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S&T POST

APR - JUN 2018

Agriculture

Climate/Disaster

Health

SCIENCE FOR CHANGE

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NIBRA

DOSTruption

Cambridge English Dictionary defines "disruption" as an interruption in the usual way that a system, process, or event works. And the world has started to use the word to effect exceedingly fast changes in almost every human activity to attain progress. Fortunately, the term is used positively.

In the field of science, technology, and innovation (STI), dramatic changes sometimes called disruptive are seen and felt. And not to be left behind is the country's Department of Science and Technology (DOST) that has now embarked on an unprecedented initiative touted as a truly disruptive process called the "Science for Change Program" or S4CP. It has now become the centerpiece program of the science department under the leadership of Secretary Fortunato T. de la Peña.

Sooner or later, with the S4CP the target of having one percent (1%) research and development (R&D) budget from the gross domestic product or GDP will be achieved. With this, we can say that the country has started to address the lingering concern on investment in human capital in science, technology, and innovation as STI has been recognized as the major the driver of change.

In our small way, with the S&T Post featuring in this issue some valuable information about the S4CP, our readers would know what has been going on and that good things are coming. Featured here as part of the program are the general blueprint of S4CP including the 12-point strategy called "Science for the People" (SFTP), one that has become the working tagline of the department – one that is truly faithful to its promise that science works for the benefit of the people. The readers will also be introduced to new acronyms such as NICER, CRADLE, BIST, and RDLead, among others.

Also in this issue are some of the latest developments in the Philippine science community as S&T Post shares the stories about a cost effective detection of tuberculosis, a new locally developed taxi-hailing application, and the experience of some Filipino students on an interview with an astronaut aboard the International Space Station, among others.

Interestingly, more and more good science stories from the DOST surface to everyone's delight. Some of these include social innovation in health, advocacy on basic research, on the upcoming 2018 National Science and Technology Week, report on golden rice, technical skills competition, technologies for various sectors, among others.

This issue also features wonderful stories surrounding scholarships and small scale entrepreneurship. Further, world class award-winning inventions are likewise highlighted for inspiration.

Unexpected as it may seem, this outside-the-box thinking is breaking away from the status quo, forgetting an established process is truly disruptive. The current initiatives from the DOST management and the desire to make the much needed changes have resulted in our own "DOSTruption" – the DOST led disruptive actions enabling positive changes in the Philippine science community.

Aristotle P. Carandang, LPT, MPS, Ph.D

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DEPARTMENT OF SCIENCE AND TECHNOLOGY

ADMISSION IS FREE

in celebration of the

National Science and Technology Week

science for the people 2018

Innovation for Collective Prosperity

World Trade Center, Pasay City

17-21 July 2018

General Program of Activities

TIME	TITLE OF ACTIVITY	VENUE AND ADDRESS
	17 July	
8:00 AM - 11:00 AM	Opening Ceremony	Main Stage, World Trade Center, Pasay City
	17-21 July	
9:00 AM - 6:00 PM	Viewing of Exhibits	World Trade Center, Pasay City
9:00 AM - 11:00 AM	DOST Hybrid Electric Train Demo Run	Dela Rosa to EDSA & vice versa
	18 July	
8:00 AM - 5:00 AM	#ScienceJournoAko: Communicating S&T Innovation	Function Room 4, World Trade Center, Pasay City
8:00 AM - 5:00 PM	UPSTART: Upgrading Science and Technology Research Trends	Meeting Room 1, Philippine International Convention Center, Pasay City
9:00 AM - 11:00 AM	Transport Program: Hybrid Electric Train (HET)	Function Room 3, World Trade Center, Pasay
9:00 AM - 12:00 NN	Bringing Research to Market: A Mixer for Researchers and Industry	Function Room 2, World Trade Center, Pasay City
9:00 AM - 5:00 PM	Harnessing STI Towards Industry 4.0	Main Stage, World Trade Center, Pasay City
9:00 AM - 5:00 PM	Regional Forum on Strategies to Enhance Innovation and Management Capacities of Startups and SMEs	Main Stage, World Trade Center, Pasay City
1:00 PM - 3:00 PM	DOST-MIRDC Facilities in Support of the Metals and Engineering Industries	Function Room 3, World Trade Center, Pasay City
1:00 PM - 3:00 PM	IP Kayumanggi: A New Input for the Sustainability of the Duck Egg Industry	Function Room 2, World Trade Center, Pasay City
2:00 PM	In Touch With Excellence	Meeting Room 1, Philippine International Convention Center, Pasay City
3:00 PM - 5:00 PM	Are We Ready for the Food Safety Regime? Evidence for the Commodity Supply Chain Stakeholders	Function Room 2, World Trade Center, Pasay City
4:00 PM - 5:00 PM	When the Blue Sea Turns Red	Function Room 2, World Trade Center, Pasay City
	18-19 July	
9:00 AM - 5:00 PM	Part I: Industry 4.0: Are we there yet?	Main Stage, World Trade Center, Pasay City
	Part II: Innovation Ecosystem: Setting the Stage	Main Stage, World Trade Center, Pasay City
	Part III: Leading the Way	Main Stage, World Trade Center, Pasay City
	Science and Technology at Work in Philippine Business Industry	Main Stage, World Trade Center, Pasay City
	Part IV: Awarding of Best SETUP Adoptor	Main Stage, World Trade Center, Pasay City
	Synthesis and Open Forum	Main Stage, World Trade Center, Pasay City
	19 July	
8:00 AM - 9:00 AM	Biological-based Approaches for Cacao Pest Management	Function Room 2, World Trade Center, Pasay City
8:00 AM - 5:00 PM	Forum on Waste Management to Inclusive Circular Economy	Function Room 3, World Trade Center, Pasay City
10:00 AM - 11:00 AM	Carrageenan Technology on Mungbean Production	Function Room 2, World Trade Center, Pasay City
10:00 PM - 12:00 NN	SARAI SEAMS and SPid for Smart Agriculture	Function Room 2, World Trade Center, Pasay City
1:00 PM - 3:00 PM	Greenhouse-Type Solar Dryer for Quality Coffee Beans	Function Room 2, World Trade Center, Pasay City
2:00 PM - 4:00 PM	Signing of Memorandum of Understanding Between Panay Railways Inc., Philtrak, Inc. and MIRDC	Main Stage, World Trade Center, Pasay City
3:00 PM - 5:00 PM	LAMP Kit for Shrimp Early Mortality Syndrome	Function Room 2, World Trade Center, Pasay City
	20 July	
8:00 AM - 5:00 PM	Community Empowerment through Science and Technology (CEST) Summit	Main Stage, World Trade Center, Pasay City
1:00 PM-5:00 PM	Women Inspiring Women	Philippine International Convention Center, Pasay City
	21 July	
9:30 AM	The Fusion of Science and Art (Museum Stewardship)	Function Room 1, World Trade Center, Pasay City
9:45 AM	The Fusion of Science and Arts (Natural History)	Function Room 1, World Trade Center, Pasay City
10:00 AM	The Fusion of Science and Arts (Resilient Filipino Music at the Margins)	Function Room 1, World Trade Center, Pasay City
10:45 AM	The Fusion of Science and Arts (Resilient Filipino Dances at the Margins)	Function Room 1, World Trade Center, Pasay City

for more details, please visit **www.nstw.dost.gov.ph**

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SECOND QUARTER 2018

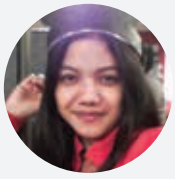
ABOUT THE COVER

The DOST's Science for Change Program (S4CP) endeavors to significantly accelerate science, technology, and innovation in the country through massive increase in investment on S&T Human Resource Development and R&D through the program. The cover highlights the five R&D program sectors (Agriculture; Health; National Integrated Basic Research Agenda; Industry, Energy and Emerging Technology; and Disaster Risk Reduction and Climate Change Adaptation) that serve as our priority areas in keeping up with the current global technology and innovation trends. Represented by arrows pointing in an outward direction, the growing number of promising researches and technologies, as well as researches and scientists in these sectors, contribute to the cohesive convergence and integration of R&D efforts. These initiatives bring us closer to the attainment of inclusive socio-economic growth and a better life for Filipinos. Indeed, this makes it Science For Change.

CONTRIBUTORS

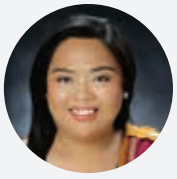

Dr. Ma. Josefina D. Abilay


Anne Marie Alto


Djonna Gay I. Albufera


Bernardo T. Caringal


Apple Jean Martin-de Leon


Catherine Joy C. Dimailig


Alexander A. Medrano


Dr. Marissa A. Paglicawan


Jesse M. Pine

Cost effective TB detection possible with new diagnostic model

by Catherine Joy C. Dimailig, *DOST-PCHRD*

RESEARCHERS OF a study that developed a computer model to assess the impacts of different diagnostic algorithms for tuberculosis (TB) believe that the new model will greatly improve detection of TB and multidrug-resistant TB in the Philippines.

In a forum organized by the Philippine Council for Health Research and Development (PCHRD), Dr. Charles Yu of De La Salle Health Sciences Institute (DLSHSI) and Ewan Tomeny from the Liverpool School of Tropical Medicine (LSTM) in UK, presented the initial results and future implications of the project on the cost effectiveness of TB detection in the country.

The study called "TB Filipino Impact Testing (FIT): Impact Assessment of Diagnostic Algorithms and Tools for Multi-Drug Resistant (MDR-TB) and Drug Sensitive Tuberculosis (TB) in the Philippines" was designed to represent patient pathways at specific sites that will be used to compare the impacts and cost effectiveness of different diagnostic algorithms.

Dr. Yu explained that the study is being conducted to support the cost effective roll out of new tools and algorithms for the diagnosis of multidrug resistant tuberculosis and drug sensitive tuberculosis in the Philippines. It was designed to represent patient pathways at specific sites that will be used to compare the impacts and cost effectiveness of different diagnostic algorithms.

Initial results from modelling in Cavite sites show that rolling out GeneXpert as a replacement to microscopy is cost effective where drug sensitive and MDR-TB cases are correctly treated. Moreover, it has been shown that most of the alternative diagnostic algorithms modelled would reduce patient costs significantly.

Tomeny discussed that, in the future, the virtual implementation modelling can provide a better understanding of current and potential future patient pathways through visualization, comparison of options by projecting the patient and health systems evidence over extended timeframes, estimation of patient and health system costs, and assessment of incremental cost effectiveness of scale up.

The next stage of the research will look at data from additional provinces in the Philippines. Data will be available soon for Davao and Bulacan. The LSTM will support the DLSHSI and National TB Program in using the models to evaluate alternative diagnostic algorithms in these provinces and across the Philippines.

Ewan Tomeny from the Liverpool School of Tropical Medicine presents the initial results of their study during the forum. (Photo from DOST-PCHRD).

The forum, held on 25 April 2018 at the National Institutes of Health, University of the Philippines Manila, served as an opportunity for researchers and medical practitioners to discuss and assess the current TB situation in the Philippines. Most of the participants were interested in using the model and applying it in the detection of other diseases such as dengue or HIV.

TB FIT is one of the six projects of the first cycle of the Newton Agham program, which is part of the collaboration between the Medical Research Council–UK and PCHRD. The program extends assistance to projects that help improve health outcomes through research based solutions and innovations.

DOST gives R&D grant to a new taxi-hailing app

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

TO PROVIDE efficient pick up and drop off of passengers and quality trips for both commuters and drivers are goals of the company, MiCab, in developing a taxi-hailing application. It got the nod of the Department of Science and Technology- Philippine Council for Industry, Energy and Emerging Technology Research and Development (DOST-PCIEERD) which awarded MiCab P3.1M for a one-year research and further development of the platform under its Startup Research Grant Program.

MiCab's edge over other apps

MiCab is a Transport Network Company newly accredited by the Land Transportation Franchising and Regulatory Board.

Eddie F. Ybañez, MiCab chief executive officer and co-founder said that MiCab does not charge booking fees as the commuters only have to pay what is on the taxi meter. Under government-approved fares, taxis charge a P40 flag down rate, with an additional P13.50 every 300 meters and P2 per minute travel.

According to Ybañez, MiCab was borne out of the desire to provide convenience to the commuters. However, after digging deeper, he realized that the passengers are not the only ones having problems with getting a ride; the taxi drivers are also having a hard time finding passengers. The essence of MiCab is to connect these two groups of people.

"For the taxi drivers, MiCab will help increase their revenue by connecting them directly to their passengers, thereby reducing costs caused by waiting time or just driving around. Saving more on gas means bigger take home pay for the taxi drivers. For the general public, we contribute to easing the traffic by optimizing existing public vehicle infrastructure, connecting supply to where the demand is, and not adding new vehicles," Ybañez said.

Creating a meaningful impact to the lives of the passengers and drivers is what really inspires him to pursue what he is doing now with MiCab, he added.

Ybañez also said that through MiCab, they will be contributing in the improvement of the public transport system in the country. He believes that it will always have a domino effect.

"As the traffic is eliminated and regulated, people get from Point A to Point B predictably and efficiently, and time is saved. Time saved from commuting will mean more time spent learning or working, thus the output of valuable work increases. Valuable work will mean a stronger economy and a better city, a better country," said Ybañez.

DOST-PCIEERD Startup Research Grant

To conduct research and development for the refinement of their product and service, Micab has applied for DOST-PCIEERD Startup Research Grant.

"Under this research grant, we are creating our own real-time traffic data engine that can help our passengers and taxi driver partners better plan their day," said Ybañez.

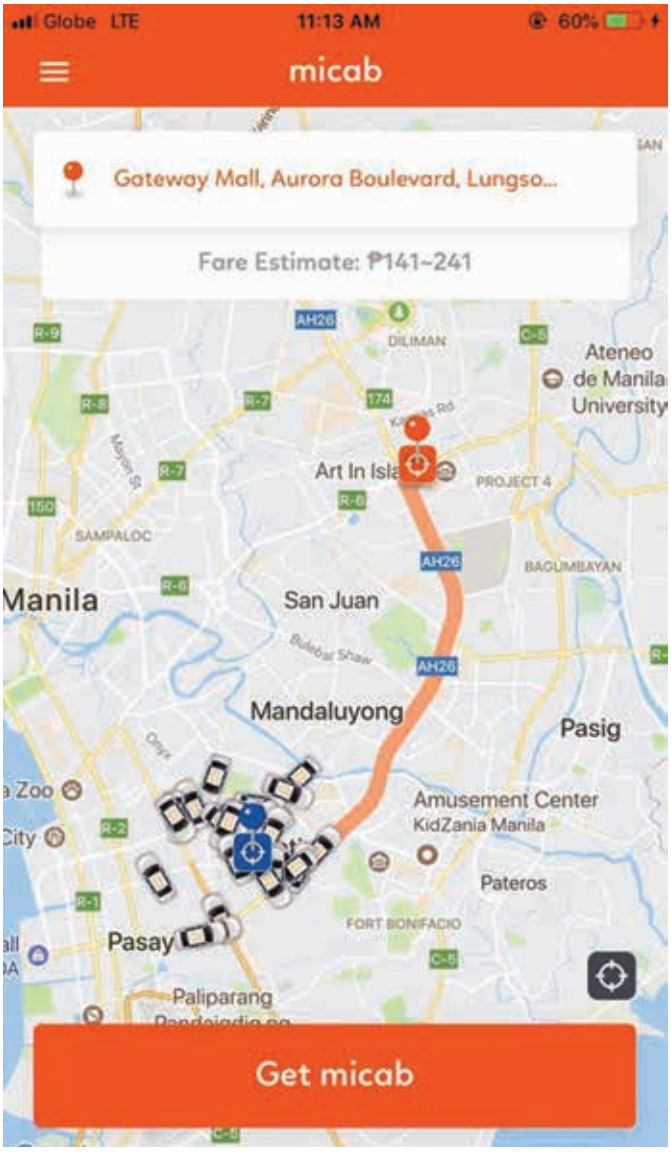
He explained that MiCab currently uses third-party applications for real-time traffic engine and navigation data which are too expensive to sustain. Through the Grant with DOST-PCIEERD, MiCab will develop its own real-time engine that collects data from its taxi partners and users, this will then result in a much more accurate and efficient application.

"What helps the taxi drivers and the passengers is the ridership pattern engine based on real time traffic engine that we have plus our passengers' usage. This will tell our drivers where to go on a particular time, where the passengers are," he elaborated.

He also shared that this project with DOST-PCIEERD also includes the hiring of experts that would help them develop the real-time traffic engine including a Data Science Research Specialist and Data Scientist.

DOST-PCIEERD launched the Startup Research Grant that aims to provide the much-needed financial support of selected local startups that require assistance in improving their prototypes, conducting feasibility studies, validating user and market requirements, producing to scale, joining international startup events, and protecting their intellectual property rights. fifteen local startups received this grant in 2017.

For more information, visit www.pcieerd.dost.gov.ph.



The Department of Science and Technology- Philippine Council for Industry, Energy and Emerging Technology Research and Development granted P3.1M for further research and development on MiCab, a new taxi-hailing app. (Screenshot from the MiCab application).

Aside from the students, some ASTI and PHL-Microsat members were also able to ask questions to Mr. Tingle.

Filipino studes make first ever live interview with astronaut aboard the ISS

By Raissa Jean A. Ancheta, *DOST-PCIEERD*

A MIX of Grade 11 and college students recently made a milestone in Philippine history by touching base with the International Space Station (ISS) and even interviewing an astronaut on board. The ISS is a habitable artificial satellite that serves as space environment laboratory for various experiments and testing of spacecraft systems and equipment required for missions.

The historical feat, made by elementary pupils from the University of the Philippines Integrated School (UPIS) and electronics engineering students from the Holy Angel University (HAU), was held at the Department of Science and Technology-Advanced Science and Technology Institute (DOST-ASTI) on 15 May. To their delight, the students were able to talk to Scott Tingle, an astronaut from the National Aeronautics and Space Administration.

At approximately 4:20 PM Philippine time, DOST-ASTI successfully established contact with the ISS and Scott Tingle. All 12 participants were able to ask their questions and receive enthusiastic and insightful answers from Tingle within the 10-minute call duration.

"The approximately 10 minutes that Mr. Scott Tingle gave us is now a part of our history, and I am very thankful to be part of that history. Laus Deo Semper (Praise be to God always)," said Angela Kaye Tacang, another Holy Angel University student.

This was a follow-up to the first attempt that failed in February this year.

"This historic event was emotionally fulfilling and inspirational. Though the first attempt [was a failure], it just proved that there should be no reason not to repeatedly try until there is success," said Mariangela J. Miranda, one of the participating HAU students in the live question and answer session.

"Many people have worked hard to accomplish such a remarkable project and I want to thank them for letting us experience something that we could share to others — that we've heard and learned how astronauts live and face challenges in space. It also inspired us to pursue our education so we can reach our dreams just like how they reached theirs. It's

The students line up as rehearsed during the actual call to NASA astronaut Scott Tingle.

going to be a very long ride they say, but it's all worth it in the end."

Moderating the session was DOST Balik-Scientist Engr. Leo Almazan who explained that the contact to the Amateur Radio on the International Space Station (ARISS) was an activity designed to provide students with "unique, authentic experiences designed to enhance student learning" in the STEM fields and this was done through a direct link to the astronauts aboard the space station.

