcanology and Seismology and the University of the Philippines Diliman–Institute of Civil Engineering. This innovation is used for impact assessment of severe wind hazards due to tropical cyclones for the target LGU, which is Cebu City.

The program aims to decrease the vulnerability of an area to severe wind brought about by tropical cyclones and increase its resilience by strengthening the capacity of the LGUs and other stakeholders to disaster risk reduction and management efforts.

Timbal explained that with the SWERVE tool, users can access the impacts of severe wind hazards caused by typhoons from the provincial level down to the barangay level. In so doing, this can be a big help to LGU officials, disaster managers, and planners to improve their mitigation strategies and develop a more effective action plan to be implemented in their respective areas to lessen the impact of this natural hazard.



There are three components of risk needed to be integrated into the SWERVE tool: 1) severe wind hazard, which determines the strong wind speeds over particular areas; 2) vulnerability, which characterizes the integrity of buildings when exposed to the strong winds; and 3) exposure, which refers to the exposed elements to severe wind hazards such as buildings, population, and infrastructure. By combining these three components, they will be able to estimate the risk in terms of physical damage, damage cost, number of damaged structures for either partial or complete state, and number of affected populations.

As of today, the methods used in the SWERVE program are applicable for probabilistic and post-event assessments, and in the future, DOST-PAGASA is looking forward to generate impact-based forecasts with regard to severe wind hazards brought by tropical cyclones.

The SWERVE project was just one of the research and development (R&D) initiatives presented during the 6th National R&D Conference (NRDC), Part 2, on 17 Novemeber 2021. Viewers may still access the webinars via the NRDC Facebook page at https://www.facebook.com/dostnrdc.

Screen capture from the 2020 YES Awards video presentation

PH sci, math medalists flourish amid pandemic

Text and photos from DOST-SEI

NOT EVEN COVID-19 can stop young Filipino math and science geniuses from hauling medals from international competitions in 2020.

This, as the Department of Science and Technology–Science Education Institute (DOST-SEI) recognized 1,395 students in its Youth Excellence in Science (YES) Awards held virtually last 29 October 2021.

The number of awardees is down 14% from the 1,631 tallied in 2019. But for DOST-SEI Director Dr. Josette Biyo, the number remains impressive given the challenges faced by the organizers of the international competitions themselves.

"This year's number of 1,395 medalists—with a total of 3,672 awards amassed from 67 competitions—is proof that despite the pandemic, many of us continue to push for excellence. Many of our teachers and parents continue to believe in our youth's innate talents. Many of us in the science community hold on to your fire as this country's hope and strength going forward," said Dir. Biyo.

As with last year's awarding, DOST-SEI recognized this year's honorees through a virtual ceremony featuring messages from DOST Secretary Fortunato de la Peña, Dir. Biyo, and testimonials from a medalist and a school representative.

"Indeed, the past year has been an unexpected challenge for everyone. Which is exactly why your triumphs are all the more laudable and worthy of celebration, for each of you is here against great odds. You are all truly exemplars of the best young minds in the Philippines," stressed Sec. de la Peña.

2020 IMO Gold Medalist, Andres Rico Gonzales III of De La Salle University Integrated School, spoke of his victory amid a challenging year.

Triumph amid losses

Andres Rico Gonzales III of De La Salle University Integrated School spoke of his experiences in winning gold in the 2020 IMO.

"During international competitions, we fight not only for our own merit but also for our country. That is why, every year, we are all excited for the YES Awarding because it is the culmination of our hard work being recognized by our government. God has given us the talent and passion for reasons bigger than ourselves—that is, to help and share these gifts for the betterment of many," he said.

Gonzales began competing in the IMO in 2018 when he settled for an honorable mention. In 2019, he finally nabbed a bronze medal. He said he wants to get the gold in his last year of eligibility.

"As for me, my biggest dream is to win in IMO," he said.

Gonzales revealed that 2020 was especially challenging because of how the pandemic changed his life permanently.

"Last year was the most trying time in the lives of my family because we're still grieving for the demise of my father who just died two weeks after he was diagnosed with cancer. Our business closed, and a lot of drastic changes came after this," he narrated.

He furthered, "Preparing for the IMO is rigid because we all know it is the hardest international math competition for high school students. Then came the pandemic, which delayed the competition and subsequently coincided with the academic year. It was hard to focus. I had to juggle between studying for school and reviewing for the IMO."

"I grieved. I prayed. I fought," Gonzales said, adding he wished to inculcate in the minds of fellow awardees that perseverance and determination truly spell success.

"We don't know what the future will be. But one thing's for sure: whatever the challenge may be, science and technology will serve as the backbone and the frontline of the fight," he disclosed.

DOST Secretary Fortunato de la Peña declared the YES Awardees as "truly exemplars of the best young minds in the Philippines."

DOST-SEI Director Dr. Josette Biyo, congratulated the 1,396 YES Awardees for 2020.

Gold Ribbon School Award

The YES Awards also recognized institutions that consistently led the medal hauls in international science and math contests in the past three years. DOST-SEI labeled them as Gold Ribbon School Awardees.

Among the finalists were St. Jude Catholic School, the Philippine Science High School (PSHS) Main Campus, and De La Salle Santiago Zobel School, which had the most number of medals from 2018 to 2020.

In a testimony, PSHS Main Campus Director Dr. Lawrence Madriaga thanked DOST-SEI for the award, highlighting that the school joins international competitions not just for performance metrics but to measure their students' competency against the best of the world.

"We believe that if we want to continually improve as a school, we have to constantly challenge ourselves and aim to be at par with our international counterparts. We always look for opportunities to improve the way we nurture our students to become STEM professionals and be part of nation-building in the future," Dr. Madriaga said.

The YES Award is a DOST institutional award for exemplary achievement of the youth in the fields of science and mathematics and shall come in the form of a medal of distinction to be awarded by the DOST Secretary or the DOST Regional Director.

DOST BANNERS BIODIVERSITY PROGRAMS AND THE SARIBUHAY DOCUSERIES TO THE PUBLIC

Screenshots from the first episode of Saribuhay docuseries, which premiered on 28 October 2021.

By Allan Mauro V. Marfal, *DOST-STII*

The Department of Science and Technology–Philippine Council for Agriculture, Aquatic, and Natural Resources Research and Development (DOST-PCAARRD) held a special virtual presser on 28 October 2021 to share to the public and other key stakeholders their various programs towards strengthening the country's biodiversity.

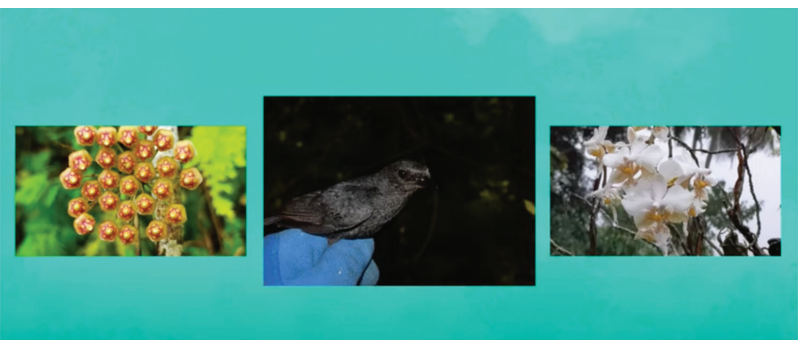
Dubbed as the DOST-PCAARRD S&T Biodiversity Program, it aims to contribute significantly to the DOST's conservation efforts and impart the knowledge towards sustainable use of biodiversity in different ecosystems in the country—terrestrial biodiversity, marine, and aquatic biodiversity plus indigenous plants and native animals' biodiversity.

All the details and components for each program were presented and discussed during the special virtual presser.

First is the Terrestrial Biodiversity S&T Program. This pertains to the nationwide resource assessment initiative on the flora and fauna that aims to document new species discoveries in the country's rich biodiversity.

Second is the Marine Biodiversity R&D Program. This is composed of seven projects as it embarked on a grand scheme of ecological and ecosystem diversity management and conservation in the hope of having a sustainable use of our marine resources. The significant outputs of the program include, among others, the science-based information generated from the documentation of deep-water biodiversity in the Benham Bank Seamount that helped pave the way for the declaration of 50,000-hectare Benham Bank as a marine protected area.

Last, there is the Indigenous Plants and Native Animals Biodiversity S&T Program that documented and characterized various rarely used indigenous plants as sources of food and livelihood. Also, the program ventured into the community-based production, breeding, and distribution of native pigs as a commercially viable livelihood.



Saribuhay series on DOST Biodiversity S&T Program

Meanwhile, the R&D results of these Biodiversity S&T Program interventions were featured in the 'Saribuhay Docuseries'. Through this communication platform, every Filipino will have the opportunity to understand and appreciate the importance of environment protection and conservation in ensuring sustainable development.

Each episode takes the viewers on a visual journey towards appreciating the value of the country's rich biodiversity that serves as our basic life support system and abundant source of raw materials for various industries.

Additionally, these episodes would provide in-depth and wider perspectives on conservation efforts being done by our local scientists and researchers as presented in an educational and entertaining fashion that will surely elicit positive responses from viewers.

The airing of its pilot episode was held on 28 October 2021.

Incidentally, more knowledge products and innovations of DOST-PCAARRD were also featured in the celebration of the 2021 National Science and Technology Week (NSTW) from 22–28 November 2021 through the virtual platform. To also know more of the different technologies, innovations, activities, forums, and webinars of the other DOST agencies and regional offices showcased in the 2021 NSTW, kindly visit its website at http://nstw.dost.gov.ph/ and check out the Facebook page at https://www.facebook.com/nstwdost.

ICT enabled products and services provide major boost to local health sector

By Allan Mauro V. Marfal, *DOST-STII*

THE INFORMATION and Communications Technologies (ICT) enabled products and services have become even more relevant and necessary for the local health sector, especially during the COVID-19 pandemic, as the government seeks alternative and safer means to provide health-related services to its citizenry, as well as to healthcare workers.

In a virtual discussion dubbed "Talakayang HeaRT Beat on ICT for Health Projects" held on 29 September 2021, four projects supported by the Philippine Council for Health Research and Development of the Department of Science and Technology (DOST-PCHRD) were featured. Two of which happen to have found novel and noble purposes during the pandemic.

First is FASSSTER or the Feasibility Analysis of Syndromic Surveillance using Spatio-Temporal Epidemiological Modeler for Early Detection of Diseases, which the Department of Health uses at the moment to model disease spreads based on the daily COVID-19-related data collected and to formulate evidence-based decisions.

The other one is the RxBox, which Dr. Nathaniel Orillaza Jr. and Dr. Geoharil L. Hamoy with their team have retooled to serve as telepresence terminals at the Philippine General Hospital. This electronic tool helps minimize both the patients' and healthcare workers' physical exposure to COVID-19 patients.

Also presented in the virtual program was the "CHERISH study or the Retrospective Study on the Accuracy of AI-powered Reading of Chest X-Rays in the Diagnosis of COVID-19 Pneumonia in a Tertiary Hospital" by Dr. Beatrice Tiangco and her team at the Medical City. The said study aims to facilitate COVID-19 pneumonia diagnosis through an application embedded with AI models.

Another project that is possibly adoptable is the ABC or the "Aruga sa Batang may Cancer" initiative, which is a web-based learning management system for healthcare providers that renders pediatric palliative care for children afflicted with this disease. Similar to the RxBox, the all-in-one technology used for this project targets regional health units: healthcare facilities that can only provide basic healthcare services to small, far-flung communities, thus providing less fortunate Filipinos access to medical care.

Dr. Jaime C. Montoya, Executive Director of the DOST-PCHRD, said that by highlighting these projects, it becomes interesting to witness how our Filipino innovators are able to step up to the plate and deliver results in a short amount of time, given the resources we have.

"As they say, necessity is the mother of invention, and our innovators are capable of producing quality products that could be retooled to fit the needs of the times. The aforementioned technologies are examples of these adaptable and resilient innovations," said Dr. Montoya.

Dr. Montoya also shared the theoretical and practical implications of ICT use during the COVID 19 global health crisis.

"Even beyond the research areas supported by DOST-PCHRD, ICT has huge impact, especially in the telehealth or telemedicine services. ICT has bridged the distance towards your healthcare providers like your doctors even in the absence of face-to-face interactions. Through ICT, it enables your doctors to give advice through looking at your medical information and history through online platforms," said Dr. Montoya.

Meanwhile, DOST Secretary Fortunato T. de la Peña underscored the support of the DOST for research initiatives dedicated to data science and eHealth solutions for recording and utilizing patients' information, mapping of health risks and health resources, telemedicine, and health promotion.

"The projects that we have shown you today are only examples of how we can utilize ICT solutions for health. Through these initiatives, we hope to strengthen the country's capacities for health and ultimately bring healthcare solutions closer to our communities," Sec. de la Peña said.

On the other hand, given its importance and roles in the healthcare systems, especially in the current pandemic that we are in right now, Sec. de la Peña assured that we have a sustainable and productive innovation in ICT for the healthcare system in the country.

"First of all, in developing the projects, the element of sustainability is also considered. We ask that question to the

continued on next page

DOST Secretary Fortunato T. de la Peña, DOST Undersecretary for R&D Dr. Rowena Cristina L. Guevara, and DOST-PCHRD Executive Director Dr. Jaime C. Montoya, and the project leaders of the featured studies composed of Asst. Professor Rita C. Ramos (ABC), Prof. Jason R. Albia and Dr. Beatrice Tiangco (CHERISH), Dr. Maria Regina Justina Estuar (FASSSTER), and Dr. Nathaniel Orillaza Jr. and Dr. Geoharil L. Hamoy (RxBox) answered questions related to the technologies and the ICT for Health programs of the DOST-PCHRD during the Talakayang HeaRT Beat on ICT for Health Projects held on 29 September 2021 (screenshot from DOST-PCHRD).

DOST-I spices up local firm's processing facility in Cabugao, Ilocos Sur

By Laurine R. Sales, *DOST-I*

TO SUPPORT the increasing demand for spiced vinegar known as "Inalsem", Onacoli Food Products of Barangay Bonifacio, Cabugao, Ilocos Sur expanded its current production facility with the support of the Provincial Science and Technology Center–Ilocos Sur (PSTC-IS), through the Small Enterprise Technology Upgrading Program (SETUP), by acquiring production equipment such as preparation and packaging tables and universal fritter.

With these interventions, the firm can ensure the adoption of food safety practices in the preparation of ingredients and the bottling of products, thereby increasing their productivity and capacity in making the "Inalsem".

Onacoli Food Products is a family enterprise owned and managed by Anna Mari Terry. The firm was initially registered as Daddy B's Cravings until it was renamed in 2019 to Onacoli, selling bottles of their unique spiced vinegar tagged as "Inalsem".

Their spiced vinegar is a famous dipping sauce for street food, lechon, longganisa, etc.

Besides its distinct taste, the firm maintains its premium-looking label and packaging that attracts more resellers nationwide and entices customers to buy the product. Moreover, there are some agencies who place their orders for the spiced vinegar as a token when they have activities.

SETUP, the agency's flagship program for almost two decades now, targets micro, small, and medium enterprises (MSMEs) to assist them by upgrading existing equipment and facilities that could help boost their products, services, and operations—thereby increasing their productivity and competitiveness.

For interested MSMEs who wish to avail of the program, DOST PSTC-IS can be reached at ilocossur@region1.dost.gov.ph or mobile numbers 0998-962-0231 and 0998-962-0230, respectively. For other MSMEs who wish to avail of the SETUP assistance, they can contact the DOST Regional Offices and Provincial S&T Centers in all the provinces across the country.

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researchers and project developers when it comes to their deliverables on how it would be sustained and who will use what have been developed because it is very important that potential users will also indicate ownership of the system. For many years, our researchers have been doing that through training, capacity building, and consistent dialogues and consultation with their stakeholders or target beneficiaries," shared Sec. de la Peña.

Moreover, DOST Undersecretary for Research and Development (R&D) Dr. Rowena Cristina L. Guevara believes that in the recent year, the impact of ICT in overcoming healthcare barriers was made more apparent by COVID-19.

"We hope that these projects were able to demonstrate how our support for ICT for health research—and R&D as a whole—goes a long way, allowing us to address persisting health concerns and preparing us for future challenges. Especially now as our circumstances compel us to adopt innovative strategies in the delivery of healthcare services, it is crucial that we work together to increase appreciation and funding for the works of our Filipino health researchers," said Usec. Guevara.