He explained that the previous attempt to make a live contact with the ISS failed due to illegal ham radio users that were interfering with the communication link used by the UP Electrical and Electronics Engineering Institute Amateur Radio and Satellite Station in communicating with the ISS.

Engr. Almazan explained that the second attempt which succeeded was coursed through the ARISS telebridge. DOST-ASTI connected with Amateur Station W6SRJ in California, USA and the station established a communication link with the ARISS.

While waiting for the actual call, Engr. Almazan prepped the students by making them rehearse their questions. PHL-Microsat Project 1 engineer Ariston Gonzalez also gave a presentation on space technology in the Philippines, Diwata-1, and Diwata-2.

Engr. Almazan explains the ARISS telebridge while waiting for the call to start.

The PHL-Microsat is a DOST-funded program that built, launched, and effectively used the country's first microsatellite for multi-spectral Earth observation. The program is a collaboration among the University of the Philippines, Tohoku University, Hokkaido University, and DOST-ASTI.

UPIS student Christian Sarabia said he feels "as if space is within reach — despite its physical distance." He also noted how he discovered that even people from different disciplines can contribute to help the country move forward.

Alexandra Arugay, also a UPIS student, said that with the college entrance exams coming, this experience has helped solidify what she wants to become: an engineer for space (initiatives).

"After speaking to the astronaut, especially as a STEM (or Science, Technology, Engineering and Mathematic track) student, obviously I got inspiration as to what I want to be in the future. It's so inspiring, not just for me, but for the Philippines as it develops its space programs for the future," Arugay said.

DOST-Philippine Council for Industry, Energy and Emerging Technology Research and Development' Engr. Ermie Bacarra, chief of the Human Resources and Institution Development Division, was happy about the success of the live contact. She also looked back on how the Philippine space initiatives were initially formed, and what has been achieved since then.

"Space is not actually that far," she said. "It's getting [nearer and nearer to us]." *(Photos by DOST-ASTI)*

Women-friendly abaca tool wins award for Leyte-based lady researcher

By Alexander A. Medrano and Framelia V. Anonas, *DOST-STII*

Mother and child Lalaine and Braniff Baigan from Brgy. Mac, Sogod, Southern Leyte demonstrate how women can operate the pedal-stripping machine.

NOW THERE'S an easier way for women to strip abaca fiber. Developed by a lady herself who knows the rudiments of stripping this sturdy fiber, this tool is portable, gender-sensitive, and pedal-operated.

"Women usually can't use the stripping machine because it moves fast and they are afraid their arms may be cut," explained Dr. Evelyn Bacarra-Tablante, developer of said abaca stripping tool. "Women can't also use traditional tools because these are difficult to pull."

This drove Evelyn, "Evits" to close friends, to develop this tool which won her the prized award in the Agricultural Innovation Category-Professional Level at the Invention, Creative works, Innovation, and Technology Exhibit (i-CITE) 2018 at the Southern Leyte State University, Sogod, Southern Leyte on 7 March 2018. Her paper titled "Development of Pedal-operated Abaca Stripping Tool" focused on designing and developing a pedal-operated abaca stripping tool in order to address the stripping need at the farms and to avoid discoloration of the abaca fiber. Helping Evits in her paper is her adviser, Dr. Angel Sabusap.

Evits is the coordinator of the Department of Science and Technology (DOST)-VIII's Consultancy for Agriculture Productivity Enhancement (CAPE), a program that provides consultancy teams to do studies for technology improvement and enterprise productivity of micro, small and medium enterprises (MSMEs) in the agricultural and aquaculture sectors. CAPE aims to institutionalize effective farm management strategies, including transfer and commercialization of better technologies, to improve agricultural and aquaculture productivity.

Evits has registered the pedal-operated stripping machine as a utility model.

Light weight, premium quality

"The pedal-operated tool is lighter in weight compared to other stripping machines and can be easily used by women," Evits informed. This makes the tool an efficient gateway to boost women employment in this line of work.

The tool churns out medium soft fibers with I,H, and G grades and strand thickness of 0.55 to 0.70 mm. "These are classified as 'good cleaning' by the Philippine Fiber Industry Development Authority (PhilFIDA)," explained Evits.

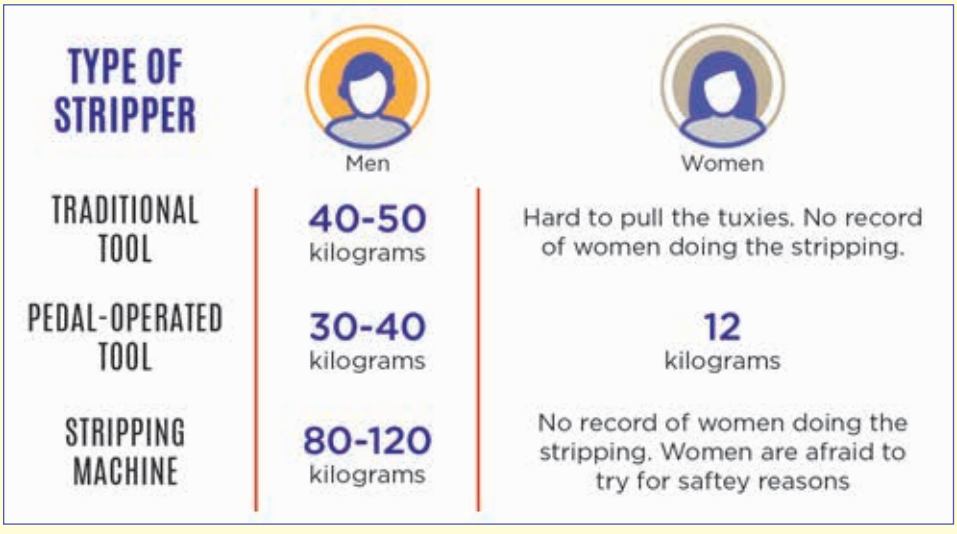
"Grade I is of primary quality with very light brown to brown color while grade G is of secondary quality with dingy white, light green, or dull brown color. The Grade H fiber, meanwhile, is pulpy with dark brown color. We call it 'bakbak,'" she said.

Evits further informed that the fiber produced by the more popular hand-stripping method, graded as JK and ML, is classified as "fair stripping." This means that the output of the pedal-stripped tool is of better quality.

The market price of fiber produced through Evits' machine is P95-P115/kilo, while the fiber from the traditional tool sells at P55-P70/kilo.

Meanwhile, the finest quality of abaca fiber is produced through the spindle stripping method. Classified as S1, S2, and S3, the fibers are of excellent stripping and have soft texture. Fiber produced by this machine can be sold from P100 to P190/kilo.

Why not just use the spindle stripping method? It is not easily accessible to the farmers, Evits said. "The machine is too heavy for the farmers to carry up the mountain where



Infograph by Josemaria Zarraga, *DOST-STII*

Comparison of output and use of abaca strippers

Evits with the pedal-stripping machine she developed and won her an award. The tool can be dismantled into three pieces which makes it easier to be brought to the abaca farm, Evits says.

the abaca farms are located. When you cut the abaca, it should be stripped immediately after the tuxying or else it will discolor."

The fibers are sorted at the grading-bailing establishments then sent for processing. These are then processed into specialty pulp and paper which are used as tea bags, cigarette wrapper, antiseptic pad, lens tissue, meat and sausage casings, capacitor, stencil paper, plug wraps, and currency notes, among others. The fibers can also be processed into automotive parts made of natural composites.

Abaca in the Philippines

Abaca plant *(Musa textilis),* also known as "Manila hemp" is a relative of the more commonly known banana plant. It is prized for its strength, saltwater resistivity, durability, and long fiber length.

The Philippines supplies 90 percent of the world demand for abaca. A few years back, the abaca industry in Southern Leyte went on a slump after the abaca bunchy top virus swiped the farms, stunting the growth and tarnishing the quality of the abaca plants.

Two years ago, the government allotted an initial P100 million to rehabilitate the abaca industry and appointed the local government of Sogod, Southern Leyte to lead said rehabilitation. Further, DOST-Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development-produced Bandala abaca which is resistant to the bunchy top virus was introduced by DOST-VIII in Sogod and revived the industry in many communities. Its resistance to the virus has been established and its fiber strength is currently being studied.

Now that women are more able to strip abaca, they can bring in additional income to the family and make use of idle time to be more productive.

DOST-developed biodegradable substitute to synthetic plastics offers opportunity for plastic manufacturers

By Dr. Marissa A. Paglicawan, *DOST-ITDI*

Photo credits to Ceajay N. Valerio, DOST-STII

Dr. Marissa A. Paglicawan, Supervising Science Research Specialist at DOST-ITDI exp[ains the biodegradab;e substitute to synthetic plastics.

Is the Philippine market ready for biodegradable substitute to synthetic plastics?

TO TEST the country's readiness to replace synthetic plastics with a biodegradable substitute, the Department of Science and Technology-Industrial Technology Development Institute (DOST-ITDI) developed a biodegradable polymer, a more environment-friendly alternative.

"Although most plastics are recyclable these days, their disposal becomes a problem due to the lack of landfill area. A single-use packaging always ends up in a landfill, a situation which prompted the government to formulate 13 House Bills and Senate Bills on the regulation and phasing out of plastic bags and other plastic packaging materials," said Dr. Marissa A. Paglicawan, supervising science research specialist at the DOST-ITDI.

Synthetic plastics are petrochemical-based, which means that they are not easily degraded and would take almost a decade to decompose. This prompted lawmakers and plastic makers worldwide to identify and develop durable biodegradable bio-based alternatives.

The downside, though, is that not all plastics can be replaced with biodegradable polymer, like those single use plastics in which recycling is not an option. Then there is the cost of biodegradable polymer which is slightly higher than the synthetic plastic.

The small size of industry players in the area of biodegradable polymer signals an opportunity for those who want to venture into the manufacturing of plastics. Plastic manufacturers can easily shift to this type of technology because there are no required investment for pre-processing equipment and skilled workers. They can still use their existing equipment of extrusion and face pelletizer machine.

"To our knowledge, there are no producers of biodegradable thermoplastic polymer in the Philippines. However, there is one local distributor of Polylactic Acid (PLA), a synthetic biodegradable polymer," Dr. Paglicawan said.

Currently, several plastic manufacturers have expressed interest in availing this DOST-ITDI technology due to bans imposed on the use of plastic packaging materials and tonnage usage of disposable plastic items in the fast food industry.

However, Dr. Paglicawan explained that they have yet to assess the marketability of the product, such as customer acceptance and price competitiveness, and the quality of the material because those specifically made from starch are inferior in quality than synthetic plastics.

Women welders wow crowd

By Zalda C. Gayahan, *DOST-MIRDC*
Photos courtesy of DOST-MIRDC

Group photo before the female welders don their PPEs for the Welding Skills Competition. (L to R) Engr. Reynaldo L. dela Cruz, Jr., chief of the DOST-MIRDC's Industrial Training Section and President of the Philippine Welding Society (PWS); Liezyl Z. Darilay; Minnie P. Ellivera; Ruth Cheel B. Tulo; Nely M. Siarot; Helen L. Dal; Mary Jean V. Dumalag; and Fernando Openda, executive director of the PWS.

UP UNTIL now, welding is generally a male dominated field. It was no surprise that a lot of males responded to the invitation to participate in the Welding Skills Competition during the third day of the S&T Caravan held in Tagum City, Davao del Norte on 25 April 2018.

But what made the competition more exciting was the response of female welders. The competition attracted six female participants, all with unique stories of how their interest in welding started and why they joined the contest.

It turned out that five of the six participants heard about the Welding Skills Competition through the schools where they were working as welding trainers and assessors, while Helen L. Dal, 31, heard about it from a friend who encouraged her to join. Helen is currently employed as welder in a welding shop in Compostela Valley.

The other participants: Mary Jean V. Dumalag and Minnie Ellivera, both 40; Liezyl Danilay, 32; and Nely M. Siarot, 30, registered immediately after hearing about the announcement. While Ruth Cheel B. Tulo, 30, initially did not make it because all of the slots were already filled up, she decided to be at the competition venue anyway to cheer for Mary Jean who is a colleague at work.

Why they love welding

All female participants love welding. Helen used to consider it as her pastime only but later learned to really love the practice of welding. Her welding skills are well-known in their neighborhood. Once she considered the craft as her way to realize her father's dream. Now it serves as her bread and butter to support her five children.

Mary Jean, on the other hand, is a welding trainer/assessor. She says she is fond of doing work that are typically for men. She adds that she was really looking for a skills competition to join because she wants to experience how it was to join a contest.

Nely, on the other hand, says she came from the garments industry but later shifted to welding. She says she is really interested to learn and improve her welding skills.

For Minnie, who travelled from Davao City to personally submit her application in Tagum City, joining the competition is her way to level up her skills in welding. She says the messages of encouragement posted on social media are enough recognition of her skills and make her feel very proud to be in this profession.

Mary Jean V. Dumalag

Minnie P. Ellivera

Helen L. Dal

Liezyl L. Danilay

Ruth Cheel B. Tulo

Nely M. Siarot

Meet the six participants in the female category of the Welding Skills Competition

Liezyl is a welder's daughter and as a young child would always watch her father work. Even then, her interest in welding was there but her father discouraged her because she might get hurt. When her father died, all the welding equipment were left unused in their home. That was the time when she decided to learn how to weld and to finally do what she has always dreamt of doing.

Then there's Ruth Cheel who, after being told that all slots for the competition were already filled up, decided to stay at the venue to

support her friend Mary Jean. She was lucky to be included as an official participant after one of the initial contestants backed out at the last minute. Ruth Cheel ended up as winner in the female category after besting her competitors.

Not just about winning

After the competition for the women's category, which lasted for an hour and a half, it was the men's turn to show their welding skills. Those who made it to the final list of contestants were: Ruel C. Navales, 26; Rovelon C. Salga, 44; Cornelio A. Ruz, Jr., 34; Dennis O. Orcullo, 35; Bernie B. Galupo, 28; and John Mar P. Siodora, 31.

The men in action at the Welding Skills Competition.

Winner in the men's category was John Mar from Compostela Valley. He is a National Certificate II holder in welding already and aspires to earn another certification. For John Mar, winning is his chance to earn another certificate in welding.

For Ruth Cheel, joining the competition is not all about winning. For her, it is the best way to improve her craft and to encourage her students to also keep learning and improving.

Both Ruth Cheel and John Mar earned the respect and admiration of Tagum City's S&T community. The applause of the crowd when their names were announced as winners may have lasted only for a few minutes but the boost in confidence, affirmation of their skills, and the passion to improve their craft and further influence other people to keep on aiming higher, will surely go a long way.

DOST's heat treatment tech lifts pallet industry to global standards

The heat treatment facility of ACE+FA Enterprises

MAKERS OF wooden packaging materials in the Philippines can now easily comply with an international standard that mandates them to sterilize their crates and pallets using a technology developed by the Department of Science and Technology-Forest Products Research and Development Institute (DOST-FPRDI).

Pallets are flat transport structures used for transporting goods. Wooden crates and pallets, if not sterilized, are at risk of being infested with invasive insect pests and diseases which have been known to cause environmental disasters. In northeastern and midwestern America, these agents of destruction—though very, very small—have invaded forests and wiped out entire species of trees in a matter of decades.

To help ensure that invasive insect pests and diseases are not transmitted from one country to another through global trade, the International Standard for Phytosanitary Measures (ISPM) No.15 was enforced in 2002, mandating the makers of wooden packaging materials to sterilize their pallets and crates. Mode of sterilizing is either through heat treatment (HT) or methyl bromide (MB) fumigation.

"Compared with methyl bromide or MB, HT is a safer and cheaper way to fumigate wooden packaging materials," said Wency H. Carmelo of DOST-FPRDI. Carmelo further explained that high MB levels are known to cause deaths and are very harmful to the ozone layer. HT, on the other hand, is non-toxic and about 50 percent cheaper than MB treatment. "MB also makes wood pallets non-recyclable, " she added.

Made up of a furnace-type dryer with a computerized data logger, the HT ensures that the pallet blocks' core reaches at least 56°C which is maintained for 30 minutes. At this setting, all insects and infectious organisms infesting the wood are killed, no matter what their life stage are.

Here in the Philippines, the wooden pallet industry have aleady adopted DOST-FPRDI's HT technology. Twelve pallet makers in the Southern Tagalog Region now use the technology and are providing HT services to other pallet producers and the many exporting companies based in the area. Among the successful adopters of the technology are Nippon Express and Adtek Philippines, Inc.

Another successful adopter of the technology is Cabuyao, Laguna-based ACE + FA Enterprises which has saved around P80,000 a month after it stopped renting the HT services of another firm and started using its own. It is now an accredited HT provider. Likewise, another pallet maker also in Cabuyao, Laguna was able to save at least 100,00 board feet of lumber from sure decay, thanks to the HT facility.

In 2011, Suri Pallets, Inc. put up a lumber dryer designed by a private company. The machine, however, failed to work properly, leaving the firm unable to dry its huge stock of lumber. The management then asked DOST-FPRDI to help and in, 2015, the dryer was renovated using the design of its low-cost HT system. With the make over, Suri was able to dry all its lumber supply and increased its output from 100 to 500 pallets per day.

"We are happy that DOST-FPRDI's heat treatment technology is an export industry enabler and provides for our pallet makers a safer and cheaper way to comply with global standards," Carmelo concluded.

DOST-FPRDI develops competent rubber workers

By Apple Jean Martin-de Leon, *DOST-FPRDI*

HIGH SCHOOL students in Zamboanga Sibugay will soon learn the rudiments of growing, planting, and harvesting the sap of rubber trees which is the most important crop in their province.

Teacher Elsa Vendiola, tasked to teach the rubber production course, is confident she will be able to teach the subject well, thanks to a recent training she went to.

Organized by the DOST-Forest Products Research and Development Institute (DOST-FPRDI), the training was designed to teach four competencies: establish a rubber budwood and seedlings nursery, plant rubber trees and seedlings, do budding operation, and harvest latex.

"From the course, I learned not only concepts but skills I could pass on not only to my students but even to my peers in school," explains Vendiola.

For Esmeraldo Hanito of the University of Southern Mindanao, the training made him realize that there are more efficient ways of rubber tapping. "This new knowledge excites me as I am about to retire from the academe soon," says Hanito.

Vendiola and Hanito were among the 25 trainees who were assessed and awarded the National Certificate II (NC II) by the Technical Education and Skills Development Authority or TESDA. This means that they "demonstrated necessary skill and knowledge to perform the tasks carried out by a professional."

Photos from Fors. Jeriel Payuan and Christian Amante

Prof. Angelito Aballe (in white polo) discusses the correct harvesting of rubber latex. Tappers make a cut in the trunk to collect the sap (called latex) without damaging the tree..

The quality and speed in tapping were evaluated during the training.

Hands-on activity on seedbed preparation and seed sowing.

Building on people's innate capacity

For most areas in Kabasalan town, rubber production is part of community life. At 2 to 3 in the morning, children as young as 11 years old wake up to tap rubber trees. Their parents, meanwhile, collect the sap later in the day. The bark of the trees is said to give out more sap when cut early in the morning.