Preceded by the Health Information Systems Program under the National Unified Health Research Agenda 2008, the ICT for Health Program was launched in 2011. It aims to generate tools that will bridge the gaps in healthcare through telehealth services, ICT-enabled medical devices, and public health surveillance *(with information from DOST-PCHRD).*

Janitor turned cosmetic manufacturer awarded the Best SETUP Adoptor for CALABARZON region

By John Maico M. Hernandez, *DOST-CALABARZON*

Henry and Apple Raca, former janitor and sales agent, are now successful owners of the C&H Cosmetic Industry and were hailed as the agency's Best SETUP Adoptor this year. C&H Cosmetic industry is a Small Enterprise Technology Upgrading Program (SETUP) adopter of the Department of Science and Technology (DOST) CALABARZON.

The Best SETUP Adoptor Award is given to a company that exhibits outstanding operational performance due to technology adoption and utilization of DOST's technological innovations and technical assistance. The award uses productivity, resilience, agility, innovation, sustainability, and excellence as metrics in selecting which adopter excelled the most.

Henry shared his humble beginnings working as a janitor during the day and as a student at night until he landed a job as a sales agent. On the other hand, Apple had a good life. But in a twist of fate, their family business failed and she was left with no choice but to pull off her abilities to make a living. Yet destiny brought them together.

Henry, who later worked as a sales agent, met Apple, a rookie in their company. They shared time as co-workers, agents of insecticide products, until such time that they found themselves falling for each other and soon decided to make a family together.

As a couple, they dreamt big and so they unfolded their maximum potentials to kick off their own business together. Using PHP 5,000, a fraction of the cash gifts during their wedding, they started a trading company. This venture became successful and has inspired them to embark on a brave journey of creating their own beauty product company instead of just trading other brands. The love of Apple for beauty and skincare products served as their springboard in venturing into this kind of business.

SETUP assistance

In 2014, Henry learned about DOST's SETUP while watching television. The couple applied for SETUP's assistance at the DOST's Provincial Office in Batangas, armed with the desire to improve their fully manual and labor-intensive soap production. When their application got approved, they were able to acquire equipment that helped mechanize their production processes and eliminate rejects, which—in effect—increased their productivity. As they progressed as a business, they were able to also provide local employment in Quezon, and Batangas, and all over the Philippines by creating their regional distribution channels.

Aside from the SETUP project they availed in 2014, the firm also received other DOST services such as the Energy Audit Consultancy Program, PO Financing Program, and LIGTAS COVID-19 Program under the DOST–Technology Application and Promotion Institute.

In 2020, they applied for another SETUP project to upgrade their cosmetic line production processes and cater to a wider market. These interventions paved the way for the company to achieve a 436% total increase in production volume from 2014–2021; a 92.2% increase in sales, local and export market penetration, and improved packaging and soap cutting processes that reduced contamination risks and ensured the products' quality of the company. Significantly, the company has also reduced their production rejects from 23% down to only 2% at present. Savings was computed at around 45% for energy and about 88% for time. Meanwhile, more than 600 employees all over the country are now working for the company.

Embracing R&D

What sets them apart from other soap companies is their market-oriented research and development (R&D) program. As a result, they were able to develop their own "Kereina White Formula," which employs all-natural plant-based ingredients for their soap products. Using this formula, the company can help more than 5,000 coconut farmers who supply their coconut oil requirements.

Through the leadership of the Raca couple, the company has also developed an emergency-ready strategic plan where their business continuity plan, five-year market plan, full-year plan, risk management plan, and R&D plan were identified and linked together. With this strategy, they spun off three more companies dedicated to local, export, and online marketing distributions of their products that safeguarded their sustainability. They have co-established a US-based Extension Office at Azusa, California, to distribute their products to 40 states in America. Realizing the big potential of their products, the company is now exporting to countries in Asia, United Arab Emirates, Africa, and Australia, among others.

Henry and Apple are also proud of the local and international recognitions they received throughout the years. They are the first Filipino cosmetic company with *HALAL*-compliant manufacturing plant certified by the United Arab Emirates and the first Filipino cosmetic company with Halal certification in the Middle East given by Prime Certification Accreditation. They were also awarded a Canadian Health Accreditation for Cosmetics and Skincare, Best Innovative Product Award in South Luzon during the Department of Trade and Industry's Gawad SME, and the 2020 InJap Sia Outstanding Young Entrepreneur Awards Finalist.

Profit with honor

Amid the pandemic, the challenge for Henry and Apple was to ensure that they win and stay operational since soap products were not part of what people consider essential during a crisis. According to them, it was no longer a test of survival for the company but a commitment to save the lives of their 600+ employees and their families. Driven by this cause, they have strategically developed an alcohol formula to add to their product line. While there's still a persisting public demand for alcohol, the company thrived in the middle of this crisis and continued to employ its people. The agile shift of production was made possible by utilizing some of the equipment they have acquired through their second SETUP project with DOST CALABARZON.

Aside from operating as a business, the tandem of Henry and Apple also focused their mission to give back to the community through their "#Project C&H: We Care and Help" program. This program includes converting chemical drums into trash bins and benches to benefit schools and barangays in Quezon; annual financial support to Barangay Balat-Atis, San Antonio, Quezon; and sponsorship of civic programs and activities like the Department of Education's Brigada Eskwela in Batangas and Quezon.

As a gesture to reach out and support other communities, the company also initiated donation drives to lend a hand to people in need, specifically those who were affected by the Taal Volcano eruption in 2020 and the implementation of community quarantine due to the COVID-19 pandemic. They distributed relief goods not just to the municipalities affected by the crises but also to their workforce and residents of Barangay Balat-Atis, San Antonio, Quezon.

Aside from providing local employment to hundreds of people, their company was also recognized by the municipal government of San Antonio Quezon as the first company in their municipality to practice non-discriminatory hiring as they provide jobs and opportunities to senior citizens, PWD (people with disabilities), LGBT (lesbian, gay, bisexual, and transgender) and out-of-school youths.

Given the success they have received from their business, the only story that Henry and Apple would want to share with the world is their firm determination to brave the challenges of running a business to achieve their wildest dream and to do it with the goal of transforming, not just yourself, but the lives of the larger community.

The story of Henry and Apple is just one of the many tales of successful beneficiaries of SETUP since the program started in 2002. More tales of success were featured in the celebration of the 2021 National Science and Technology Week (NSTW) from 22–28 November 2021 through the virtual platform. The Best SETUP Adoptors chosen among the regional winners were awarded and recognized for their efforts in leveling up their operation and processes to produce world-class products and services using science, technology, and innovation.

PINOY PRIDE: science week features a Filipino made mobile app called "KOOHA"!

By Murvi S. Cua, *DOST-STII*

IN CELEBRATION of the National Science and Technology Week #2021NSTW, the Department of Science and Technology –Advanced Science and Technology Institute (DOST-ASTI) kicks off the festivities through the "Kooha: A Social Sensing Network Application (Explore the Koohascape)" webinar.

Kooha—which was coined from the Filipino word "kuha," which means to take or capture—is a photo-sharing application that enables real-time participatory photo and sensor data collection using mobile devices. Kooha is an initiative of the DOST-ASTI, developed by Filipino scientists and engineers for the benefit of Filipino citizens.

The Philippines has always been one of the most active nations online; hence, Kooha is the perfect app for Filipinos. In fact, the Philippines was even crowned by Time Magazine as the "Selfie Capital of the World." So, just imagine your food selfie or a random photo of the sunset can be converted into useful data. One might ask, how can they turn our photos into data? And what kind of data would that be?

According to Project Leader Roxanne Aviñante, photos captured and shared via Kooha are embedded with data (sound level, light, motion acceleration, gravity, pressure, etc.) collected through built-in phone sensors on the user's device. These data can then be used to draw out insights and generate new knowledge that can be used across sectors. These kinds of information are very useful for our data scientists, researchers, and citizen scientists in generating insights and making decisions on things that are relevant to society.

But how can we benefit from this so-called "big data"?

Big data is defined as an extremely large data set that may be analyzed computationally to reveal patterns, trends, and associations—especially relating to human behavior and interactions. This big data is then used to draw out insights and generate new knowledge and technologies that can be used across different applications in various sectors such as transportation, telecommunication, business and industry, policymaking, environment and health, academe, to name a few.