"Most local farmers are already skilled tappers. We want to complement their skill with scientific knowledge to lessen the damage on rubber trees. Proper tapping will not only prolong tree life, but will also improve latex yield that could increase farmers' income," explains Dr. Maria Cielito G. Siladan, project leader and chief of DOST-FPRDI's Training and Manpower Development Section.

According to Siladan, rubber is one of the country's most valued agricultural crops. Of the 140,000 metric tons of rubber produced in the last quarter of 2017, almost half came from Zamboanga Peninsula. Currently, the Philippines ranks 10th among the rubber producing countries in the world.

Trainees check on various rubber products manufactured at the Philippine Pioneer Rubber Products Corporation in La Paz, Naga, Zamboanga Sibugay.

"DOST-FPRDI recognizes the government's effort to push for a stronger rubber industry. This rubber production training is one of the Institute's ways of contributing to that goal," she adds.

Geared toward increasing the number of competent rubber farmer-tappers and improving the quality of harvested latex, the course has so far trained 386 persons, 49 of which are NC II holders. It is part of the project "Capability Building on Tapping and Use of Appropriate Coagulant for Improved Rubber Latex Yield" funded by DOST's Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development.

"We hope to replicate this initiative in other provinces so that more people can benefit from the science of rubber tapping," ends Siladan.

The training was held on 9-21 April 2018 and was facilitated by Prof. Angelito Aballe of the JP Aballe Learning and Development Center with the help of DOST-FPRDI's Foresters (Fors.) Jeriel S. Payuan and Christian R. Amante.

DOST presents first batch of NICER, CRADLE grantees

By Laurence M. San Pedro, *DOST-STII*

IN ITS drive to rev up science, technology, and innovation in the country, the Department of Science and Technology (DOST) launched the Science for Change Program (S4CP) to infuse massive increase in investment on research and development (R&D) and science and technology (S&T) human resources development.

DOST Secretary Fortunato T. de la Peña believes that the S4CP can help expand R&D initiatives and increase the country's S&T workforce.

"We want to expand our country's research pool. In fact, there are only 84 colleges and universities that have been participating in the R&D grounds considering that there are about 2,000 colleges and universities in the country," he remarked.

The science chief adds that the launch of the program was pushed through immediately to be able to proceed on business as usual." We have introduced certain changes and we are thankful that we are getting support from the national leadership," said Secretary de la Peña at the S4CP launch during the 3rd National Research and Development Conference held on 20 April 2018 at the Philippine International Convention Center, Pasay City.

The launch was highlighted by the presentation of the first grantees of the Niche Centers in the Regions for Research and Development (NICER) and the Collaborative Research and Development to Leverage Philippine Economy (CRADLE) programs.

The NICER program is a component of the DOST's accelerated R&D Program for Capacity Building of Research and Development Institutions (RDIs) and Industrial Competitiveness under the S4CP. Through this program, DOST provides institutional grant for Higher Education Institutions (HEIs) in the regions to undertake quality research that will bring and promote regional development.

The pioneer batch of NICER recipients includes Isabela State University (granted P18 million for the establishment of the Cagayan Valley Freshwater Fisheries Center); University of the Philippines-Manila (granted P65,988,910 to establish the Center for Innovations for Cost Effective Disaster Risk Reduction and Management in Health outcomes in NCR and the Philippines); University of the Philippines-Visayas (granted P52 million to establish the Center for Mollusk Research and Development); University of the Philippines-Cebu (granted P37 million to establish a Niche Center on Environmental Informatics in Central Visayas); Cebu Technological University-Argao (granted P17.2 million to establish the Flora and Fauna Assessment Using Permanent Biodiversity Management System in Cebu Island Key Biodiversity Areas; and Samar State University (granted P25 million to establish the Eastern Visayas Center for Crustacean Research and Development).

DOST Secretary Fortunato T. de la Peña (rightmost) and Dr. Rowena Cristina L. Guevara (leftmost) present the certificate of appreciation to the University of Southeastern Philippines and Hijo Resources Corporation for being one of the first grantees of the CRADLE program during the 3rd National R&D Conference on 20 April 2018 at the PICC Summit Hall, Pasay City. (Photo by Henry A. de Leon, DOST-STII)

Meanwhile, through the CRADLE program, a private sector industry partner will identify a problem, while its partner HEI or RDI will carry out the necessary R&D to find a solution to the problem.

"The CRADLE program is aimed at bridging the academe and industry toward a productive R&D," Sec. de la Peña said.

In terms of funding, the maximum grant for each CRADLE project is P5 million which shall be completed within a period of one to three years. Also, the partner company must provide at least 20% of the total project cost.

The first recipients of the CRADLE program are the following: Technological Institute of the Philippines, in collaboration with Pascual Pharma Corporation (granted P5,179,400 for the project entitled "PCOPEIA: Predictive Chromatography of Organic Plant Extracts with Intelligent Agents"); University of San Agustin in collaboration with Del Monte Philippines, Inc. (granted P4,999,138 for the project "Metabolomics as Tool for the Discovery of Hypocholesterolemic Natural Products from Pineapple"); and the University of Southeastern Philippines in collaboration with Hijo Resources Corporation (granted P4,999,438 for the project "Synergize Academe-Industry Research Undertaking to Improve Productivity through Development of Banana Diseases Surveillance System).

Other DOST programs for capacity building of RDIs and industrial competitiveness are the Business Innovation through S&T (BIST) Program which is designed to assist Filipino-owned companies to innovate and develop competitiveness and adapt to changing global dynamics, and the R&D Leadership (RDLead) Program which aims to strengthen the capabilities of Filipino researchers, scientists, and engineers in the HEIs and RDIs.

Social Innovation in Health:
Key to improved healthcare system

By Louella D. Labasbas, *DOST-STII*

Dr. Bernadette Ramirez, World Health Organization Scientist, delivers her keynote speech during the 36th PCHRD Anniversary held 16 March 2018 at the PICC. She tackles the importance of social innovation in health and in reinforcing an improved healthcare system in the Philippines.

THROUGH THE years, countless medicines and advancements in healthcare have improved the quality of life and prolonged people's life span across the globe. But despite the advancement in the healthcare system, multidrug resistance and infectious diseases have also been evolving.

One of the possible factors behind this is the unequal health priority management worldwide. Developed countries tend to have effective foundation and strategies in addressing health concerns, while developing countries like the Philippines tend to adopt the practices of developed countries and modify them depending on their current needs and situations.

This discussion became the highlight of the celebration of the 31st Founding Anniversary of the Department of Science and Technology-Philippine Council for Health Research and Development on 16 March 2018 at the Philippine International Convention Center.

"The current scenario with the disease-endemic countries is [that] they configure usually with the 'one size fits all' mentality. We only decide or prescribe 'this is the best way' for our community. Sometimes it does not work," said World Health Organization Scientist Dr. Bernadette Ramirez.

Dr. Ramirez highlighted that the problem in healthcare is more concentrated at the "vulnerable and neglected" ones, such as among selected African countries and other third world countries with underdeveloped healthcare systems.

"We also forget the contextual nuisances of our reality. We forget that we are actually dealing with people. In turn, there are still billions of people who have not benefitted from advancements in healthcare," she emphasized.

"It is really important for us to talk about economics in the long run when we talk about sustainability of our efforts. It should be a process that fosters internalized change in people. When we are doing a project, laging 'ano ba ang social innovation component nito?' Now, the outcomes are sustainable and scalable so you can build on it and that will enhance and strengthen the health system," Dr. Ramirez pointed out.

To address concerns in health, the involvement of the community, comprehensive solutions, and transdisciplinary action among different agencies (e.g., medicine, research, and implementation) could be a great leap towards change.

"In order to find the best practices, we have to start documenting what works and what doesn't work, in a way that it is multidisciplinary and transdisciplinary," said Dr. Ramirez.

She also mentioned the four pillars in achieving Social Innovation in Health Initiative, including research, capacity building, practice, and influence. These four pillars, when implemented effectively, can contribute in providing the needs of communities globally and support research capacity among social innovators, researchers, and students. More importantly, it will help build the capacity of local organizations in their respective countries.

In closing, Dr. Ramirez said that social innovation in health is a novel solution to a social problem that is more effective, efficient, sustainable, and collaborative. It is not only limited to health professionals, but a hand-in-hand revolution in the community.

DOST-NRCP advocates for more basic research

By Laurence M. San Pedro, *DOST-STII*

ON ITS 85th year, the Department of Science and Technology-National Research Council of the Philippines (DOST-NRCP) calls for researchers to go back to the basics and focus on doing basic research.

As most number of researchers today are focused on applied research, the DOST-NRCP is eyeing to get more researchers to do basic research.

"All innovations start with the basic research which is more on discoveries, new knowledge, and extending beyond the boundaries of one's discipline. This year is a call [for researchers] to do more basic [research] as the will be inputs for further applied research that can be used by the public," said DOST-NRCP Executive Director Marieta B. Sumagaysay.

The call for more basic research was made during the annual scientific conference and 85th General Assembly of the DOST-NRCP on 14 March 2018 at the Philippine International Convention Center.

"The focus on basic research has not been given the correct magnification because the perspective is always on what will be the application," said former DOST-NRCP President Christina A. Binag. She added that the Council wants to equally focus on basic research which is a prerequisite for applied research.

Meanwhile, DOST Undersecretary for R&D Rowena Cristina L. Guevara cited a mission program (involving 10 medicinal plants) that was introduced by the DOST more than 20 years ago as a good example of basic research. It was called the National Integrated Research Program on Medicinal Plants or NIRPROMP which was later adopted by the Department of Health. This in turn led to the creation of Republic Act 8423, otherwise known as the Traditional and Alternative Medicine Act of 1997.

According to Usec. Guevara, researches on medicinal plants such as sambong and lagundi were conducted under this program to examine their bioactive ingredients and toxicity. To date, the public is benefiting from the outputs of the said researches as these medicinal plants are already used as herbal medicines to treat kidney stones and respiratory-related problems, to name a few.

"The Philippines has around 8,500 endemic plants and we now have the Tuklas Lunas program to assist related basic researches," Guevara added.

Tuklas Lunas refers to the drug discovery and development program initiated by the DOST-Philippine Council for Health Research and Development (DOST-PCHRD) in a bid to provide solutions to the country's medical needs by means of basic research.

Photo by Ceajay N. Valerio, *DOST-STII*

During the general assembly, the Outstanding Achievement Award was given to NRCP members whose exemplary research and scientific endeavors in their respective fields of basic and applied sciences have resulted in various high impact innovations and breakthroughs.

With the help of this program, the DOST-PCHRD aims to create a drug discovery database that will store information on all conducted researches involving natural products. This will also serve as a tool in helping researchers identify which species have the potential for further studies that could lead to the discovery of a new drug. The program also includes research on Philippine fauna.

Expanding the country's research capacity

With its 13 scientific divisions, the DOST-NRCP currently has 4,087 members, 50 percent of whom are from Metro Manila. The Council hopes to expand its research pool by getting more members from the regions and targets to expand its membership base to 20,000 by 2022.

"There are many scientists from the regions and we need them to address location-specific issues. If we have an army of scientists all over the country, our policy-making influence through research will be faster," Sumagaysay added.

DOST Secretary Fortunato T. de la Peña also hopes to expand research opportunities in the regions. "We have activated NRCP clusters in Visayas and Mindanao. This is very important because this is consistent with our initiative in expanding our research pool, particularly in the science and technology sector, so that the institutions in the regions can be represented," said Secretary de la Peña.

The science chief adds that researchers and scientists in the regions know better their needs and potentials, and, therefore, the DOST-NRCP should have a strong research pool from different regions in the country."

In line with this, basic research components are included in the National Integrated Basic Research Agenda (NIBRA) as part of the National Harmonized Research and Development Agenda. By 2022, the six issue-based programs under the NIBRA are envisioned to address issues that includes water security (TUBIG Program), food and nutrition security (SAPAT Program), health sufficiency (LIKAS Program), clean energy (ALERT Program), sustainable communities (SAKLAW Program), and inclusive nation-building (ATIN Program).

"This is a great opportunity for us to show that we can act on these issues before they become issues in the country. Because most of the time, *umaaksyon tayo kapag nandiyan na 'yung problema. At kapag nandiyan na ang problema, kapag ang problema ay konektado sa teknolohiya, hindi na natin nahahabol 'yung mga solusyon kasi nandiyan na 'yung unos,"* said Senator Paolo Benigno "Bam" A. Aquino IV, chair of the Senate Committee on Science and Technology.

Filipino researchers, innovators, and scientists, from different parts of the country gathered together for five simultaneous scientific sessions during DOST-NRCP's annual scientific conference, with the theme, "Policy Research for Legislation." These sessions aimed to come up with appropriate research based recommendations toward strengthening legislations on governance, public health, food security, and international linkage.

DOST partners with DTI to boost competitiveness of MSMEs

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

DOST Secretary Fortunato T. de la Peña (middle) and DTI Secretary Ramon M. Lopez (second from right) led the recently concluded "Innovation Partners: DTI and DOST" media briefing. In the said occasion, the two agencies formally launched their partnership to reinforce the capabilities of MSMEs particularly in the provinces. Also in photo are DTI Assistant Secretary (Regional Operations Group) Demphna Du-Naga (left), DTI Undersecretary Zenaida C. Maglaya (second from left), and DOST Undersecretary for Regional Operations Brenda L. Nazareth-Manzano (right). (Photo by Gerardo G. Palad, DOST-STII)

WITH THE goal of making the products and services offered by local micro, small, and medium enterprises (MSMEs) more competitive in the world market and accessible to a larger number of consumers, the Department of Science and Technology (DOST) and the Department of Trade and Industry (DTI) have committed to work together by sharing their materials, knowledge, and facilities.

Details on the cooperation agreement between the two agencies were formally shared to members of the media during the "Innovation Partners: DTI and DOST" media briefing held on 5 April 2018 at the 3M office in Taguig City. DOST Secretary Fortunato T. de la Peña and DTI Secretary Ramon M. Lopez led the said occasion. The two agencies agreed to work together along dissemination of information and knowledge on science, technology, and innovation in the country,

"This kind of cooperation between the two agencies (DOST and DTI) is quite timely, because both of us have priorities to enhance the capabilities of MSMEs in the country, particularly in the provinces," said DOST Sec. de la Peña.

Meanwhile, DTI Sec. Lopez believes that the cooperation between DOST and DTI would provide benefits not only to the MSMEs but also to local governments and residents.

"DOST and DTI have a common goal, which is to bring development to every part of the country. As these two agencies embark [on] this partnership, we assure that we would give our best efforts to maximize the use of each other's resources and facilities to support the productivity of our local MSMEs and eventually allow them to give job opportunities to the local residents," said Sec. Lopez.

Among the highlights in the media briefing was the turnover ceremony of the S&T Nook of DOST in the Negosyo Centers of DTI. The S&T Nook is a stand-alone kiosk that contains important information on the various DOST services and research and development projects.

DOST and DTI's agreement includes DTI's One Town, One Product (OTOP) project beneficiaries to enrol their local products at oneSTore.ph of DOST. oneSTore.ph is the first-ever government e-commerce platform developed by experts from DOST Region II. This allows local products to be sold nationwide and even outside the country having the internet.

DOST to lead the NSTW 2018

By Rosemarie C. Señora, *DOST-STII*

S&T ENTHUSIASTS are in for a treat this coming 17 to 21 July 2018 as the Department of Science and Technology (DOST) headed by Sec. Fortunato T. de la Peña leads the nation in celebrating the 2018 National Science and Technology Week (NSTW) at the World Trade Center (Halls A-C) in Pasay City.

Held annually, the NSTW highlights how science, technology, and innovation (STI) play a major part in achieving national development.

This year's NSTW will carry the theme "Science for the People: Innovation for Collective Prosperity."

The exhibit for this year will simulate an ecosystem of how STI work together for the progress of a community. Technologies developed by the DOST and its attached agencies, as well as its partners, will be displayed for the first time via interactive displays in four clusters namely: STI at Home, STI in School, STI in the Workplace and STI in the Marketplace.

Visitors are encouraged to participate in games and raffles for some prizes and tokens.

Aside from the main exhibit, forums will be conducted at the mezzanine area of the Center. To be held at the main stage are forums on the Small Enterprise Technology Upgrading Program (SETUP) and Community Empowerment through Science and Technology (CEST) program.

There will also be activities lined up on the side such as film showing, scientific career talks, science journalism writeshop, and others. Though the entrance to the NSTW is open to the public for free, some of the events may require pre-registration or on a per-invitation-only basis.

The NSTW is celebrated every third week of July through Proclamation No. 169 of 1993. It aims to recognize the contribution of science and technology in the development of the country and garner support from the public and private institutions for its sustainable development.

After the event, a series of regional science and technology fairs will also be held in every region in the country until December. For complete schedule, please visit www. nstw.dost.gov.ph.

Briefer on the Regulation of Golden Rice under Contained Use

By the National Committee on Biosafety of the Philippines

THE NATIONAL Committee on Biosafety of the Philippines (NCBP) was constituted on 15 October 1990 through the issuance of Executive Order No. 430 with the primary task of formulating national policies and guidelines on biosafety. The NCBP under E.O. 430 facilitates the review and evaluation of biosafety research, deliberate the introduction of genetically modified organisms, identify the potential risks involved in the proposed activities and prescribe measures to minimize the potential risks associated with such activities.

From 1999 to 2008, the NCBP approved and had been closely monitoring research initiatives and experiments on Golden Rice (GR2E) in the country.

At present, there are 15 completed Golden Rice projects and two are ongoing. In approving these research proposals, the NCBP and Department of Science and Technology-Biosafety Committee (DOST-BC) thoroughly review the proposed biosafety procedures and recommended measures, as necessary, to achieve the appropriate level of containment to ensure the integrity of the facility and preventing escape of any viable materials into the outside environment. Moreover, all on-going experiments are continuously monitored to check compliance with the prescribed biosafety protocol.

From 1999 to 2008, GR projects were reviewed, approved, and supervised by the NCBP under E.O. 430 series of 1990 and from 2008 to date, approvals and monitoring for biosafety compliance were under the purview of the DOST-BC following the mandate of the DOST as per E.O. 514, series of 2006. On-going projects are being monitored together with the Post Entry Quarantine personnel for handling and movement of regulated articles and with the Institutions' respective Biosafety Committees to check for any breaches in the protocol. Reportorial requirements on the on-going activities and completed projects were strictly imposed.

Both the NCBP and the DOST-BC ensure that the applications on the Golden Rice project go through a sound risk assessment based on the best available science. The DOST-BC is confident that through the efficient, functional, and predictable implementation of the country's biosafety regulatory system, all GMO projects that the NCBP and DOST-BC forwarded to other agencies for the next steps of development have been performed with adequate safety measures and standards, in consideration of the environment, human, and animal health.

Strengthened biosafety regulation

On March 17, 2006, the NCBP was strengthened through Executive Order No. 514 to serve as the lead body to implement the National Biosafety Framework (NBF). It is mandated to develop national biosafety standards and policies to ensure that experiments on genetically modified organisms are performed with adequate safety measures and standards, in consideration of the environment, human, and animal health.

As part of the implementation of Executive Order No. 514 (Establishing the National Biosafety Framework, Prescribing Guidelines For Its Implementation, Strengthening the National Committee on Biosafety of the Philippines, And For Other Purposes) issued on 17 March 2006, the task of evaluating applications and monitoring on-going research experiments for contained use and confined test of Genetically Modified Organisms (GMOs) was delegated to the DOST-BC.

Under E.O. 514, the NCBP became the lead body in coordinating and harmonizing inter-agency and multisector efforts in developing biosafety policies in the country (where such are not already stipulated by law) as well as set scientific, technical, and procedural standards on actions by agencies and other sectors to promote biosafety in the Philippines. It is tasked to implement the NBF which delineated the responsibilities of handling applications under their respective jurisdictions including risk assessment of GMOs. Implementation of biosafety policies developed by the NCBP is implemented by four government Departments.

The Department of Agriculture (DA) is taking the lead in addressing issues related to the country's agricultural productivity and food security. It's also taking the lead in evaluating and monitoring plant and plant products derived from the use of modern biotechnology, as provided in DA Administrative Order No. 008, s. 2002 (2002-2015) and the latest Joint Department Circular Series of 2016, which strengthened the public information and participation in the decision making process and included the socio-economic considerations in the criteria for placing in the market GM crops.

The Department of Environment and Natural Resources does the environmental risk assessments and identification possible risks in coming up with a decision. It also take the lead in evaluating and monitoring GMOs for bioremediation, the improvement of forest genetic resources, and wildlife genetic resources.

The Department of Health on the other hand is tasked to formulate guidelines in assessing the health impacts posed by modern biotechnology and its applications. It also requires, reviews and evaluates results of environmental health impact assessments on GMOs and handles evaluation and monitoring of processed food derived from or containing GMOs.

The Associated Departments and Agencies are exercising such jurisdiction and other powers that have been conferred to them under existing laws. In particular, the following departments and agencies have also been participating in biosafety decision making, where appropriate: the Department of Foreign Affairs in promoting and protecting Philippine interests on biosafety in bilateral, regional and multilateral forums; the Department of Trade and Industry in relation to biosafety decisions which have a specific impact on indigenous peoples and communities; and the Department of Interior and Local Government, in relation to biosafety decisions which have an impact on the autonomy of local government units. (For details about the decision making process on contained use, visit: NCBP at http://ncbp.dost.gov.ph/ and DOST-BC at http://dost-bc.dost.gov.ph/)

FAQs in Golden Rice Technology *

1. *Is the safety assessment of Golden Rice accurate and adequate?*

Without exception, all countries/jurisdictions undertake the safety assessment of GM foods using the Codex approach. Among 182 events and stacks, the average event is reviewed for food safety by seven different national authorities.

In addition, according to the Food Standards Australia and New Zealand (FSANZ), food derived from GR2E is considered to be as safe for human consumption as food derived from conventional varieties.

2. *Are animal feeding studies necessary?*

According to the Codex Alimentarius 2003 DNA Plant Guideline, "Animal studies cannot readily be applied to testing the risks associated with whole foods, which are complex mixtures of compounds, often characterized by a wide variation on composition and nutritional value."

The only difference between GR2E and conventional rice is the expression of three new enzymes (ZmPSY1, CRTI, and PMI) and production of beta-carotene in the rice endosperm. The lack of toxicity associated with the newly expressed substances in GR2E rice, combined with lack of any unexpected,

unintended, changes in nutrient content or agronomic performance indicates there is no scientifically credible risk hypothesis that would warrant whole food animal feeding studies.

3. *Are there adequate levels of beta-carotene in Golden Rice? Why is GMO rice necessary if there can be other vegetables that could be sources of beta-carotene?*

Its proponents admitted that Golden Rice contains less that 10% of an equivalent amount of carrots and many green and leafy vegetables contain much more beta-carotene than Golden Rice. However, the bioconversion efficiency of beta-carotene is approximately eight-fold higher for Golden Rice than for other plant sources.

Moreover, high consumption of rice and high bioconversion efficiency means that Golden Rice has the potential to contribute significantly to improving vitamin A status.

4. *Is there a possible genetic pollution from the field trials of Golden Rice?*

Golden Rice field trial will be conducted under conditions of reproductive isolation (spatial and temporal) to mitigate pollen and mediate gene flow. In addition, there is also strict material control observed to mitigate possibility of seed mixture.

5. *What will be the level of residues of the ZmPSY1 and CRTI in the field, and how long will it last in the rice field ecosystem? What will be the effects of these gene fragments from microorganisms to other organisms?*

These proteins and their genes are already widespread in the environment – ZmPSY1 from corn which has a long history of safe use and CRTI from a bacterium found in a wide range of natural environments. ZmPSY1 and CRTI only expressed in rice endosperm (grains) at ppb levels, 0.00034% and 0.00004% of total protein, respectively. Neither ZmPSY1 nor CRTI have any toxic properties. Rapidly degraded by proteolytic enzymes, such as pepsin; proteases are widely distributed in soils.

*Based on Don Mckenzie's slide presentation during the CNA Science Communication Workshop, 17 November 2017 (As of January 29, 2018)

New trends on digitization, data security to perk up IT center

By Haziel May C. Natorilla, *DOST-STII*

DIGITIZATION OFFERS new opportunities to integrate content build up while minimizing the burden of long-term preservation of books, serials, and other collections. It is natural now to find more information in multiple platforms via electronic format.

To improve the digitization system within its information technology centers, the Department of Science and Technology-Science and Technology Information Institute (DOST-STII) recently gathered its digitization and IT staff, together with counterpart personnel from the DOST-Philippine Council for Agriculture, Aquatic, and Natural Resources Research and Development (DOST-PCAARRD), in a two-day workshop in Calamba, Laguna.

The seminar-workshop, organized by DOST-STII with DOST-PCAARRD under the "Developing the DOST-PCAARRD Information Technology Center (DPITC) Project," aimed to enhance the agency's current levels of efficiency and effectiveness as an information center with key concepts on digitization's core guidelines, policies, procedures, and techniques. It also equipped participants with knowledge on quality assurance skills, with hands-on practice on selected software tips and techniques, and with an overview on RA 10173 or the Data Privacy Act of 2012.

Dr. Chito N. Angeles, university librarian of the University of the Philippines, discussed digitization for long term preservation and access. He focused his lecture on basic digitization concepts and relevant applications for the library.

Dr. Angeles explained digitization core ideas, workflow and digital file formats, hardware requirements for image capture, storage solutions, different software editor applications, applicable minimum standards, and the digital library system. He encouraged updating and transferring data assets (e.g. print, nonprint, digital) from one digital storage to another every seven years to minimize the effect of database wear and tear and data losses due to unreadable storage material.

Meanwhile, Rajyl P. Muleta, Information Officer II of the Complaints and Investigation Division of the National Privacy Commission, gave an overview of the Data Privacy Act of 2012. He explained how it affects the individual and the organization, particularly on what information can be collected and released. He then continued his lecture on systems security, the importance of identifying what assets are being protected and what assets are most exposed, and how are the assets deployed.

The discussion helped raise awareness and remove misnomers about data privacy. IT operations behind the digital information collected, processed, and released were also shown. In mapping the typical deployment and internal infrastructure of an organization alongside common internet security solutions and server security, Muleta emphasized that data security is vital in preventing data breeches.

The seminar-workshop empowered staff with new trends and practices on digitization and data security, most of which were techniques that can be readily applied in their work.

Photo by Jessica T. Barrientos, *DOST-STII*

DOST-STII and DOST-PCAARRD personnel with Alan Taule, chief of the Information Resources and Analysis Division, DOST-STII (right, seated); Marita A. Carlos, director of the Applied Communications Division of DOST-PCAARRD (center); and resource person Dr. Chito Angeles (seated, second from right), UP University librarian.

Science for Change

Science for the People

Strengthening R&D to create a science culture

by **Rodolfo P. de Guzman**, *DOST-STII*

The fast changing landscape in the field of science, technology, and innovation (STI) has given impetus to the country's science agency, the Department of Science and Technology (DOST), to embark on a disruptive initiative dubbed "Science for Change Program" or S4CP, the centerpiece program of the administration of DOST Secretary Fortunato T. de la Peña.

According to the United Nations Educational, Scientific and Cultural Organization or UNESCO, human capital in science, technology, and innovation or STI remains the driver of change in any growing economy.

So if the country is to achieve accelerated and inclusive growth, it needs to harness its human resources by meeting the benchmark of 380 researchers, scientists, and engineers (RSEs) per million population. Likewise, the gross domestic product (GDP) expenditure on research and development (R&D) must not be lower than one percent.

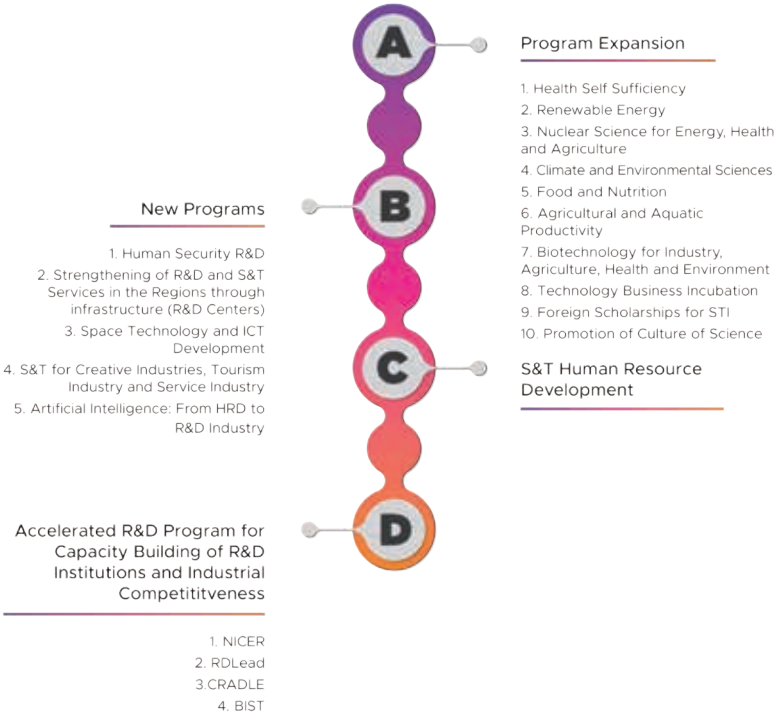
Thus, the Science for Change Program or S4CP was created primarily to respond to the needs of the ever increasing demand for better health services, increased food production, industry upgrading, and development of cutting edge technology through massive research and development in order to ride on the wave of the future.

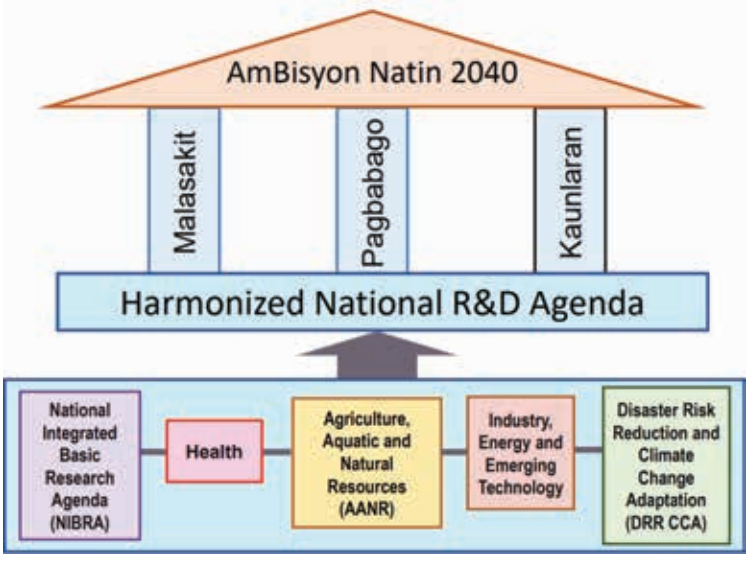
S4CP blueprint

The S4CP blueprint is anchored on the Duterte Administration's ***AmBisyon Natin 2040*** that carries three core agenda of *malasakit, pagbabago, and kaunlaran.*

During the orientation and call for proposals for the Science for Change Program held on 22 February 2018 at the SMX Convention Center in Pasay City, DOST Undersecretary for R&D Dr. Rowena Cristina L. Guevara underscored the importance of a strong R&D sector in achieving inclusive growth. Usec. Guevara spelled out the components of the Harmonized National R&D Agenda that was created to address the following priority areas: the National Integrated Basic Research Agenda; Health; Agriculture, Aquatic and Natural Resources; Industry, Energy and Emerging Technology; and Disaster Risk Reduction and Climate Change Adaptation.

Taking on the cue to create a synergistic approach on R&D initiatives, the S4CP primarily endeavors to significantly fast track STI in the country by pouring in massive investment and financial resources in S&T Human Resource Development and strengthening R&D programs in focus areas.





These areas include the implementation of Program Expansion within 10 years; creation of New Programs in five years; prioritization of S&T Human Resource Development; and promotion of Accelerated R&D Program for Capacity Building of Research and Development Institutions (RDIs) and Industrial Competitiveness.

First, the 10 Program Expansion will zero in on the following: health self sufficiency; renewable energy; nuclear science for energy, health, and agriculture; climate and environmental sciences; food and nutrition; agricultural and aquatic productivity; biotechnology for industry, agriculture, health, and environment; technology business incubation (TBI); foreign scholarship for STI; and promotion of culture of science.

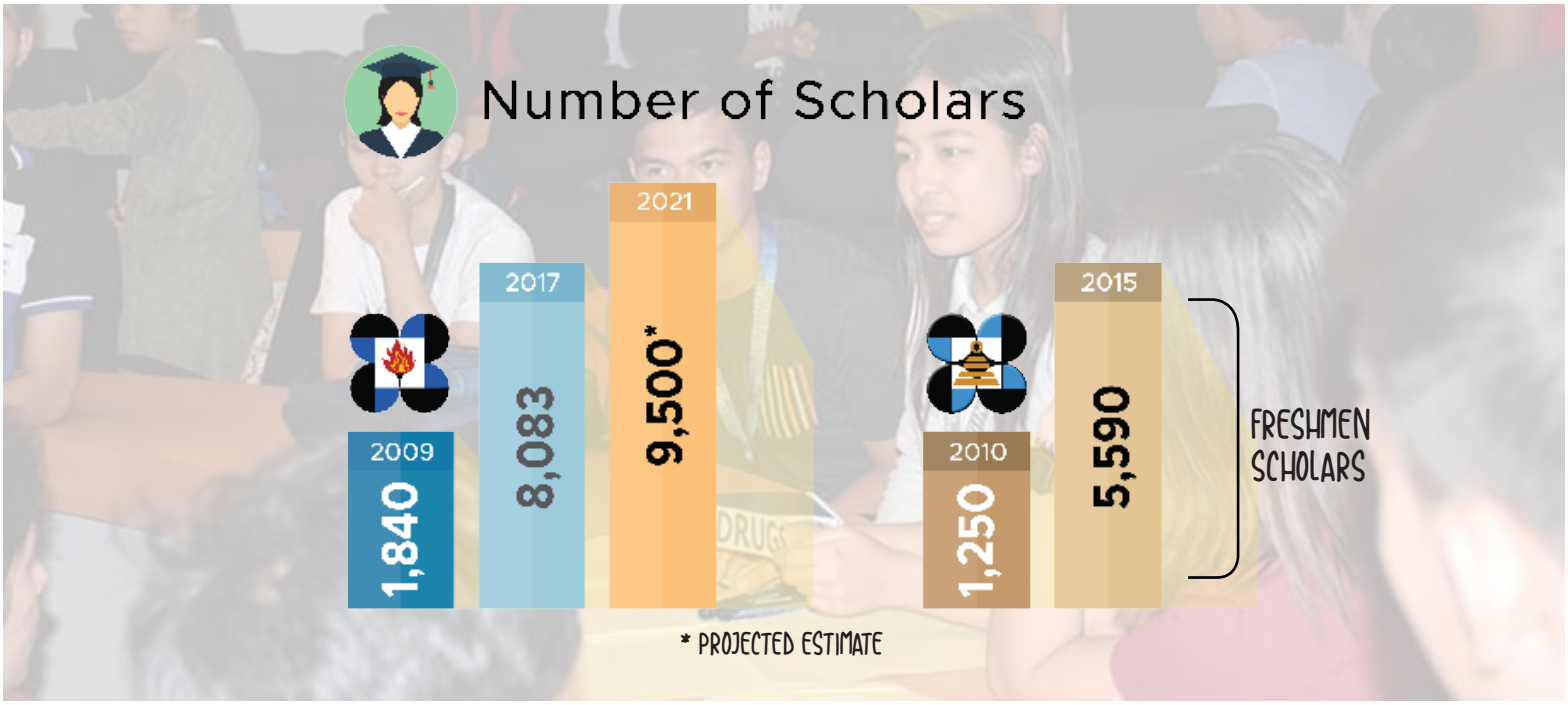
Second, for the five New Programs, the DOST listed the following: human security R&D; strengthening of R&D and S&T services in the regions through infrastructure (R&D Centers); space technology and information communication technology development; S&T for creative industries, tourism industry, and service industry; and artificial intelligence (AI) from human resource development to R&D industry.

Third, in addressing the need to strengthen human resource development, the DOST firmed up its commitment to increase the number of RSEs by providing more scholarship grants for undergraduate and post-graduate degrees in science, technology, engineering and mathematics (STEM). This is being done through the DOST-Science Education Institute (SEI) and the Philippine Science High School System (PSHS) that has now 16 regional campuses all over the country.

The number of students at the PSHS has increased from 1,840 in 2009 to 8,083 in 2017 and projected to surpass 9,500 by 2021. The DOST-SEI also increased its freshman scholars from 1,250 in 2010 to 5,590 in 2015, and rising. With this trend, the Grand Plan for S&T Human Resource Development of having 380 RSEs by 2022 is not impossible.

Based on Philippine data we now have 270 R&D personnel per million population or just 110 short of the benchmark. On the other hand, based on 2013 DOST R&D Survey, we now have 26,495 R&D personnel.

Fourth, the Accelerated R&D Program for Capacity Building of Research and Development Institutions and Industrial Competitiveness has four sub-programs, namely: Niche Centers in the Regions for R&D (NICER); R&D Leadership or RDLead; Collaborative R&D to Leverage Philippine Economy for RDIs and Industry or CRADLE; and Business Innovation through S&T (BIST) for Industry.



Science for the People: A strategy

To provide muscle to the S4CP, the DOST crafted a 12-point strategy called **Science for the People (SFTP)**. At the same time, this has become the battle cry of the department, grounded on the philosophy that science must work for the benefit of the people.

This strategy includes the following interventions:

1. R&D to address pressing problems;
2. R&D for productivity;
3. R&D to tap, manage and store renewable energy resources;
4. R&D to apply new technologies across sectors;
5. Disaster risk reduction and climate change;
6. Maximize utilization of R&D results through technology transfer and/or commercialization;
7. Accelerated R&D programs for capacity building of research and development institutions and industrial competitiveness;
8. Assistance to the production sector;
9. Upgrading of facilities and improvement of S&T services;
10. Human resource development for science and technology;
11. Capacitate and utilize institutions in the regions like state universities and colleges (SUCs) who do R&D and develop human resources in S&T; and
12. Collaboration with industry, academe, and international institutions.