In addition, Kooha also aims to carve out a niche for big data generation using available sensors in smartphones and external sensor devices; develop an online social network of students, enthusiasts, researchers, and citizen scientists built on the concept of sharing and mapping contributions of photographs and sensor data across the globe; empower the general public to contribute to the scientific community; and provide a medium for data scientists, researchers, and citizen scientists to make positive use of big data generated by the Kooha application.

Contribute to science and become a citizen scientist by downloading Kooha! The application is now available for download on Google Play. You can also visit their website at kooha.asti.dost.gov.ph or their Facebook page to know more about the application's features and to subscribe for their latest updates.

If you missed the webinar, you can watch it here: https://bit.ly/30LI3ye.

The virtual celebration of the 2021 National Science and Technology Week (NSTW) ran from 22-28 Nov 2021, with its theme, "*Agham at Teknolohiya: Tugon sa Hamon ng Panahon.*" If you missed the webinar, you can watch it here: https://bit.ly/30LI3ye or via the official Facebook page of NSTW.

3Ds: Design, Develop, and Deliver is MATDEV's contribution to the medical field during the pandemic

By Ryan Sebastian Soyosa, *DOST-STII*

ONE OF the many interesting innovations during the opening day of the 2021 National Science and Technology Week celebration (#2021NSTW) was on 3D design and development.

The two-hour webinar session was conducted by the Department of Science and Technology–Industrial Technology Development Institute (DOST-ITDI) that focused on aiding medical institutions by providing solutions during this pandemic with coaching and mentoring workshops on design and production of medical equipment parts titled "Creating Hope with MATDEV."

The Advanced Manufacturing Center's Materials Development Laboratory (AMCen's MATDEV) is taking the lead in research and development (R&D) materials for 3D printing that aims to reduce the cost of raw materials and increase the utilization of local materials for high-end 3D printing.

Present during the webinar were experts in MATDEV led by DOST-ITDI Deputy Director Dr. Christine Marie Montesa, who spoke about the significant contributions and early efforts of AMCen's MATDEV in the response against COVID-19 pandemic through prototyping and production of various PPEs plus medical components and devices that help address supply shortage at the height of the crisis. These initiatives are jointly undertaken with the collaboration of the DOST–Metals Industry Research and Development Center.

While MATDEV works on creating solutions to the problem, several restrictions during the early days of this pandemic led them to come up with their own design by using their resources and developing medical supplies in utilizing local materials and deliver face shields and ear relief bands to medical frontliners battling COVID-19.

Other medical equipment in 3D print designs: venture valves, modified oxygen mask, valve holding chamber, and door handles (photos from DOST-ITDI).

This effort produced a total of 3,144 face shields and 2,770 ear relief bands distributed to 47 hospitals, 10 health centers and clinics, and four government agencies and other institutions—thus ensuring the safety and protection of the health workers and frontliners.

Other MATDEV medical equipment produced included the following: venture valves, valve holding chamber, and modified oxygen mask—which were presented by one of the resource speakers, Engr. Manrusces Enot, Senior Science Research Specialist at DOST-ITDI.

Engr. Enot also shared the good feedback they received from the medical frontliners on the designs that are easy to use and comfortable as the parts are durable enough for daily tasks—indeed a breakthrough in the development of medical and healthcare equipment.

MATDEV's Project Leader Marianito T. Margarito shared the benefits of 3D printing to the medical sector, including planning to reduce the time of operations by using various applications and techniques of 3D printing through sorting a model first to practice on and replace parts that fit perfectly.

With these encouraging results, MATDEV wants to undertake more R&D and to continue to improve medical accessories and devices as the DOST-ITDI called on to empower our medical professionals and make for a resilient healthcare system. Moving forward, MATDEV also takes this opportunity to establish connections and collaborations with potential partners by promoting 3D technology for product development and mass production with the help of MATDEV facilities and services.

"As of today, the team continues to provide services to help abate the negative impact of the pandemic," Dr. Christine Marie Montesa said.

The webinar also provided a short workshop—mainly discussing the basic process, common materials, and technology used for 3D printing. If you missed the workshop and the discussion, you can watch it again through bit.ly/CreatingHopewith MATDEV.

For more information on MATDEV, please visit their official Facebook page at www.facebook.com/ITDIDOSTUpdates.

Incidentally, MATDEV is one of the many featured innovations by the DOST and its agencies in the recently held 2021 National Science and Technology Week (NSTW). Other featured technologies and programs can still be accessed via the www.nstw.dost.gov.ph or check out the Facebook page of NSTW.

Accessible technologies create more opportunities and increase productivity in the future

By Ryan Sebastian Soyosa, *DOST-STII*
Photos from DOST-ITDI

CALAMANSI AND mango peel dietary fibers, tomato garlic sauce, mayonnaise with *pili* peels and pulp oil, and ready-to-drink herbal milk tea are all proudly and locally made in the City of Taguig, where the headquarters of Modular Multi-Industry Innovation Center or MMIC of the Department of Science and Technology's Industrial Technology Development Institute (DOST-ITDI) is located.

MMIC is one of the four laboratories of DOST-ITDI and is one-of-a-kind laboratory that caters to back-end innovations or development of by-products and agricultural waste that provides equipment, efficient manufacturing facilities, economic support, and technology assistance to its partners and the industry.

MMIC offers their complete line of facilities that can be used by local industry sectors and partners for developing new products in aid of long-term economic support, especially for the post COVID-19 pandemic.

"Let MMIC help you make your concepts a reality and expand your portfolio together let us innovate and keep developing the products of the future," Dr. Zorayda V. Ang, the Deputy Director for Administration and Technical Services of DOST-ITDI, said as she welcomed partners and stakeholders to collaborate with DOST-ITDI through MMIC.

Industries can avail of MMIC's technical assistance that will be provided for the use of facility or equipment with an ITDI expert, including technology transfer and contract research.

The center also offers the use for developing product, product equivalent, product variances, and product reintroduction to generate new innovative products from food ingredients to personal care and pharmaceutical nutritional supplements for commercial operations.

At least 38 product prototypes—including calamansi oil, pili pulp oil, sprayed dried herbal teas, sauces, and toothpastes—are some of the many interesting products that MMIC has developed from food waste into higher value products.

Through this multi-functional modular equipment and facilities, MMIC aims to provide long-term economic support towards the post–COVID-19 pandemic and service the local industry to develop new products and maximize collaborations with technology adoptors.

This MMIC webinar titled "Made in MMIC: A Webinar on Product Prototype Development" was part of the Kabuhayan theme in the #2021NSTW that also features an overview of the entire MMIC and its services, facilities, and products. Please visit this link if you missed the entire webinar: https://fb.watch/9sgqq-plZx/

Product prototypes: olive oil, pili oil, pili pulp oil, calamansi seed oil, tomato garlic sauce, mango peel dietary fiber, tomato pomace dietary fiber, and pili pulp dietary fiber.

Outstanding SETUP entreps hailed during the 2021 NSTW virtual celebration

By Rachel R. Perez, *DOST-STII*

FIVE OUTSTANDING micro, small, and medium enterprises (MSMEs) received this year's SETUP PRAISE Awards on the second day of the virtual celebration of the National Science and Technology Week (NSTW).

The top five finalists were determined and the four runners-up received awards under the following categories: Most Productive, Most Resilient, Most Agile, Most Innovative, and the National Winner. Plus, for the first time, a special award—the Most Industry 4.0-ready Award or the i-Ready Award—was given to the MSME that displayed its readiness and the ability to adopt Industry 4.0 technologies in their operations.

Below were the winners of the 2021 SETUP PRAISE Awards for MSMEs in no particular order.

Herbanext Laboratories, Inc. was named this year's Most Agile MSME for promoting Philippine medicinal plants for healthcare and manufacturing health products through the DOST-developed technologies. One of its contributions is the company's Herbanext Botanical Garden that promotes Philippine biodiversity conservation.

VL Food Products was awarded the 2021 the Most Productive MSME. It started from its humble beginnings but grew bigger because of its proprieties and innovation. Through the DOST's intervention, the company's product line greatly increased from five variants of tuna products to 42 variants. It also expanded its operation to include *Halal* R&D activities to improve the taste and flavor of their products, thereby enabling it to export to other markets, especially to the Muslim community.