10 Program Expansion

To realize health self sufficiency, the DOST, through the Philippine Council for Health Research and Development (PCHRD), continuously supports programs that will eventually make locally made medicines affordable to the general public. One program that addresses this need is the *Tuklas Lunas* (Drug Discovery) Program where R&D initiatives are geared towards identifying endemic flora and fauna that have medicinal value.

In the field of renewable energy, the DOST-Philippine Council for Industry, Energy and Emerging Technology Research and Development (PCIEERD) has been funding R&D activities in harnessing solar, wave, wind, and other natural sources of energy to minimize the country's dependence on fossil fuel.

Research and development in nuclear science for energy, health, agriculture, and industry is being spearheaded by a multi-agency group that includes the DOST-Philippine Nuclear Research Institute (PNRI), the DOST-Philippine Council for Agriculture, Aquatic and Natural Resources, Research and Development (PCAARRD), DOST-PCHRD, and DOST-PCIEERD, among others.

As a result, innovative products using nuclear technology have been developed and are being tested like the Plant Growth Promoter made from seaweeds that increases productivity in rice yield by as much as 60 percent. The use of irradiation technology is now being tested in other crops with the aim of achieving food security.

In addressing concerns on climate change and the environment, the DOST embarked on the Nationwide Detailed Resources Assessment Using LiDAR or the Light Detection and Ranging technology under the Phil-LiDAR 2 program being implemented by the University of the Philippines National Engineering Center.

LiDAR is a remote sensing method that uses light in the form of a pulsed laser to measure ranges (variable distances) to the Earth. The use of LiDAR enabled the development of hazard maps that can be used for disaster risk reduction and management as well as in the assessment and inventory of forest, vegetation, and agricultural resources.

On the one hand, the DOST-Food and Nutrition Research Institute (FNRI) conducts R&D initiatives and studies on proper nutrition that led to the development of the *Pinggang Pinoy* dietary plan and a compilation of nutritious recipes using low cost ingredients readily available in the market.

In the agriculture sector, the DOST-PCAARRD leads in developing technologies that increase farm productivity like the *Itik Pinas* project that has improved the local breed of duck to produce more eggs; the Pinoy Longline for mussels technology that is cost efficient, environment friendly, and weather resilient; use of Loop-Mediated Isothermal Amplification (LAMP) Kit for shrimp disease management; and the use of artificial insemination for goats, among others.

Photos: DOST-MIMAROPA (top) & thesummitexpress.com (bottom)

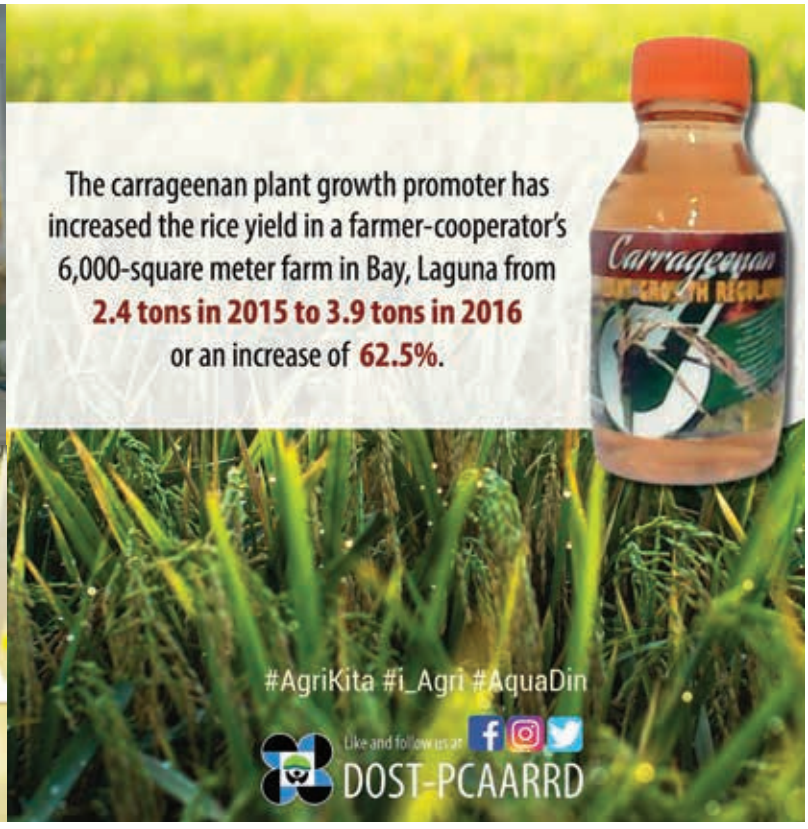


Photo: dostpcaarrd@dostpcaarrd

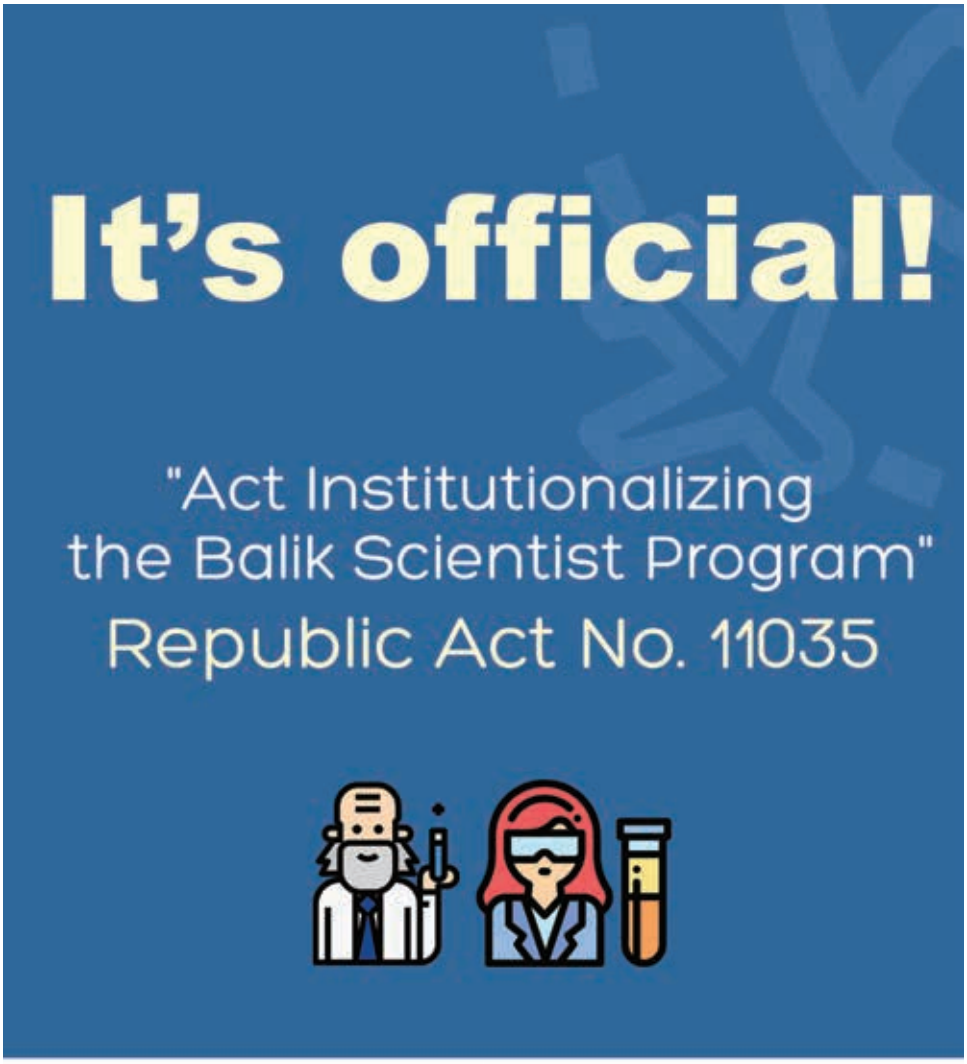
A few years back, the DOST put up the Philippine Genome Center at the University of the Philippines that serves as the core facility for bioinformatics in support of biotechnology activities for industry, agriculture, health, and environment.

The DOST has also created Technology Business Incubation facilities or TBIs housed in different SUCs primarily to assist start-up companies, to promote innovation, and encourage *technopreneurship* in the country. The TBI aims to help start-up technology-based businesses by providing a range of resources, services, and facilities needed during the development stage until they are financially viable, are capable of sustaining their operation, and able to compete in the market. DOST-funded TBIs also offer office spaces, technical services, and other vital facilities to start-up companies.

Further, foreign scholarships are offered through strong partnerships and linkages forged with foreign educational institutions. The DOST-SEI leverages the opportunities available for local scientists, engineers, and researchers by providing support and guidance to those who want to pursue master and doctorate degrees in S&T courses.

Corollary to fostering academic exercises through scholarships, the DOST's Balik Scientist Program helped in increasing RSEs that engage in R&D activities. The Balik Scientist Act was enacted into law as RA11305 on 15 June 2018 by President Rodrigo Duterte. The Act, authored by Zamboanga del Sur 1st District Representative Divina Grace Yu and Senator Paolo Benigno "Bam" A. Aquino IV, was instrumental in enticing 37 scientists to come home in 2017.

The Balik-Scientist Program (BSP) was first established by DOST with the goal of encouraging Filipino experts, scientists, engineers, and researchers based in other countries to return to the Philippines and help in strengthening and moving the country's S&T capabilities forward.



Further, this program counteracts the effects of brain drain in the country especially with the dwindling human resources engaged in research and development.

Lastly, the DOST is actively engaging various modalities in promoting a culture of science in the country through different programs and promotional activities like the production of various S&T publications, use of television and radio as media for information dissemination, capitalizing on social media platforms, and organizing exhibits, forums and conferences.

5 New Programs

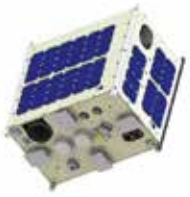
The first of the new programs is on R&D for Human Security that prompted the Department and its attached institutes to develop technologies that would ensure the safe well being of the people particularly in times of natural calamities. This involves research and development of packaging technologies for relief foods, ICT technologies for quick disaster response, remote sensing for disaster damage assessment, and others.

The DOST, likewise, prioritizes the strengthening of regional R&D capabilities to address pressing problems on the local level. One of these programs is the establishment of Food Innovation Centers (FICs) in the provinces in collaboration with SUCs. The FICs develop unique food products with the use of locally fabricated machineries like the water retort, vacuum fryer, and freeze dryer. As of 2016, the DOST has already established FICs in all regions including a Halal certified facility in Regions 11 and 12 and Halal laboratory in ARMM. The main FIC is located at the DOST- Industrial Technology Development Institute (ITDI) in Bicutan, Taguig.

Regions with FICs

NCR
Region 1
Region 2
Region 3
Region 4-A
Region 4-B
Region 5
Region 6
Region 7
Region 8
Region 9
Region 10
Region 11
Region 12
CAR
CARAGA
ARMM

Diwata Microsatellites



Diwata-1

High Precision Telescope
Spaceborne Multispectral Imager
Wide Field Camera
Middle Field Camera

Diwata-1 Images

15k+ **Images** taken in 2017, covering 22.5% of the Philippines' land area

Diwata-2

High Precision Telescope
Spaceborne Multispectral Imager
Wide Field Camera
Middle Field Camera
Enhanced Resolution Camera
Amateur Radio Unit

Another program of the DOST is the OneLab where regional laboratories are set up to provide high standard testing services at a fraction of the cost if done outside of the country.

Last April 2016, the DOST launched its first Filipino made microsatellite called Diwata-1, signaling the start of the country's foray into space technology. Diwata-1 was made by Filipino scientists and engineers from the University of the Philippines Diliman in cooperation with Tohoku University and Hokkaido University in Japan. This microsatellite produced thousands of high resolution images as it passes the Philippines four times a day. The photos are used for disaster preparedness, weather monitoring, agricultural inventory, and a lot more. Diwata-2, with much improved features and equipped with radio, is expected to be launched before the end of 2018.

Likewise, the Philippines marked another milestone with the launch of Maya-1, the first Filipino cube satellite. This project is under the PHL-microsat Program of the University of the Philippines Diliman, in collaboration with DOST-ASTI and the Kyushu Institute of Technology in Japan. Maya-1 was launched into space on 29 June 2018.

The S&T for Creative Industry, Tourism, and Service Industry is also being given close attention by the DOST to involve the use of STI in promoting the arts as well as bolster improvement in the tourism and service industry.

Lastly, the DOST is now gearing up to maximize the use of artificial intelligence in various fields that will eventually make everyday life much easier for all of us.

Legislative support: House Bill 4581

To move this initiative into fruition, the Philippine legislature has given its full support by sponsoring House Bill 4581 called the Science for Change Program Act that will put muscle to STI programs of the DOST.

Albay Representative Joey S. Salceda, the principal author of the bill, is a staunch supporter of STI and has been pushing for more budgetary resources to fund science, technology, and innovation projects, researches, and studies. The bill is also being supported by the House Committee on Science and Technology led by Bohol 2nd District Representative Erico Aristotle C. Aumentado. At the Senate, the measure is being supported by Senator Paolo Benigno "Bam" A. Aquino IV.

Under the bill, the Department will be given substantial budgetary resources to fuel R&D programs on a higher level. The budget for R&D in 2017 was P5.8 billion and the bill proposes a budget of P21 billion in 2018, doubling yearly over the five-year period that could reach P672 billion by 2022.

With massive support from the lawmakers and the concerted efforts of the STI community, the country is now poised to meet the UNESCO targets by 2022. By strengthening R&D initiatives and human resource capital now and for the succeeding years with the full implementation of the Science for Change Program, the dream of creating a culture of science can be a reality sooner than we expected.

Source: Powerpoint presentation titled "Orientation and Call for Proposals for the Science for Change Program" presented on 22 February 2018 at the SMX Convention Center in Pasay City by DOST Undersecretary for R&D Dr. Rowena Cristina L. Guevara.

- R&D to Address Pressing Problems
- R&D for Productivity
- R&D to Tap, Manage and Store Renewable Energy Resources
- R&D to Apply New Technologies Across Sectors
- Disaster Risk Reduction and Climate Change
- Maximize Utilization of R&D Results Through Technology Transfer and/or Commercialization
- Accelerated R&D Program for Capacity Building of Research and Development Institutions and Industrial Competitiveness
- Assistance to the Production Sector
- Upgrading of Facilities and Improvement of S&T Services
- Human Resource Development for Science & Technology
- Capacitate and Utilize Institutions in the Regions - SUCs who do R&D and Develop Human Resources in S&T
- Collaboration with industry, academe, and international institutions

Lab-in-a-Mug Project The Search for Grants

by Anne Marie Alto

In 2010, Dr. Raul V. Destura and seven other co-inventors composed of infectious diseases specialists, molecular biologists, and biotechnologists received a grant under the Lab-in-a-Mug project funded by the Department of Science and Technology (DOST)-Technology Innovation for Commercialization and Technology Application and Promotion Institute, under the Technology Innovation for Communication Program, DOST-Philippine Council for Health Research and Development, Philippine Genome Center, and the University of the Philippines System.

According to Destura, all diagnostic kits under this project are integrated and miniaturized in an isothermal unit as small as a "mug" that will function as a multi-infectious disease diagnostic device similar to a portable laboratory. The "Lab-in-a-Mug" was also conceptualized, designed, and piloted at the Institute of Molecular Biology and Biotechnology, National Institutes of Health, University of the Philippines Manila with Destura as project leader. In the pipeline are testing kits for tuberculosis, salmonella, chikungunya, influenza, malaria, schistosomiasis, leptospirosis, Zika, and paragonimiasis, which already have their proof of concepts and will set off once funding is secured.

The funding enabled the team to conduct the study which they completed in almost two years from 2010 to 2012. Having a shared goal of identifying a common and deadly virus at its early stage, Destura and his team were able to develop a new method of detection that is within reach of the Filipino people, unlike the previous inventions.

"First we identified the need for technology, then we discussed what the best platform technology was for this particular problem, and then we arrived with the technology using isothermal amplification. After deciding what platform to use, the experimental methods were done for proof of concept. After finding out the feasibility of the proof of concept, the laboratory performance testing assay on known standards and controls followed. When it passed laboratory performance assay, we identified the

analytical sensitivity and specificity based on laboratory performance. After getting the number, we proceeded with clinical validation study to test it with actual patients needing it," Destura explained.

Getting the sample size complete was a major challenge to test the effectiveness of the kit. The first trial required over 100 patients and the second consisted of more than 500 patients. Getting the consent of that number of patients was another issue, considering that not everyone wants to be part of the study. The team got most of its patients from the National Children's Hospital, Philippine General Hospital, and the Medical City.

"We filed for Food and Drug Authority (FDA) approval and it is now an FDA-exempt technology, manufacturing site-approved, and commercial laboratory-approved," he added.

Braving the mainstream market

Many factors contributed to the delay in using the kit; the supply chain being one of the major roadblocks. "The procurement process and the arrival of the reagents are a huge challenge while we're doing the clinical trial. Some kits arrived on time, some are near expiring. When you put them all together, it really affects the integrity of your kits."

In 2013, Destura and his team formed the Manila HealthTek Inc. to commercialize Biotek-M™ Dengue *aqua* kit and the rest of the Lab-in-a-Mug projects. "It's easier now that it's a spin-off company. All of the kits arrive much earlier and the performance is way better than the ones we tested in clinical trials. The clinical trial performance was already adequate for clinical use, the added performance power was a pleasant surprise to us," he said.

The Manila HealthTek Office stands in Marikina where the kits are currently being mass-produced. But since the researchers initially developed the kit as part of a research and development program funded by several organizations, they had to secure their approval, apply for a license, and comply with regulatory processes before formally commercializing the kit.

For three years, the company had to diversify its services to sustain its income while waiting for the rights to be granted. Finally in 2016, the rights to commercialize the technology was transferred to Manila HealthTek Inc.

"It needed a lot of capitalization. But it has entered the mainstream market which is the Department of Health (DOH). We are going into sectional discussions with the local government units and private hospitals to take in the technology," Destura added.

The Manila HealthTek is not limited to Biotek-M™. It is also dedicated to developing, manufacturing, and distributing technology for diagnostic medicine. It promises quality and accurate diagnosis of communicable and non-communicable diseases at a fraction of a cost.

photo: www.upm.edu.ph

Its Research and Development Division and Molecular Diagnostic Services Division help provide the necessary support to local and international scientists from designing the laboratory component of their research proposal to expanding their market reach.

Destura admits that credit for Biotek-M™ should not entirely go to him but his team of inventors.

"They gave more than I expected them to do in terms of commitment [and] that meant a lot. I made them co-owners of the company Manila HealthTek Inc., this is also to send a message to other technology developers not to leave their associate researchers behind."

A translational research

Aside from problems concerning design, laboratory performance assay, clinical validation, and marketing analysis, there's also the issue of scrounging for funds. Indeed, it has taken years for Biotek-M™ to fly off the ground but when it did, it achieved noteworthy success.