Allen Stick and Trading was awarded as the Most Innovative MSME. Owned by Dr. Allen Salvatierra, a rural health doctor who invented the Allen Stick with the tagline "measuring made easy and portable." Through the DOST's assistance, its production increased and product quality has improved. This also paved the way for the company to develop new products.

Ideatechs Packaging Corporation was declared the 2021 National Winner. A company hailing from Potrero, Malabon City, indeed it personifies its business mission. It develops paper-based packaging materials that are disposable, biodegradable, and highly recyclable. Moreover, through the DOST's technological interventions, the firm was able to increase its product line, number of employees, and production capacity due to shifts from manual to automated production. It also established another two sales offices in Cebu and Cavite.

C and H Cosmetic Industry was named the Most Resilient MSME and also bagged the first special award: the i-Ready Award. Starting with just PHP 5,000 in capital, the company has now upgraded to Industry 4.0. The company applied for DOST-SETUP in 2014 and received numerous technological supports for its product line—soaps and beauty products. Amidst the pandemic, it was able to develop new products such as alcohol and sanitizer. Beating the odds, the company even expanded its market in many parts of Asia, United Arab Emirates, Africa, North America, and Australia.

"We are glad that despite the pandemic, the majority of our assisted MSMEs continued with their operations, braving the limitations and challenges brought about by the new normal," DOST Secretary Fortunato T. de la Peña said in his message to the public during the ceremony.

He added, "What made us even prouder were their initiatives to give back to their communities through their products and services at the onset of the pandemic."

Among the DOST officials who graced the awarding ceremony were Undersecretary for Regional Operations Engr. Sancho A. Mabborang, DOST-NCR Regional Director Jose Patalinjug III, DOST-VIII Regional Director Ernesto Granada, and University of the Philippines Institute for Small-Scale Industries Director, Prof. Melanie M. Moraga-Leano.

To become SETUP PRAISE Awardees, MSMEs should have a SETUP iFund and have completely refunded the assistance to at least 85% without default and have been declared by the DOST's Regional Office as the SETUP PRAISE Regional Winner.

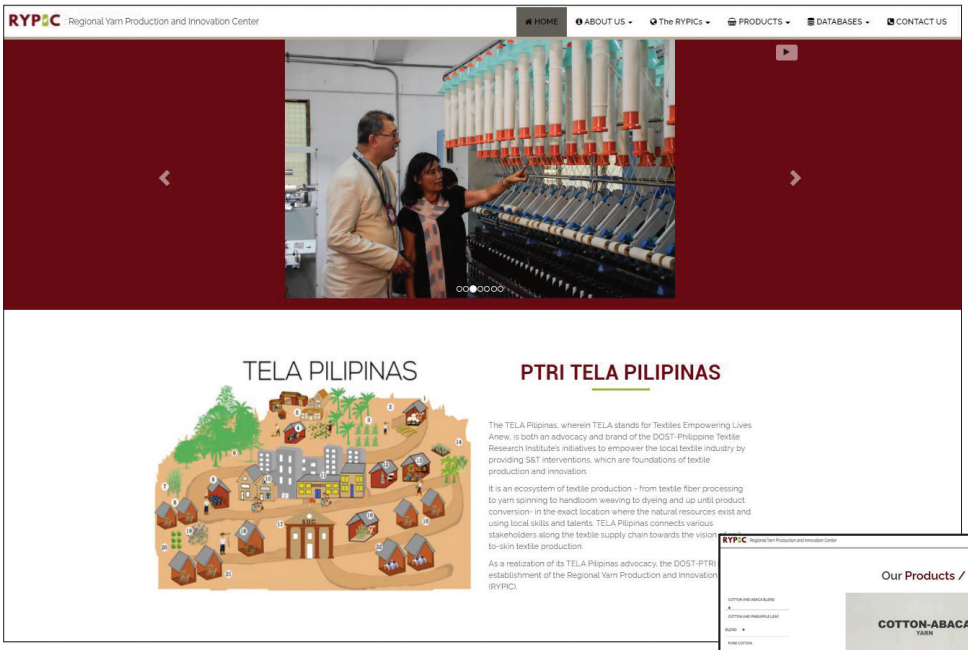
Furthermore, here were the cash prizes given to other declared winners of the 2021 SETUP PRAISE Awards: PHP 10,000 for the Provincial Winner, PHP 20,000 for the Regional Winner, PHP 50,000 for the Finalist, and PHP 100,000.00 for the National Winner for a total prize of PHP 180,000.

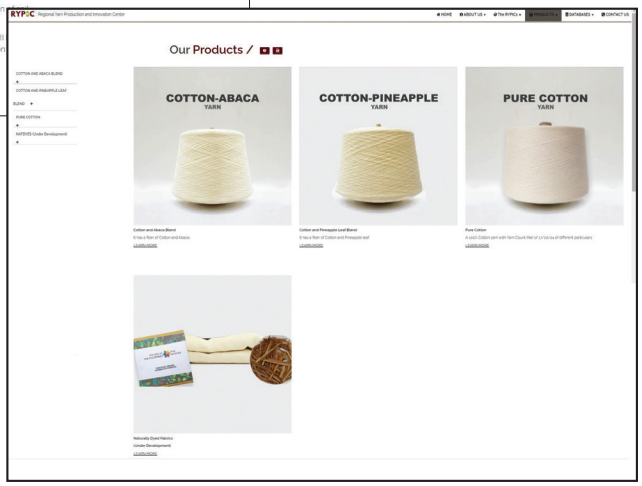
The 2021 National Science and Technology Week (NSTW) ran from 22-28 November 2021 with theme "A*gham at Teknolohiya: Tugon sa Hamon ng Panahon.*" Featured technologies, programs, and other techno-fora are still accessible via the NSTW website at https://nstw.dost.gov.ph/ and the NSTW Facebook Page at https://web.facebook.com/nstwdost.

Screengrab at the virtual SETUP PRAISE Awards for MSMEs awarding ceremony.

Regional Yarn Production and Innovation Center

Text and photos from DOST-PTRI





IN THIS digital age, opportunities for the more efficient transaction of goods, and even quick access to information, are consistently rising. Different platforms are used to promote, buy, and sell products online for convenience. With this, the Department of Science and Technology–Philippine Textile Research Institute (DOST-PTRI) launched its newest innovation—the Regional Yarn Production and Innovation Center or RYPIC official website containing relevant information about RYPIC, natural textile fibers sources, and how one can order natural blended yarns anytime, anywhere, and online.

The birth of the official website is aligned with RYPIC's goal, which is to model textile sustainability in production and consumption by engaging the local communities and creating an ecosystem that will fuel one activity after another to gradually power up an industrial sector. The website supports the mission of RYPIC to jumpstart a local innovation ecosystem for the textile sector and to cater to the requirements of micro, small, and medium enterprises, academic, and government institutions for yarns and fabrics using local raw materials, skills, and talents.

Through RYPIC, economic development and tourism will be boosted in the region—from helping the farmers, weavers, up until the market once the demand for sustainable yarns increases. The harvested Philippine cotton by our farmers will be of greater value. Most importantly, farmers of pineapple, banana, and *abaca* can now use the wasted leaves and pseudostems of these plants to become the raw materials of the natural blended yarns made in RYPIC. RYPIC becomes the mechanism to jumpstart the use of natural blended yarns in the region from which the raw materials are sourced. RYPIC does not only help the farmers but also the local weavers, as these RYPIC yarns can mainly be used for handloom-woven fabrics.

"Our e-portal is going to provide information, link us up, connect, and tell us what is available and to try and imbibe more trust and confidence in the system. Together we can create a very colorful map in our national textile innovation for our country," said DOST-PTRI Director Celia B. Elumba during the launching of the e-portal in the "Pick RYPIC: Shaping Yarn Innovation in Regions to Warp-Speed NTF to the Digital Marketplace" webinar last 24 Nov 2021 via Zoom.

The website features include information about RYPIC, products, map navigation, partners, and contact details. For the products, information on the different natural textile fiber-based yarns in blend with cotton-*abaca*, cotton-pineapple, 100% pure cotton, and the soon-to-be-developed naturally dyed fabrics can be viewed. The product details and the materials used for each yarn are also provided. Upon choosing the right yarn, a downloadable sales form is to be filled out and sent via email.

With the success of the first RYPIC, it is seen to be a model that can help attain regional developments in the country. For the year 2022, another RYPIC is set to be established in Northern Luzon. By the end of 2025, more RYPICs will be installed to be located in Southern Luzon, Western Visayas, and Southern Mindanao.

Visit the RYPIC official website through www.dost-ptri-rypic.com to know more about the yarns you want to purchase. There is a navigation video on the website and a step-by-step instructions video for easy access. With just a few clicks, your order will be on its way!

Animals in animation: A showcase of Siargao's biodiversity

By David Matthew C. Gopilan, *DOST-STII*

AT LEAST 14 unique animals found in Siargao Islands take spotlight in a three-day webinar for kids during the National Science and Technology Week (NSTW) celebration.

In the webinar titled, "Worth More Than Gold: Siargao's Biodiversity," these animals have shown that the country's surfing capital is more than Cloud 9 waves, white-sand beaches, Sugba Lagoon, and Magpupungko Rock Pools.

The webinar was hosted by the National Research Council of the Philippines (NRCP) of the Department of Science and Technology (DOST). Animation was used to creatively showcase the basic research results and encourage the youth to start protecting the natural resources that they will inherit in the future.

In the animation, the animals briefly talk about themselves on what they are, where they live, and how humans can protect them. Aside from animation effects, the entire presentation was accompanied by video footage from the wild.

One of the featured animals is the Philippines' native squirrels. Found only in Mindanao and Palawan plus also in Siargao, the Mindanao tree squirrel eats fresh fruits then disperse the seeds in the forests. The seeds later on grow and become new trees.

Siargao also has thick mangroves where mudcrabs or *Scylla serrata* thrive. Mudcrabs can be cooked with coconut curry or garlic butter.

Other featured animals in the animation were:

1. Philippine duck, *Anas luzonica*
2. Sailfin lizards
3. Firefly or *alitaptap*
4. *Paka gadikit*, or *Kurixalus appendiculatus*
5. Orange-fiddler crab
6. Saddle butterfly fish, *Chaetodon ephippium*
7. White-eared brown dove
8. Lesser long-tongued fruit bat
9. Philippine crocodile, or *Crocodylus mindorensis*
10. A butterfly species, *Ypthirea serrepea*
11. Fanged river frog, from the genus *Limnonectes*
12. Orange-dotted tuskfish, *Protogynous hermaphrodite*

The Mindanao tree squirrel, mudcrabs, and the other 12 on the list are just two of the 403 animal species that are found in the municipality of Del Carmen, Siargao Islands.

The webinar is also connected to the project, funded by DOST-NRCP, which aims to catalog diverse flora and fauna in Siargao Islands.

There were also at least 100 plant species in Siargao Islands according to Dr. Cecilia B. Moran, the project leader and professor from the University of Santo Tomas in Manila.

"Sa pamamagitan ng video na inyong mapapanood, nais naming isulong o i-promote ang basic research at maipamahagi ang aming mga natuklasan sa isang malikhain at mas naiintindihan ng mga karaniwang indibidwal at lalong lalo na ng mga mag-aaral (Through this video that we can all watch, we want to promote basic research and share what we have discovered, in a manner that is creatively presented and is easily understandable by an ordinary individual)," Dr. Moran said.

The figures are based on the recently concluded research project, which was funded by DOST-NRCP.

"Growing up, we have our names for the flora and fauna found in the islands. But it is only recent, with the support of DOST... that finally we have scientific names attached to our endemic species and found new species to science."

She also encouraged all the national government agencies, as well as the academic community and private sector, to continuously work together in protecting the natural resources of what Time Magazine's "World's Greatest Places."

Lastly, DOST Secretary Fortunato T. de la Peña emphasized the role of ecological sustainability as it helps "build an environment with prosperity from within."

"Today we will witness the outstanding works of our scholars and the brightest minds in the Philippines as they instrumentalize the power of knowledge in making harmony and sustainability possible," he said.

Appreciating basic research results: Del Carmen Municipal Mayor Engr. Proserfina Matugas-Coro thanks the DOST for supporting ongoing biodiversity studies in Siargao Island.

PHIVOLCS says to watch out for other "Big One"

By Ryan Sebastian Soyosa, *DOST-STII*

EXPERTS FROM the Department of Science and Technology–Philippine Institute of Volcanology and Seismology (DOST-PHIVOLCS) said that every region or province in the country is vulnerable to its own "Big One." This was underscored during the second part of the webinar series conducted during the 2021 National Science and Technology Week (NSTW) celebration.

The Philippines, which is part of the Pacific Ring of Fire—a region around the Pacific Ocean where many earthquakes and volcanic eruptions occur—has an average of 20 recorded earthquakes per day and many active volcanoes.

According to Jeffrey S. Perez, DOST-PHIVOLCS Supervising Science Research Specialist, "we at DOST-PHIVOLCS want you to imagine the potential risks that could happen [during a strong earthquake]. That is why there is a need to be prepared today."

He emphasized that accurate information goes hand-in-hand with efficient disaster preparedness efforts of the government to mitigate the risks.

Through the use of science-based tools and information, experts can develop earthquake scenarios that form the basis for the needed preparations before disasters could happen.

On the other hand, the Rapid Earthquake Damage Assessment System or REDAS is a key simulation software for a scenario-based impact assessment that the Institute used in developing disaster scenarios. According to DOST-PHIVOLCS, REDAS is a very important tool that the local government should all be familiar with to create their hazard assessment and identify vulnerable areas.

In addition, DOST Undersecretary and the Officer-in-Charge of DOST-PHIVOLCS Dr. Renato U. Solidum, Jr. stressed the importance of disaster preparedness at the local, community, and household levels. He said, "importante 'yung earthquake scenario at ang tamang kaalaman ng bawat isa para ang ating mga gagawing responses are appropriate and aligned with each other; may pang-national, may pang-local, at may pangpamilya."

In the webinar, DOST-PHIVOLCS provided localized earthquake scenarios on specific locations that they called "Big Ones." Thus, the "Big One" is the term associated with the worst possible scenario that may happen not only in the Greater Metro Manila Area but in every region or province that is vulnerable to high-magnitude earthquakes.

Furthermore, one of the largest earthquakes along the Philippine Fault happened in Gabaldon, Nueva Ecija segment in 1645, which spans 100 km long. DOST-PHIVOLCS said that this generated a Magnitude 7.9 earthquake and destroyed the Manila Cathedral, as described in its historical marker.

The Institute called on the public to know their scenario-based hazards and risks. The scenarios can guide the planning and implementation of appropriate disaster preparedness measures and proper response actions, especially at the community and family levels.

If you missed this webinar during the 2021 NSTW, kindly click on the link (https://tinyurl.com/searchingforthebig) or visit the official DOST-PHIVOLCS Facebook page (www.facebook.com/Phivolcs) for more details.

The DOST-PHIVOLCS has documented the significantly strong earthquakes that happened in the country for the last century (photo courtesy of DOST-PHIVOLCS).

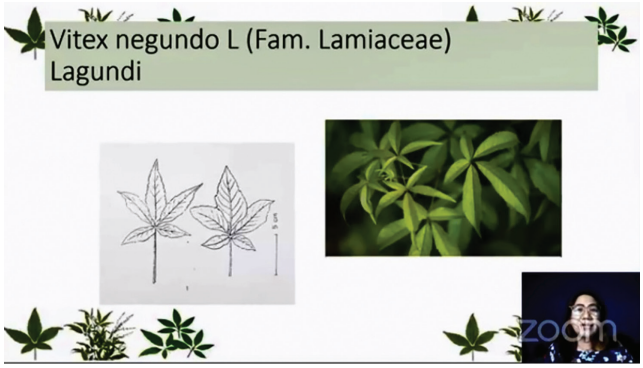
Lagundi and VCO studies show encouraging results against COVID

By Rachel R. Perez, *DOST-STII*

THE DEPARTMENT of Science and Technology–Philippine Council for Health Research and Development (DOST-PCHRD) announced the results of its two studies aimed to see the efficacy of *lagundi* and Virgin coconut oil (VCO) against COVID-19.

This was revealed through a webinar conducted in celebration of the 2021 National Science and Technology Week (NSTW) on 25 November 2021.