The DOH recognized this major advancement in dengue detection and made it into a policy to be the second confirmatory method of the Dengue Diagnostic Program.

"We became the second-line testing for dengue. If NS1 turns out to be negative in its result, it will be re-tested using the Biotek-M™," Destura said.

Looking ahead

Destura and the team are looking further down the road for innovations even if the kit is still on the roll-out. He said that the drive to create innovations in healthcare delivery is fueled by one simple thing: love for country.

"Biotek-M™ is not about me. Biotek-M™ is for this country. That has been our inspiration in developing this technology. I certainly have grown so much from the experiences that the entire team has gone through. Things happen for a reason and it happens at the right time, given the right moment. If you are clear with your vision, what you want for yourself and for the country, then you just have to bite the bullet and stop making excuses for things that you cannot do because the only thing that stands in the way is you," he emphasized.

Every individual has a critical role in working on something great for this country. These scientists are willing to play their part in technology development, powerful enough to bring acceptable, accurate, and affordable health care within reach of the Filipinos.

Editor's Note: Article is culled from the main article "Quicker, Cheaper, and Proudly Pinoy-First Dengue Diagnostic Kit Developed by UP Manila Scientists" which appeared at https://www.upm.edu.ph/node/2288. Reprinted with permission from the UP Manila Health Ripples community magazine.

A stronger PH peso, literally

by **Rodolfo P. de Guzman**, *DOST-STII*

Photo: www.pageone.ph

Did you ever wonder how many hands have owned the peso bills that are now in your wallet? How have the bills survived the countless change of hands with all the folding, crumpling, and passing on it went through?

Unknown to many, the Philippine peso bills go through some strength tests to ensure that it will last for some time, considering that it has a very fast pass-on rate.

Strength tests of the Philippine paper money are done in one laboratory of the Department of Science and Technology-Forest Products Research and Development Institute's (DOST-FPRDI) equipped with a specialized machine that tests the strength properties of the currency base paper.

This state-of-the-art facility is called the DOST-FPRDI's Pulp and Paper Testing Laboratory or FPPTL, housed at the University of the Philippines Los Baños.

The FPPTL serves as a reliable testing center for local pulp and paper makers, converters, and the consumers to ensure that the paper materials they use to produce various products meet the quality for global standards.

For the Bangko Sentral ng Pilipinas or BSP, the facility is very important in testing the currency base paper it uses in producing banknotes. Money, aside from its intrinsic value, is very expensive to produce. The quality of materials used matters a lot. In fact, the BSP spends around P3 billion annually just to print new banknotes and mint coins to replace those that have deteriorated and were demonetized.

Just recently, producing new banknotes has become very expensive because paper money is printed using imported currency base paper made of 20 percent abaca that is available locally and 80 percent cotton that comes from the United States. Ironically, the country exports abaca pulp and imports it in the form of currency base paper.

Life span of paper money

Usually, paper bills last from one to five years depending on its use. However, the useful life of paper money can be shortened when people misuse or abuse the paper money by folding it in small portions, crumpling it, or even getting it wet in some instances when it is exchanged without much care in wet markets, as payment for public transport, and other economic activities.

The good thing now is that with thorough research and study, experts were able to develop good quality currency base paper by blending local plants like abaca [more popularly known as the Manila hemp for its strong quality], salago, and mangium.

Salago plant is a kind of shrub grown locally and its fiber is produced mainly for the export market that amounts to about more than P1 billion per year. The salago fiber is very much similar to the "mistumata" fiber being used in Japan for its specialty papers.

On the other hand, mangium is a fast growing tree grown in many local plantations, thus ensuring a steady supply of raw materials for the currency base paper.

Meanwhile, on abaca, the country is the largest producer of this plant with an export volume reaching 85 percent of the world's abaca requirement for both pulp and fibers which is worth some P5.5 billion.

The mixture of abaca—the strongest plant fiber—with salago and mangium has given the currency base paper better resistance for tear. Further, the folding endurance is at par with imported currency base paper. Moreover, the material's runnability is much improved as indicated by the continuous paper web formation from the form wire, press, and dryer sections up to the final paper roll without any break from the entire process.

Photo: news.abs-cbn.com

Testing paper strength

The FPPTL, in full operation for more than a decade now, has become an indispensable facility for producing high quality paper money. The testing facility conducts paper and paper board tests that include the following:

- analyzing paper and paper board's physical and optical properties such as texture, grammage, brightness, thickness, and density;
- examining the proximate chemical analysis for moisture, ash, extractives which include alcohol-cyclohexane, 1% sodium hydroxide (NaOH), and hot/cold water, and klason lignin;
- determining strength properties such as resistance to bending, puncture, tearing, and crushing force of paper and board; and

In 2007, it was the first DOST-FPRDI testing laboratory to be accredited and was given the prestigious PNS/ISO/IEC 17025:2005 accreditation after passing the assessment of the Philippine Accreditation Office of the Department of Trade and Industry.

As the sole authority in paper tests, DOST-FPRDI tests all pulp, paper, and paperboard products. This coincided with the research and development initiatives in pulp and paper technology that has since been in place way back in the late 1950s.

Photo: www.care-philippines.org

photo: Henry A. de Leon

SCIENCE FOR CHANGE

Seaweed additives up for more field tests

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

The project on carrageenan plant growth promoter (PGP) will be field tested in more areas in the country. Made from carrageenan extracted from seaweeds and further processed through irradiation, the PGP can improve rice yield by 30 percent. The yield is attributed to carrageenan's ability to fortify rice stems.

The carrageenan PGP is funded by the Department of Science and Technology-Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (DOST-PCAARRD) and developed by the DOST-Philippine Nuclear Research Institute (PNRI).

Said project on carrageenan plant growth promoter (PGP) will greatly help farmers access less expensive but highly effective plant growth enhancers that can lead to improved harvest and increased income.

As a growth enhancer, carrageenan provides a ton of benefits such as improved rice productivity, resistance to rice tungro virus and bacterial leaf blight, and increased harvest. A farmer can also save 18.12 percent of production cost because no chemical pesticide was applied.

Field testing of carrageenan PGP in rice and corn

Last March, the DOST-PCAARRD, Department of Agriculture, and the National Crop Protection Center of the College of Agriculture and Food Science of the University of the Philippines Los Baños (UPLB) have finalized the agreement on the field verification of the carrageenan PGP in major rice and corn producing areas of the country.

The effectiveness of the carrageenan PGP in rice will be evaluated in the field sites located in regions 1, 2, 3, 4A, 6, 9, and 11 while experimental sites for corn will be in Region 2 and UPLB.

The research team will test its efficacy to induce resistance against tungro virus in bed rice, bacterial leaf blight in hybrid rice, inspect pests such as green leaf hopper, brown plant hopper, rice stem borer, cutworm, and armyworm.

Carrageenan is compatible with the traditional practice on fertilizer application, thus, its use is easily accepted by the farmers. To add, it also promotes sustainable agriculture because it is environment-friendly and enhances the presence of natural enemies that fight major pest in rice fields. It also enables more efficient absorption of plant nutrients which results in improved growth.

Meanwhile, a researcher from DOST-PNRI said that carrageenan can strengthen rice stem and grains firmly attached to the panicle which makes the plants more resistant to strong typhoons. *(With information from DOST-PCAARRD)*

SCIENCE FOR CHANGE

Farm monitoring FROM SPACE

by Laurence M. San Pedro, *DOST-STII*

Photo: www.sarai.ph

Farm monitoring on a daily basis is never an easy task. Farm essential assets such as water, irrigation, flooding, power, and equipment need to be taken into account regularly.

Today, with a wide array of emerging green technologies that promote an efficient, innovative, dynamic, and eco-friendly workplace, farm monitoring has become easier and better through various farm monitoring systems and devices.

During the 3rd National Research and Development Conference, a new farm monitoring system was presented by Dr. Vicente G. Ballaran, Jr. of the University of the Philippines Los Baños (UPLB). It is called the "SARAI Enhanced Agricultural Monitoring System or SEAMS."

SEAMS is among the technologies developed from the project "Smarter Approaches to Reinvigorate Agriculture as an Industry in the Philippines (SARAI)" which is led by UPLB and funded by the Department of Science and Technology-the Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (DOST-PCAARRD).

Project SARAI was conceptualized to address the Philippine agriculture sector's high vulnerability to the impacts of climate change. Our farmers too face various challenges in adapting to new ecological conditions and continuously struggle to come up with new more efficient and effective agricultural practices.

"What seems to be impossible is now possible through SEAMS. With this farm monitoring system, satellite images [from space] can now be used for monitoring of crops," said Dr. Ballaran.

How it works

SEAMS uses free and daily updated satellite images from the United States and Europe for near real-time monitoring of the actual area planted to rice and corn. It is capable of processing data from the satellite and convert them to a form that can be used by the farmers.

Other uses of this monitoring system include land use change, vulnerability assessment, identification of possible breeding grounds of major insect pests, and weather condition in areas without weather stations.

"Rainfall, temperature, and other weather data can be measured by satellites. Areas that are prone to flooding can also be identified. It has a weather forecasting capability for several days to as long as six months, thus, giving farmers ample time to prepare for their activities," he added.

Dr. Ballaran added that overall, SEAMS provides a tool that teaches our farmers to become more resilient and become more advanced in farm management.

Hybrid Electric Train
Made by Filipinos, for Filipinos

by **Louella D. Labasbas**, *DOST-STII*

Photo: www.dost.gov.ph

If you would ask someone "What is your ultimate wish as a commuter?" it would definitely be a comfortable and hassle-free transport system. However, the current situation in the Philippines leaves much to be desired.

In 2013, the government resumed the operations of the Philippine National Railways (PNR) after its suspension due to a series of typhoons from 2006 to 2012. It is so far operating as the most affordable commuter rail that ventures from Metro Manila to Laguna, and to the Bicol Region.

Since then, commuters–whether elderly, professionals, students, and common workers–have been taking the PNR trains, resulting in highly congested and uncomfortable train coaches, especially during rush hour.

To address this problem, the Department of Science and Technology-Metals Industry Research and Development Center (DOST-MIRDC) developed a hybrid electric train, a five-coach train capable of carrying 220 passengers and can safely run at 40 kph on the existing PNR tracks.

The P120-million project was initiated in 2013 and since then has been undergoing several tests to adhere to the specifications and safety standards of the PNR and the engineering firm Systra Philippines, Inc. (SPI).

"The hybrid electric train is one of the mass transport solutions DOST-MIRDC has developed that is composed of two power sources, the diesel generator set and batteries," said Engr. Robert O. Dizon, executive director of DOST-MIRDC.

The technology is said to be efficient because it has regenerative capability. Its batteries can store generated energy as it runs and stops. It is also considered eco-friendly because it can reduce fuel consumption by up to 50 percent.

The hybrid electric train has been subjected to several test runs and modifications and SPI said that it has a strong potential as a mass transport system. To date, the hybrid electric train has run 1,500 km in an eight-hour continuous testing on a 2.7-km test track.

Dr. Rowena Christina L. Guevara, DOST Undersecretary for Research and Development, also said that a series of tests is necessary to ensure that it is safe during operations and to check if there might be any possible problems particularly in the braking system.

According to Engr. Pablo Acuin, project leader, a follow-up optimization was done based on the last endurance test and can proceed to another test run starting 27 June 2018. He also mentioned that DOST-MIRDC is securing PNR's approval of the proposed demo run of the hybrid electric train in time for the celebration of the National Science and Technology Week in July 2018.

ITIK PINAS
boosting the balut industry

by Jasmin Joyce P. Sevilla, *DOST-STII*

Better *itik*, better *balut*.

Itik is a native duck in the Philippines while *balut* is the egg that this duck lays. *Balut* is a favorite Filipino delicacy, eaten while still steaming hot and the bird embryo sprinkled with a dash of salt and some drops of vinegar.

Aside from the big demand for *balut*, there appears to be an increasing demand in duck meat too. However, the Philippine duck industry is being threatened by low egg production due to the decline in the genetic quality of layer ducks.

Thus the Department of Science and Technology-Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (DOST-PCAARRD) developed a genetically superior breeder duck called 'Itik Pinas' (IP) to further boost the development of the duck industry in the country.

The project is in collaboration with the National Swine and Poultry Research and Development Center-Bureau of Animal Industry (NSPRDC-BAI).

Photos from the powerpoint presentation of the researcher presented during the 3rd National Research and Development Conference (NRDC) held at the Philippine International Convention Center on 20 April 2018.

According to Dr. Synan S. Baguio from DOST-PCAARRD, IP will help in addressing the low and inconsistent selection and breeding of the traditional Pateros duck, as well as in increasing the number of duck breeders in the country that produces high-quality duck products.

The project came up with a breed that has uniform physical characteristics, predictable production performance, and consistent product quality.

"Itik Pinas is a duck breed that can lay 70 percent more eggs annually compared with the 55 percent eggs produced by the ordinary breed," Dr. Baguio explained. In addition, Itik Pinas can produce an egg weighing approximately 65 grams which is ideal in *balut* making.

Dr. Baguio also added that aside from these qualities, what makes Itik Pinas a superior breeder duck is that it is cost-efficient and low maintenance. He added that the IP breed is seldom infected by illnesses and it does not require expensive feeds. Such characteristics could help increase the income of *balut* producers in the country.

DOST-PCAARRD and NSPRDC-BAI developed three strains of Itik Pinas—two of which are pure breeds known as IP-Itim and IP-Khaki, while the other is a commercial hybrid line known as IP-Kayumanggi.

Last year, performance testing on IP was done in Regions II, III, IV-A, VI, IX, XI, and XII, as well as development of product standards for *balut* and salted eggs.

TAHONG SA SAMPAYAN
Long line, big profit

by **Rodolfo P. de Guzman,** *DOST-STII*

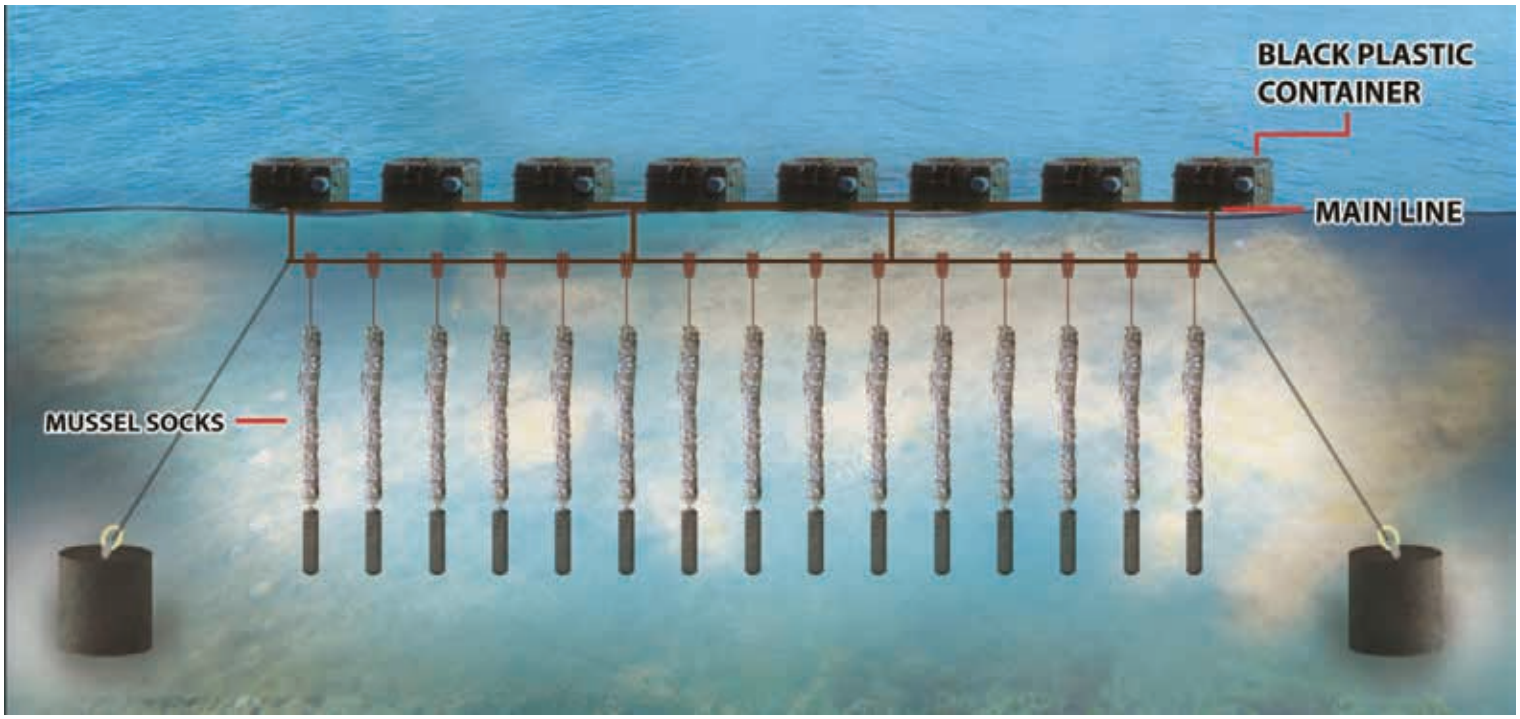
Photos: musselphilippines.com

May pera sa sampayan!

Indeed the new method of mussel (tahong) farming locally developed by our scientists promises a better income for fisherfolks particularly in the provinces. This innovation is called the "longline system of mussel growing," a kind of hanging method.

This is different from the traditional way of growing mussels which is called the "stake method" where bamboo stakes or poles are used to culture the young mussels or spats. In this method, the bamboo poles act as a wall or barrier to the runoff from the uplands resulting in siltation. In time, the accumulated silt makes the waters shallow and is no longer suitable for mussel culture.

The innovation in the longline method is that the young mussels are literally hanging on the line that is submerged in the water, thus it is called "sampayan," the Filipino term for clothesline.



Photos: musselphilippines.com

Hang 'em up

The setup includes the young mussels placed in onion bags that are hung in 50-meter longlines with recycled plastic containers that serve as floats. The cost of the longline is much lower than the stake method that uses bamboo, which is more expensive.

The local longline method is a cheaper version of the longline culture system used in New Zealand for producing high quality mussels. The said system has been modified by the Department of Science and Technology-Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (DOST-PCAARRD).

The said method is also easy to manage and maintain. At the start, the spats are collected from the wild using spat collectors made of coconut husks that would otherwise be thrown away.

Then the spats are placed inside the onion bags called "socks" which are then hung in the longline. The fisherfolk just needs to regularly clean the longline of unwanted materials which come from the water and attach themselves to the lines.

After four to six months, the mussels are ready for harvest.

Advantages of longline method

Aside from being environment friendly, the longline is also climate resilient, meaning it is not easily destroyed during typhoons and other natural calamities. What the fisherfolks do is that when there are typhoon advisories, they fill the plastic containers with seawater so that the line can be lowered, thus preventing it from being damaged by big waves or strong winds. The longline can also be untied from the concrete anchor and moved to a sheltered area until the typhoon has passed through the culture site.