In his message, DOST Secretary Fortunato T. de la Peña conveyed to the participants his hope that through science and technology (S&T), more doors will be opened to address the public health concerns in the country. "S&T is key in generating health solutions for all," said Sec. de la Peña.



Screen-grabbed from the webinar titled "Repurposing Natural Resources for COVID-19."

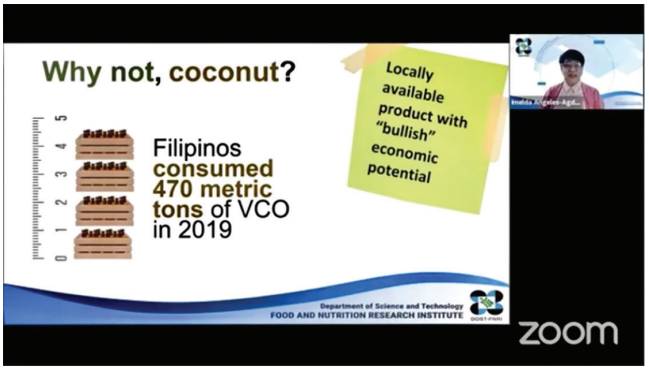
R&D on lagundi

In her presentation, Dr. Cecilia C. Maramba-Lazarte—Director of the Institute of Herbal Medicine at the University of the Philippines (UP) Manila–National Institute of Health—discussed the clinical trial on the effectiveness of *Lagundi* tablets and syrup to mild COVID-19 cases with no comorbidities. The two-stage, randomized double-blind, placebo-controlled study was conducted from July 2020 until August 2021.

One of the reasons why *lagundi* was considered as a treatment against COVID-19 is its multi-targeted characteristics—its substance can relieve patients with respiratory tract symptoms.

Moreover, Dr. Maramba-Lazarte revealed that the first study showed that the standard dose of *lagundi* syrup (600 mg administered three times a day for 10 days) and a high dose of *lagundi* tablet (three times a day for 10 days) are both safe and effective in terms of clinical recovery time, modified early warning score, and global evaluation scale.

Meanwhile, the second phase of the study saw *lagundi's* efficacy in decreasing mild COVID-19 symptoms, particularly the loss of smell or anosmia. It also provides relief from any discomfort brought about by other symptoms.



DOST-FNRI Director Dr. Imelda Angeles-Agdeppa presented the results of the study on VCO as an adjunct treatment for COVID cases.

The project was jointly funded by the DOST through the PHP 4,956,786.3 DOST–Grants-in-Aid (GIA) "Addressing and Responding to Covid-19 through Health Research" or ARCHER project and the PCHRD-GIA amounting to PHP 489,571.20.

R&D on VCO

In the second part of the webinar, DOST-PCHRD discussed the findings of its VCO study, where it was found out that VCO can be used as adjunctive therapy for hospitalized COVID-19 patients and is beneficial to suspect and probable COVID-19 cases.

The DOST–Food and Nutrition Research Institute (DOST-FNRI) Director and Scientist II Dr. Imelda Angeles-Agdeppa particularly pointed out the valuable effects of VCO among suspect and probable cases of COVID-19.

She called VCO "liquid gold" with medicinal and therapeutic properties. Previous studies also confirmed that its components have antiviral properties.

Meanwhile, UP Manila College of Public Health Associate Professor Dr. Fresthel Monica M. Climacosa said that VCO, as adjunctive therapy, can be used together with the primary treatment or drug.

In summary, the study pointed out that with a pre-determined dose of VCO mixed on meals for probable and suspect COVID-19 individuals, it can "alter the lipid levels by increasing both the bad and good cholesterol, respectively, promote relief from acute inflammation, and can promote recovery by resolving the signs and symptoms."

Dr. Climacosa emphasized that although the study found that VCO could be used as an adjunct supplement to suspect or probable cases of COVID-19, it is suggested that more studies and tests are needed to gather confirmatory evidence on its efficacy against COVID-19.

The VCO study is implemented by DOST-FNRI with partner agencies—the Philippine Coconut Authority and DOST-CALABARZON—and funded by the DOST-PCHRD.

Cool ride with the Hybrid Electric Road Train goes to Ilagan City

By Joy M. Lazcano, *DOST-STII*

The HERT of the DOST.

THE HYBRID Electric Road Train (HERT) will soon be rolling up north as the coolest ride out as the Local Government Unit (LGU) of Ilagan City, Isabela is now finalizing its agreement with the Department of Science and Technology (DOST) to adopt this mass transportation technology developed by local engineers.

As part of the celebration of the 2021 National Science and Technology Week (NSTW), the Metals Industry Research and Development Center (MIRDC) presented this latest development following its goal to promote the HERT as one of the solutions to the mass transportation woes that usually accompany urbanization.

Launched on 22 August 2014, the HERT measures 40 m in length, runs at a top speed of 50 kph, and can carry 240 passengers per trip. It has two variants: the 160-capacity per coach and the bigger 240 passenger-per-coach model. It runs on a combination of diesel fuel and a 260-battery generator, thus referred to as a hybrid. HERT does not need infrastructure reconfiguration as it runs on ordinary paved roads similar to the bus rapid transportation system. Although it would require a dedicated lane, the benefits it would provide to the commuting public is considered substantial.

Last August 2021, DOST signed an agreement with the LGU and formed a consortium of local metals and allied industry fabricators to develop locally the HERT from scratch. Initially, the Ilagan City LGU will fabricate one set with three coaches of a 240 passenger HERT variant.

According to Rommel Corona, Supervising Science Research Specialist of the DOST-MIRDC, aside from the environmental aspect of the technology, it promotes the development of the country's transportation industry by developing further the HERT and achieving technological self-reliance. "This will create new industries and support local manufacturers," expounded Corona.

The adoption of the transportation technology will enable the local metal fabrication in Ilagan City to support and develop their own metals industry. The city has its own capable metal fabricators in the sectors of local transportation, agro-machinery, and auto body fabricators, among others.

Prior to the agreement, Cauayan City—also in the province of Isabela—was the first to have its HERT in 2019. During its turnover ceremonies as part of its Smarter City initiatives, DOST Secretary Fortunato T. de la Peña explained that "unlike the conventional railway systems, the hybrid electric road train is more energy efficient since there is no need for the alternating current running through suspended cables."

The HERT was seen plying the route of Clark Freeport Zone in 2015 to test its roadworthiness, thus providing a reliable mode of transportation inside the zone. By 2016, the train with modifications has already been adopted by the Clark Development Corporation to serve some of its 1,000 business locators' employees at the Clark Freeport and Special Economic Zone.

In fact, it was one of the main attractions during the opening day of the 2015 NSTW celebration, where excited passengers were treated to a free ride around the Mall of Asia Complex.

Realizing the value of efficient mass transportation, representatives from the local government of Cebu City had signed a memorandum of understanding on the possibility of also integrating the road train into the city's public transport system.

It was also demonstrated in 2016 as part of the "EDSA Evolution," a road-sharing project by the *Bayanihan* sa Daan Movement and various government agencies. As part of the demonstration, passengers were transported from Pasay to the *Museo Pambata* at the Luneta Park in Manila, free of charge.

Aside from the mentioned LGUs, according to Corona, the provinces of Iloilo and North Cotabato are mulling the possibility of adopting the technology.

Medical and agri sectors gain from nuclear R&D, applications

By Allan Mauro V. Marfal, *DOST-STII*

AS THE 49th Atomic Energy Week celebration (AEW) kicked off on 06 December 2021, government officials and lawmakers underscored the significant contributions of various nuclear-related research and technologies, which improved the products and services in the medical and agriculture sectors.

According to Department of Science and Technology (DOST) Secretary Fortunato T. de la Peña, nuclear science and technology (S&T) continue to contribute to various developments in health, livelihood, public order, agriculture, and the future prosperity of the country.

"Nuclear and radiation applications have long since (been) proven instrumental in various applications. These include raising the yield of our crops, diagnosing and treating various diseases, and improving the competitiveness of our products," said Sec. de la Peña.

In fact, DOST–Philippine Nuclear Research Institute (PNRI) has been spearheading new frontier research on nuclear and radiation applications in the Philippines that have potential contributions to economic and societal progress.