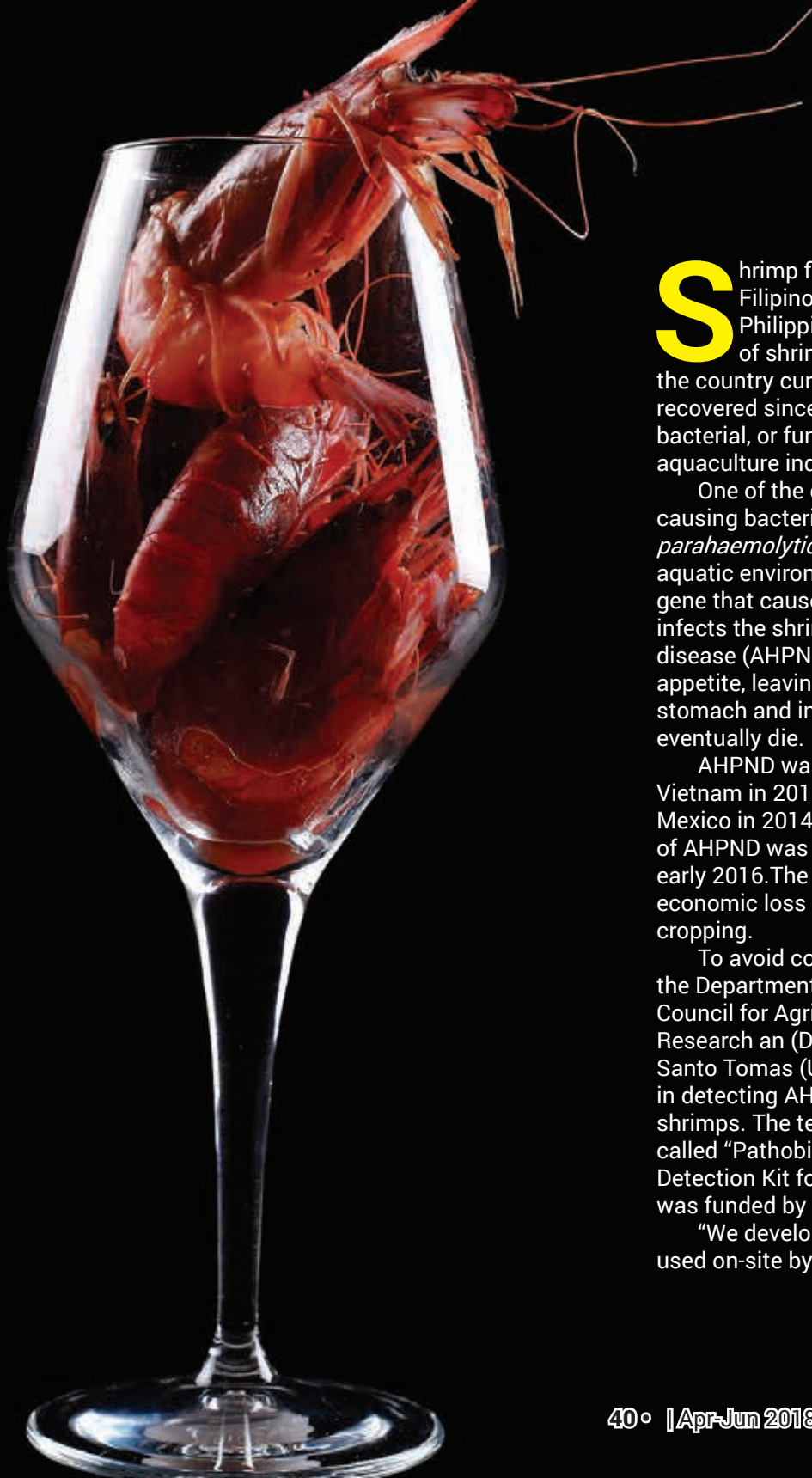
Based on research, the longline is a viable economic enterprise with a return on investment rate of as high as 87 percent and a short payback period of just one year to recoup investment.

The longline method of mussel farming can also be applied in deeper waters, will not cause sedimentation, and reduces damage to the coastal environment. Thus it becomes a sustainable enterprise.

There are now mussel farmers from Cavite, Iloilo (Guimaras Island), Capiz, Aklan, and Samar who are using the longline method. The longline system is being implemented through the DOST-PCAARRD with the help of other partners that include UP Visayas-College of Fisheries and Ocean Sciences, Samar State University, and Capiz State University. Dr. Carlos Baylon of the UP Visayas-Iloilo is the project leader of the program called Pinoy Longline Mussel Farming System.

Detecting shrimp disease now made easier

by **Laurence M. San Pedro**, *DOST-STII*



Shrimp fishing has been a source of livelihood to Filipino farmers for years. In the early 1990s, the Philippines was the world's third largest producer of shrimp. However, due to disease outbreaks, the country currently ranks sixth in the world and has not recovered since then. These diseases, which can be viral, bacterial, or fungal in nature, are a bane to the shrimp aquaculture industry.

One of the documented pathogens, or disease-causing bacteria afflicting shrimps in the country is *Vibrio parahaemolyticus*. This type of bacteria that thrives in an aquatic environment is dangerous as it harbors a toxin gene that causes mass death in shrimp farms. The toxin infects the shrimps with acute hepatopancreatic necrosis disease (AHPND). The toxin suppresses the shrimp's appetite, leaving the shrimp with an empty and pale stomach and intestine. The shrimp will not eat and will eventually die.

AHPND was first reported in China in 2009, followed by Vietnam in 2010, Malaysia in 2011, Thailand in 2012, and Mexico in 2014. In the Philippines, the first reported case of AHPND was in 2015 while several reports followed in early 2016.The AHPND outbreak in the country has caused economic loss amounting to P365,000 per hectare of cropping.

To avoid continuous loss in the aquaculture industry, the Department of Science and Technology-Philippine Council for Agriculture, Aquatic and Natural Resources Research an (DOST-PCAARRD) and the University of Santo Tomas (UST) teamed up to develop a technology in detecting AHPND or early mortality syndrome among shrimps. The technology was developed under the project called "Pathobiology and Development of Molecular Detection Kit for EMS/AHPND causing bacteria" which was funded by DOST-PCAARRD.

"We developed a low-cost diagnostic kit that can be used on-site by ordinary farmers. What the Philippine

shrimp industry needs is a quick, affordable, easy-to-use, and reliable on-site detection kit," said Dr. Mary Beth Maningas, project leader of the study, during her presentation at the 3rd National Research and Development Conference.

According to Dr. Maningas, the pains of the Filipino shrimp farmers today are that the available shrimp disease detection test products in the market are expensive and difficult to use and that outsourcing diagnostics to accredited agencies is not time-efficient.

"This is the solution. We branded it as JAMP Alert®," said Maningas. According to her, "JAMP" is for Juan Amplification as it was innovated by 'Juan' (a generic name for the Filipino) and was developed for 'Juan'."

"It works under 'one' temperature condition and you can get the result after just 'one' hour. More importantly, it can be used by an ordinary worker in the field or on-site," she added.

The JAMP Alert® diagnostic kit is a technology that uses loop-mediated isothermal amplification (LAMP) for the detection of diseases in shrimps. It has already been tested across the country and is comparatively better than other detection methods.

"The kit is rapid, precise, cost effective, and proudly Filipino," Maningas remarked.

For many decades, shrimp was the most traded aquaculture product in the world until 2015 when salmon had overtaken it. But still, shrimp accounts for 16 percent of all seafood traded in the year, according to the Food and Agriculture Organization. In fact, 90 percent of the world shrimp production comes from the Asian market.

Through the JAMP Alert® diagnostic kit, the DOST envisions a healthier fish production in the coming years.

Photos from the powerpoint presentation of the researcher presented during the 3rd National Research and Development Conference (NRDC) held at the Philippine International Convention Center last 20 April 2018.

Healthier kids for a healthier nation

by Judy Q. Aca-Saclamitao, *DOST-STII*

"Stunting is a largely irreversible outcome of inadequate nutrition, bouts of infection during the first 1,000 days of a child's life," said Dr. Mario V. Capanzana of the Department of Science and Technology-Food and Nutrition Research Institute (DOST-FNRI) in his presentation at the 3rd National Research and Development Conference (NRDC) held at the Philippine International Convention Center last 20 April 2018.

According to health experts, the long-term effects of stunting include diminished cognitive and physical development, reduced productive capacity, and poor health. The most critical period where the prevalence of stunting and underweight is high is from 6 months to 2 years of age.

"The emerging focus of interventions for young children are therefore anchored in the first 1,000 days of the child's life," added Dr. Capanzana.

To address this nutrition gap, the DOST-FNRI came up with a Malnutrition Reduction Program (MRP), a long running program that supports the current concern for stunting as elaborated in the Sustainable Development Goals and in improving the lives of our young Filipino children in the countryside

The program combines food and nutrition technologies which requires the strategy for creating the supply and demand. "With the 38 food processing facilities in the country, we are able to continuously operationalize our supply strategy by establishing these complementary food processing facilities classified in terms of volume of production as large, medium, and small scale," Dr. Capanzana explained.

The demand strategy, on the other hand, is implemented through the DOST PINOY or Package for the Improvement of Nutrition of Young Children. It is a nutrition invention strategy implemented in the regions which combines complementary feeding and nutrition education.

The MRP has covered 17 regions with advocacy activities and training. The program has also reached millions of children participants of the complementary feeding intervention initiated by both government and private groups. "I am pleased and happy to share that the DOST PINOY modules have been adopted for the Early Childhood Care and Development's First 1000 days program of the National Nutrition Council of the Department of Health. Thus, the program is now in Sulu," added Dr. Capanzana.

He likewise cited the success stories associated with the adoption of the complementary food technology by the Negrense Volunteers for Change Foundation, Inc. (NVC)

Photo: Negrense Volunteers Community

in Bacolod. Reaching millions of Filipino young children, NVC's Mingo meals (nutritious instant complementary food made of rice, mongo, and malunggay) have also reached the kids of internally displaced persons in the Tent City of Baloi, Lanao del Sur during the Marawi incident.

"Bringing Mingo meals on the ground became possible through proper packaging equipment facilitated by NVC. Today, Mingo meals are readily available in *sari-sari* stores. Mothers discovered these foods as nutritious alternative to the attractively packed junk food that tempt their kids," Dr. Capanzana reported.

It is therefore no surprise that the MRP became one of the winners of Foundation for Advancement of International Medical Education and Research's (FAIMER) Projects that Work. The US-based organization recognizes projects that succeeded beyond initial implementation continuously and have had significant positive impact on health or the community for over three or more years.

Dr. Capanzana disclosed that "Since 2015 until this year 2018, the MRP has been included in the National Priority Plan of the National Economic Development Authority (NEDA) which means that donations under the program will be tax deductible in full as stipulated in Section 34 (H) (2) (a) of the National Revenue Code."

"We are happy to report also that the BIR ruling on this regard has been released," he said.

He further remarked, "The challenges are continuous but the MRP beyond 2018 is envisioned to be sustained and institutionalized in the LGUs as part of the First 1000 Days program of the government that will reach every Juan and Juana."

In closing, Dr. Capanzana called on everyone for the adoption of the DOST's Malnutrition Reduction Program as a way of making a difference and contributing to help our Filipino children achieve their full potential through science and technology.

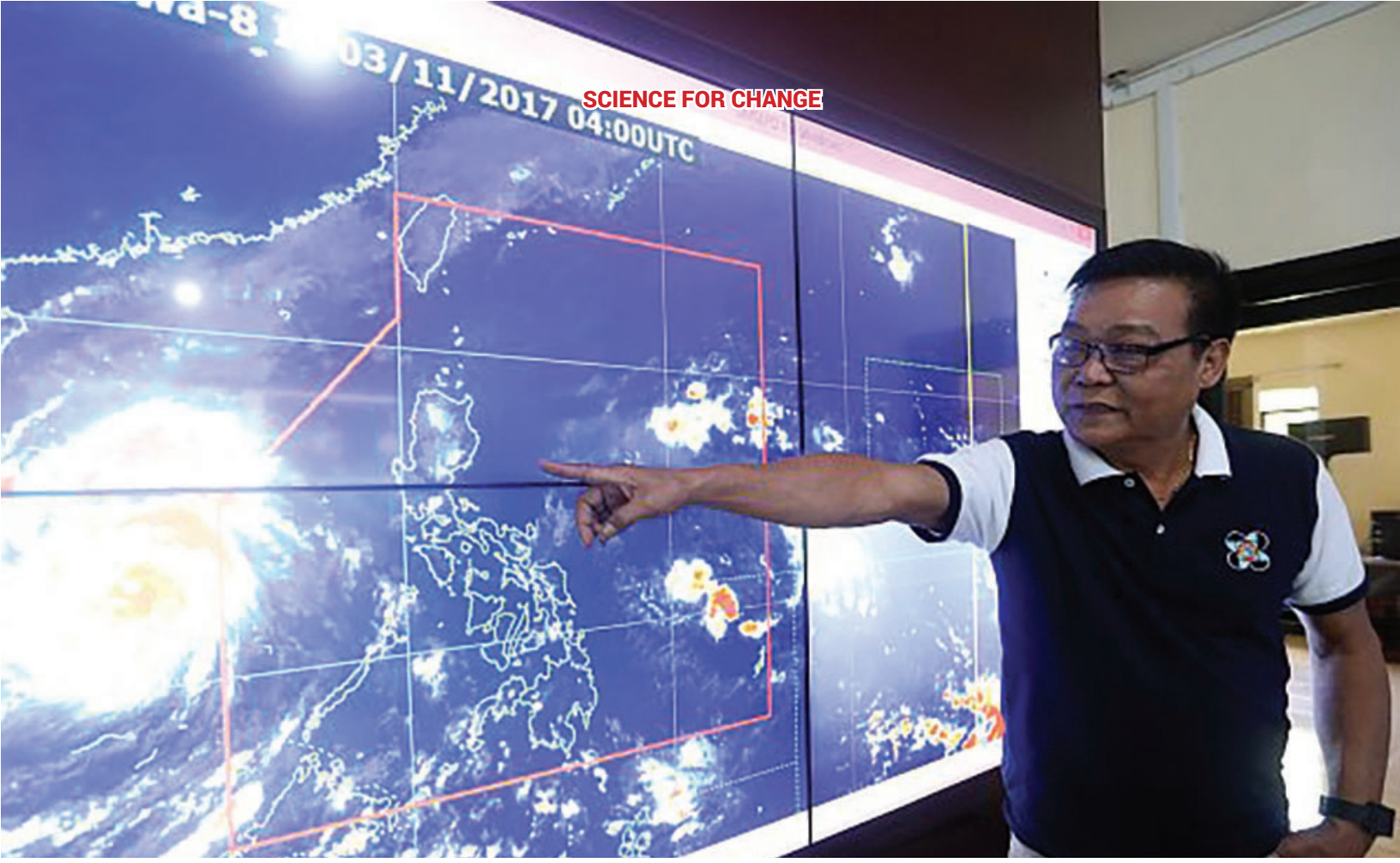


Photo: www.cabudailynews.inquirer.net

Warmer PH in the next century

by Judy Q. Aca-Saclamitao, *DOST-STII*

Scientists can predict weather conditions for the next 24 hours, next seven days or next few months. But how do they predict beyond one year? "We use climate change projections," said Thelma A. Cinco, assistant weather services chief at the Department of Science and Technology-Philippine Atmospheric, Geophysical and Astronomical Services Administration (DOST-PAGASA).

In the recently concluded 3rd National Research and Development Conference held at the Philippine International Convention Center on 20 April 2018, Cinco revealed climate trends and projected climate change in the country.

"For the past 67 years (1951-2017), the mean annual temperature has risen to about 0.1°C per decade where 1998 was the warmest, followed by 2010 and 2016," said Cinco. "All of the said years were associated with El Niño years. In fact, the increase in temperature in the last two decades was accompanied by extreme weather events."

Cinco, who also heads the Impact Assessment and Applications section of DOST-PAGASA, recounted the associated hazards with extreme climate events: flooding, landslides, strong winds, and storm surge.

Typhoon Ondoy (Ketsana) in 2009 caused massive flooding in Metro Manila while tropical storm Urduja (Kai-tak) brought landslide in Biliran, Eastern Visayas whereas the strong winds brought about by the likes of Super Typhoon Pablo in 2012 almost wiped out Mindanao's houses and agriculture. Then there's the 2013 Super Typhoon Yolanda (Haiyan) which brought storm surge in Tacloban and Samar, one of the most powerful typhoons that made a landfall in the Philippines in recorded history.

"The problem with these extremes is that some of our infrastructure are not designed to deal with these sort of extreme events especially in Mindanao where most of the people are not used to strong typhoons," added Cinco.

The use of climate change projections is very important in predicting whether these changes will continue in the future. Climate scientists generate climate projection by using emission scenarios as input to the Global Climate Models in order to simulate how the Climate System will respond to different greenhouse gases concentration from a low emission to a very high emission scenario.

Photo: dost-esamar.blogspot.com

These GCMs are very coarse, but the users need detailed information at the local scale. This is why DOST-PAGASA further downscales the global models to a higher resolution using Regional Climate Models wherein the latest model was downscaled at 25-km resolution.

Cinco further reported that the annual mean temperature for the Philippines is projected to increase by 0.9°C to 1.9°C in 2050 and 1.3°C-2.5°C towards the end of the 21st century under a medium range emission scenario.

"However, under a very high emission scenario or worst case scenario, the annual mean temperature for the Philippines is projected to increase to about 1.2°C to 2.3°C in 2050 and about 2.5°C-4.1°C towards the end of the 21st century," she said.

To make families, communities, businesses, and the whole nation resilient to climate variability and change, DOST-PAGASA has updated the climate change projection previously released in 2011. The policy brief provides a range of plausible future climate that can be used to guide decision makers in formulating their strategic plans and policies in order to adapt to the risk of climate change.

"We have started rolling out this information to different LGUs through the conduct of trainings in partnership with the Department of Interior and Local Government and the Climate Change Commission," Cinco told the conference participants. "The next step is for the local government units to use this information to factor in climate change in their formulation of their Local Climate Change Action Plan."

The world we live in has become vulnerable to extreme weather and climate changes with the onset of global warming. It is said that from the global mean temperature from 1880 to 2016, the Earth has become warmer compared with the pre-industrial period. As reported, these changes are occurring rapidly and significantly and therefore have its consequences in this current and future generations.

Cinco thus call for action towards a safe world for the current and future generations.

DOST-developed relief food for disaster victims

by Jasmin Joyce P. Sevilla, *DOST-STII*

Photo: DOST-ITDI

Earthquakes, strong typhoons, and landslides are just some of the most common natural calamities that have struck the country. Among the most notable and disastrous events were the earthquake in Bohol and Typhoon Yolanda in 2013.Their aftermath has taken a huge toll on the lives of affected communities, especially on living days on end without food. Lack of necessities such as electricity, gas, and water made it even more difficult for them to survive.

This paved the way for the Department of Science and Technology-Industrial Technology Development Institute (DOST-ITDI) to develop "Pack of Hope" to help disaster victims by providing them ready-to-eat (RTE) and nutritious meals.

According to Daisy Tañafranca, head of the Packaging Technology Division of DOST-ITDI, there are three stages of providing relief foods.