"We are proud of DOST-PNRI spearheading another great leap in our country's nuclear medicine capabilities. With enough support, PET-CT (positron emission tomography–computed tomography) and Cyclotron facilities will arise here in Quezon City, which will make diseases like cancer more affordable to Filipinos".

Dr. Arcilla also added that DOST-PNRI continues to apply the unique advantage of nuclear for noble applications. These include increasing crop yield with irrigation process and formulas, extracting uranium from seawater, and developing native fabrics for treating wastewater.

"While the cobalt-60 was for the longest time the only facility of its kind in the Philippines, we are proud to report that technology adaptors are now planning to establish their own commercial irradiators in different parts of the country," Dr. Arcilla explained.

Meanwhile, in her video message, Senator Nancy Binay said that nuclear and radiation research products had far-reaching effects on society, yet the value of nuclear research beyond power generation is often overlooked.

DOST-PNRI Director Dr. Carlo A. Arcilla shares how relevant is nuclear science and technology today in the country and how it could help key sectors in the society such as agriculture, health, and industry, including the prospects of nuclear power.

In her video message for the opening of the 48th AEW, Senator Nancy Binay said that nuclear and radiation research products had had far-reaching effects on society, yet the value of nuclear research beyond power generation is often overlook

"The ongoing COVID pandemic has emphasized how crucial nuclear technology is, not only in protecting and improving our way of life but in safeguarding our life itself," said Sen. Binay.

She cited the RT-PCR (reverse transcription–polymerase chain reaction) test as an example, which is a key element in the government's efforts to combat the spread of COVID-19 is a nuclear application, and its derived techniques continue to serve as reliable tools in investigating, detecting, preventing, and containing the outbreak of various diseases.

"Through these, we were able to help our farmers through the development of crop varieties that yield more and can withstand pests' diseases and harsher effects of climate change," Sen. Binay added.

The AEW virtual celebration highlights the latest developments in the local nuclear S&T and its role in addressing the pressing problems through virtual fora and exhibits.

The annual AEW celebration is mandated under Presidential Proclamation 1211 in 1973, which aims to generate awareness on the safe and beneficial uses of nuclear S&T.

Domination of next generation's researchers

By Ryan Sebastian Soyosa, *DOST-STII*

An interaction with the upcoming researchers of the country was the theme of the 2021 National Science and Technology Week's fifth-day event presented by the Department of Science and Technology's Philippine Council for Industry, Energy, and Emerging Technology Research and Development (DOST-PCIEERD) titled "Reimagining the Future of R&D with Next Gen Researchers: A Round Table Discussion."

The event was graced by no less than the esteemed Secretary of DOST Fortunato T. de la Peña. In his keynote message, he encouraged the next generation of researchers to be part of the ever-growing science community in the country. He added. "We actually need more Filipinos going into STEM (science, technology, engineering, and mathematics) careers and venturing into science, technology, and innovation for us to turn around our economy. Our quest for a brighter future begins now. And to our next-generation researchers, you are the future of this country and we rely on you in building a better Philippines."

To date, there was a total of 356 researchers and scientists that exceeded the target of 300 in every million population by the end of 2022. It was a big turnout of participants in DOST's goal of ushering a new generation of Filipino researchers through science, technology, and innovations and finding ways to address more challenges in the future.

But there is still a need to inspire or influence next generations of researchers and so, the roundtable discussion gathered research interests and new ideas, methods, possible solutions, and new programs.

The first part consists of an overview on technology resolution, science discovery, and its application as discussed by a distinguished member of the panel—including Dr. Jesus Noel Villaseñor that shares insights on "Science and R&D: The Engines of Innovation," Mr. Matthew Griffin on "Technology Foresight: Futurist Mindset," and Dr. Reginald Ugaddan on the "Future of S&T in the Philippines" that discussed the future of innovations in these changing times and the emerging issues of science and technology.

In the second part, the participants were ushered to a breakout session through parallel sessions in three categories: industry, energy, and emerging technology.

More than 100 participants from different institutions in the country interacted during the live panel discussions and breakout.

In conclusion, the roundtable discussion opened up new ways and endless possibilities in the constantly evolving science, technology, and innovation through ideas that can be developed with the help of DOST's various development programs in R&D and the dynamics between the new generation of innovators and science experts that can bring significant impact.

DOST Secretary Fortunato T. de la Peña during his keynote speech at the Reimagining the Future of R&D with Next Gen Researchers: A Round Table Discussion (photo Courtesy: DOST-PCIEERD).

DOST-NAST conducts earth science webinar at 2021 NSTW

By Allyster A. Endozo, *DOST-STII*
Screenshot from the DOST-NAST webinar

YOUNG STUDENT-EXPLORERS of the Philippines unite! The National Academy of Science and Technology (NAST) of the Department of Science and Technology (DOST) truly dished out a day of learning and adventure on 25 November 2021 at 03:00 PM via the Zoom platform.

Three renowned Filipino scientists recently shared their knowledge and experiences in the field of earth science to enhance the awareness of the youth participants and even encourage them to pursue careers in science, technology, engineering, and mathematics.

The panel speakers included Associate Professor Betchaida D. Payot of the University of the Philippines Diliman, Mr. Jeffrey S. Perez of the DOST's Philippine Institute of Volcanology and Seismology, and Academician Fernando P. Siringan of DOST-NAST.

Assoc. Prof. Payot, a 2020 Outstanding Young Scientist (OYS) awardee, shared her fun experiences as a field geologist who collects "ophiolite" and "xenolith" rock samples and examines their colorful thin sections in a microscope and a probe microanalyzer.

The Philippine island arc, she explained, is prone to earthquakes and volcanic eruptions. "We need a good understanding of how these processes are affecting us directly. If we want to survive, we really need to have a better understanding of geology," she said.

For Mr. Perez, also an OYS awardee back in 2017, studying past earthquakes archived in libraries and museums—supplemented by fault data from aerial photographs, satellite images, and on-site excavations—can lead to better insights on their likely recurrence.

He did lament the fact that there are very few geologists in the Philippines, a seismically active country that has suffered 100 destructive earthquakes during the past 400 years. "Baka wala pang 3000 na licensed geologists dito sa Pilipinas. Ganoon kaunti," he said.

Lastly, Acd. Fernando P. Siringan revealed that through the studies of ice and sediment cores, tree rings, coral skeletons, and sea floor and coastal features, we now know that the temperature and sea level worldwide were starkly different millions of years ago.

For him, these studies improve the understanding of our environment, how it evolved, and how it will respond to future changes. "Marami tayong materials na pwedeng pag-aralan dito sa Pilipinas, at napaka-kaunti pa ng mga ganitong pag-aaral," he said.

The lecture-forum was held virtually in celebration of this year's National Science and Technology Week (NSTW) that ran from 22–28 November 2021 under the theme "Aghám at Teknolohíya: Tugón sa Hámon ng Panahón."

The NSTW aims to bring science, technology, and innovation closer to the people by letting them experience their vital role in improving the people's quality of life, protecting the environment, and contributing to national development.

Webinar moderator Dr. Charlle L. Sy (upper-left), Full Professor at the De La Salle University's Department of Industrial Engineering and 2021 OYS awardee, with the resource speakers: Dr. Betchaida D. Payot (upper-right), Mr. Jeffrey S. Perez (lower-left), and Acd. Fernando P. Siringan (lower-right).

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MONDAYS | 5PM

YOUR SCIFLIX!

SINESIYENSYA

HOW MUCH DO YOU PAY WITH YOUR FLIX SUBSCRIPTIONS? NO MONTHLY SUBSCRIPTION AND NO LIMITED TRIALS. DOSTv OFFERS BINGE-WORTHY STORIES OF HOW SCIENCE BENEFITTED FILIPINOS. CHILL AND LEARN WITH SINESIYENSYA, YOUR SCIFLIX AT YOUR FINGERTIPS.

TUESDAYS | 5PM

BANTAY BULKAN

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WEDNESDAYS| 5PM

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DO YOU WANNA BE IN THE KNOW ON SCIENCE MATTERS? GET IN TOUCH WITH THE EXPERTS TO GIVE YOU FACTUAL AND RESEARCH-BASED INFORMATION AND RECOMMENDATION TO HELP MAKE SENSE OF RELEVANT ISSUES.

FRIDAYS| 4PM

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