The first stage happens immediately after the disaster when power, gas, and water are cut off. Survivors need food that can be eaten without drinkables and without cooking. The second stage occurs when power and other utilities are restored. During this stage, survivors can make use of emergency instant food requiring hot water and cooking. The third stage comes when all utilities are back on line, allowing survivors to use cooking equipment and prepare food and ingredients as relief from outside the disaster zone. At this stage, nutritious foods or supplements are provided to survivors.

The first "Pack of Hope" produced as first stage relief food was the RTE chicken arroz caldo. With a shelf life

of one year, it is packed in easy-to-open, vacuum-sealed, retort pouch that can be consumed directly from its packaging. Each 200g pouch can be marketed not only as relief food but also as a regular snack. In addition, its packaging is designed to withstand an aerial drop of at most 20 feet or even water submersion in case of flood.

The RTE chicken arroz caldo was field-tested in collaboration with Department of Social Welfare and Development (DSWD) in Cebu, Davao, and the Provincial Social Welfare and Development of Albay. Since 2015, the product has been distributed to calamity victims during Typhoon Lando in Region I, Typhoon Nina in Marinduque and Bohol, and Typhoon Urduja in Bohol. It was also provided to fire victims in Cebu, and to feeding program beneficiaries in Davao and Marawi.

The "Pack of Hope" technology has been adopted by Kaianya Foods, Inc. which has been supplying DSWD-NCR for two years now.

With its contribution in helping disaster victims, "Pack of Hope" has gained international recognition. In 2016, it became a finalist in the R&D 100 Awards held in the United States.

After the successful commercialization of RTE chicken arroz caldo, DOST-ITDI developed other "Pack of Hope" relief foods such as the RTE smoked fish rice meal as second stage relief food, and RTE cassava in light syrup and RTE boiled sweet potato as third stage relief food.

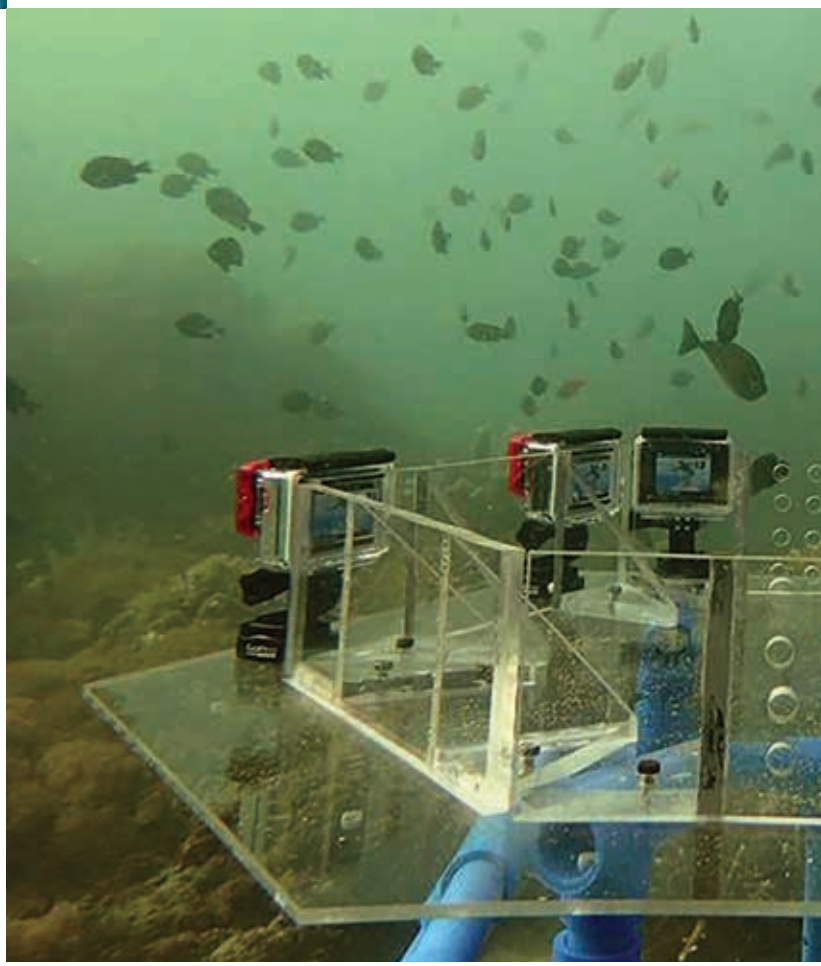
For more information regarding this product, please contact the **Packaging Technology Division of DOST-ITDI** through **packaging@itdi.dost.gov.ph** or via **(632) 837-20171 loc. 2271.**

Photos: DOST-ITDI

Fish-i

Quicker, safer & more accurate way to monitor fishes

by Laurence M. San Pedro, *DOST-STII*



With more than 3,000 different species of fish, this makes our seas the most biodiverse region in the entire world. The richness in species in our oceans and seas is an important aspect of marine biodiversity.

However, the sustainability of marine life is currently in danger as human carelessness, overfishing, dynamite fishing, and other illegal activities create an alarming threat to biodiversity. This greatly affects not only the balance of life in our oceans but also the socio-economic well-being of those whose livelihood depends on the sea.

Government has responded to these threats through several laws that regulate fishing and mandated sustainable management of our fisheries and aquatic resources. For instance, Republic Act No. 7586 or the National Integrated Protected Areas System Act of 1992 identified Marine Protected Areas or MPAs in the country and declared these as "no fishing zones" to give way for fishes to breed freely. To date, there are over 1,800 MPAs in the country.

Yet despite the significant declaration of no fishing zones, MPAs need to be continuously monitored and evaluated to assess their effectiveness. This is because the monitoring of MPAs is done through a fish visual census to help determine the success of marine conservation and rehabilitation initiatives.

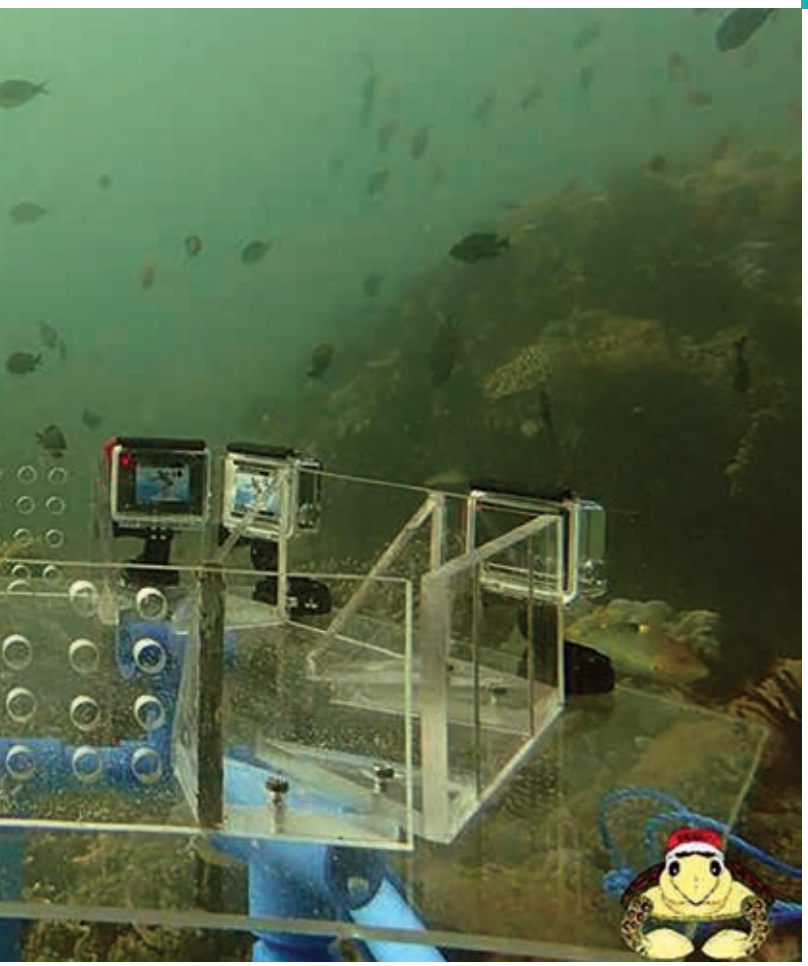
Fish experts conduct the census by manually counting the fish within an area, estimating the fish sizes, and identifying their species. This current practice

in conventional fish visual census takes a long time for the fish expert to complete the two-step process as data analysis on the surface can only be done after retrieving the data underwater.

"With only a few number of fish experts, how can we monitor all the 1,800 MPAs on a regular basis? This constitutes a data collection bottleneck," said Dr. Prospero C. Naval Jr. of the University of the Philippines (UP) Diliman during his research presentation on the recently held 3rd National Research and Development Conference.

Thus in collaboration with the Department of Science and Technology (DOST), Dr. Naval and Dr. Laura T. David of the UP-Diliman Department of Computer Science and the Marine Science Institute developed the "Fish-i" (or Fishdrop).

The "Fish-i" is a technology that uses artificial intelligence in automating fish census by reducing the need for manual counting and allowing rapid health assessment of marine reef environments. With this technology, even those with minimal knowledge and expertise in the marine sciences can acquire highly accurate information.



"The Fish-i system consists of a special camera rig we designed and a software we developed. The program uses advanced machine learning algorithms based on deep learning that analyze the fish video data and generate the results for fish count, fish species, fish size, and biomass," Dr. Naval revealed.

"All of these information are crucial inputs for fish biodiversity conservation efforts. Fish-i eliminates the data collection bottleneck and is therefore highly scalable. It is also faster and safer since the divers do not have to stay too long underwater."

The technology can assist decision makers in answering questions such as the best time to fish. It can also answer if the number of fish is increasing over time or if the number of fish species is also increasing.

Dr. Naval added, "Our country sits right at the center of the Coral Triangle. We are at the heart of the world's most biodiverse marine ecosystem and we would like to maintain this distinction for the foreseeable future."

"Fish-i is our contribution towards evidenced-based biodiversity conservation. We have developed it as a semi-automated fish visual census system, a crowd-sourced monitoring tool for MPA management which is scalable, faster, safer, and cheaper," he said.

Photos from the powerpoint presentation of the researcher presented during the 3rd National Research and Development Conference (NRDC) held at the Philippine International Convention Center last 20 April 2018.

Photo: unsplash.com

Photos: DOST-ITDI

DOST develops compact technology to treat fast-food wastewater

by Jasmin Joyce P. Sevilla, *DOST-STII*

Fast-food restaurants, formally known as quick service restaurants (QSRs), is a growing industry in the country. The food they offer is generally cheap, appetizing to the public, and is delivered quickly to the consumers.

However, with the rapid growth and wide acceptance of QSRs also comes the rapid increase of solid wastes they produce, such as plastic cups and utensils as well as left-over food, among others.

Fast-food generated solid wastes landfills compared with wastewater are easier to manage through recycling and landfills. Meanwhile, if left untreated wastewater such as fats, oil, and grease may pose as sewer blockages or act as pollutants to rivers and lakes and other water forms.

To address this concern, the Department of Science and Technology-Industrial Technology and Development Institute (DOST-ITDI) developed a compact wastewater treatment system design. It is a low-cost, sustainable technology to treat wastewater coming from stand-alone QSRs, enabling compliance to the Philippine Clean Water Act 2004 (RA 9275).

"Fast-food restaurants, when situated as an independent stand-alone store, often face the problem of setting its own wastewater treatment plant because of space requirements," explained Engr. Reynaldo Esguerra of the DOST-ITDI during the National Research and Development Conference 2018 on 20 April held at the Philippine International Convention Center. He added that the DOST-developed compact wastewater treatment system would only require one slot of a car parking space or around 12 square meters. In addition, the compact system may be buried to save on valuable space.

The compact wastewater system involves an efficient physical and biological process that converts wastewater into dried sludge using microbes that could degrade organic pollutants containing small amounts of oil. The produced dried sludge can be a good material for compost.

According to the Department of Environment and Natural Resources (DENR), the limit for discharge to bodies of water should have a measure of pollution set to 50 milligrams of biochemical oxygen demand (BOD) per liter (mg/L). But as discussed by Engr. Esguerra, this may be a difficult task for most fast-food restaurants whose raw affluent BOD ranges from 600 mg/L up to 1,200 mg/L, an amount extremely harmful for the environment.

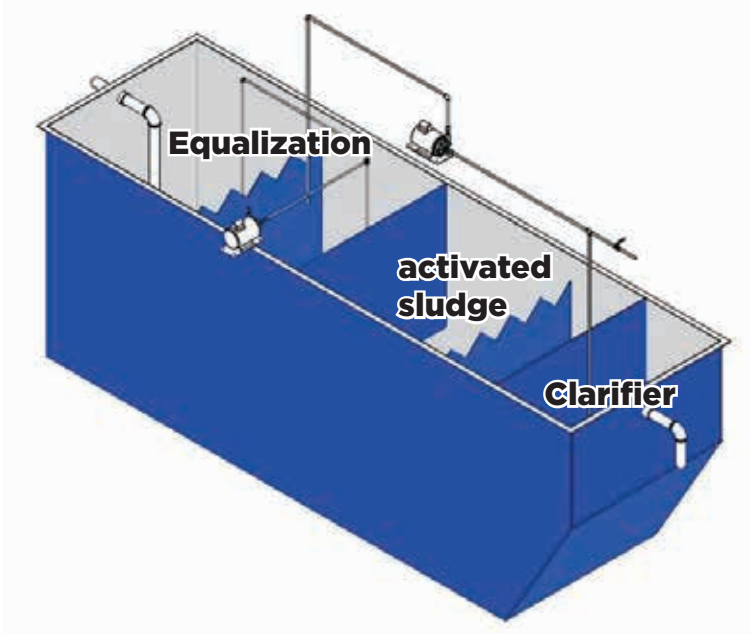
Through the intervention of DOST-ITDI and its compact wastewater treatment technology, the BOD levels for fast-food restaurants could be lessened.

"At its current pilot-scale operation, the system can bring the BOD levels down from 40 mg/L down to 10 mg/L," said Engr. Esguerra.

This would work favorably for fast-food restaurants classified by DENR as Class SB or those within or near recreational water forms such as the beaches and resorts in Boracay and in Coron.

Engr. Esguerra added that each unit of compact wastewater treatment system costs a lot cheaper compared with commercially available units that may cost around P1M each. Operating costs, on the other hand, would involve a power consumption of just 11.44 kilowatt per hour daily.

"BOD of 50 mg/L or lower can be achieved using only about 12 sq. m. of land. It costs just P320,000 with a daily electrical consumption that costs less than your supersized combo fries, burger, and drinks," said Engr. Esguerra. "Protecting the water environment may cost a few pesos but the returns would be a lifetime," he added.



Photos: DOST-ITDI

For more information, interested parties may contact the **Environmental and Biotechnological Division of DOST-ITDI** *through* **ebd@itdi.dost.gov.ph or via (632) 837-2071 to 82 loc. 2185.**

Photos from the powerpoint presentation of the researcher presented during the 3rd National Research and Development Conference (NRDC) held at the Philippine International Convention Center last 20 April 2018.

Axis Knee System
Simpler, more affordable knee replacement technique

by **Sheila Marie Anne J. de Luna,** *DOST-STII*

It is estimated that three to five percent of the world's population require knee replacement every year, with 20 million patients in ASEAN countries, reported Dr. Ilustre Guloy Jr., chair of Asian Hospital and Medical Center's Department of Orthopaedic Surgery.

Speaking during the 3rd National Research and Development Conference held on 20 April 2018 at the Philippine International Convention Center in Pasay City, Dr. Guloy said that those who suffer from knee osteoarthritis will eventually need to undergo knee replacement because the condition is progressive and they eventually will stop responding to pain killers and physical therapy.

For over 40 years, total knee replacement has been performed worldwide due to its success. However, not everyone who needs knee replacement goes through the procedure mainly because of its high cost.

"The cost of having a knee replacement is so expensive we only do three percent of the 70,000 (cases in the Philippines)," said Dr. Guloy.

Aside from the cost, total knee replacement is also a very complex procedure and is position dependent, which means that a specialist "has to orient and align the knee implant correctly so that it will function the way it is designed to function," Dr. Guloy added.

With the Axis Knee System, patients suffering from knee osteoarthritis and need knee replacement can undergo the procedure at half the price. "With an ISO certification for implant design, development, and manufacturing, we

Photo courtesy of Orthopaedic International, Inc.

Some 70,000 Filipinos needing knee replacement due to osteoarthritis now have better chances of getting their mobility back through the Axis Knee system with a simplified process and lower cost.

have produced an implant that is as good as the rest of the world's but costs 50 percent less," said Dr. Guloy.

Developed locally and with research funding from the Department of Science and Technology-Philippine Council for Health Research and Development, the Axis Knee System offers a more simple solution and less costly alternative to total knee replacement.

The Axis Knee System has a unique instrumentation system that simplifies the process and allows even the generalist orthopedic surgeon to install the knee implant correctly every time.

"To ensure that the knee will be aligned along the straight axis, we have developed an innovative mechanical axis finder," said Dr Guloy. He further explained that the mechanical axis finder uses mechanical equations to locate the correct axis of the knee. "This correct alignment and balance helps ensure that the implant will last at least 20 years," he said.

Another advantage of the Axis Knee System over total knee replacement is that it is designed for the smaller Asian size. The Axis Knee System has been in the Philippine market since 2015 and has been approved by the Food and Drug Administration. It has two patents registered in the United States, with three more awaiting approval. The Knee Axis System has also received Notices of Allowance from the patent offices of the European Union, China, and Japan.

As of the first quarter of 2018, 246 orthopedic surgeons in 14 of the 17 regions of the country have been trained to use the system, and it has been used in 347 knees in the Philippines, reported Dr. Guloy.

According to www.researchandmarkets.com, the global prevalence of osteoarthritis is estimated to be 8.2 percent and that there were 301.6 million prevalent cases of osteoarthritis (knee and hip) in adults aged 30 years and older worldwide in 2016, and such number is forecast to increase to 352.2 million by 2025.

Rosella plant was found to lower uric acid, cholesterol levels, prevent stroke and hypertension, among others. photo: news.oneexpert.gov.ph

Plants for drugs

by Sheila Marie Anne J. de Luna , *DOST-STII*

Researchers finally completed their collection of plant samples all over the country to produce extracts that can be used in the discovery and development of herbal medicines. This is the first phase of a project under the Tuklas Lunas Program led by the Department of Science and Technology-Philippine Council for Health Research and Development.

Aligned with the National Unified Health Research Agenda, the research titled "Discovery and Development of Health Products: Terrestrial Herbals and Drug Candidates" focuses on the discovery and development of supplements and medicines for diseases that affect Filipinos. Said illnesses include diabetes, inflammation and pain, hypertension, high cholesterol, gout, and microbial infection.

"Unknown to many, more than 50 percent of today's drugs are from plant natural products or their derivatives," said Dr. Evangeline C. Amor, professor at the Institute of Chemistry, University of the Philippines Diliman.

The project is a collaboration among various research and academic institutions in the country. The research looked at harnessing the natural healing powers of plants to be able to produce herbal supplements, herbal drugs, and lead compounds for drug development.

"Given our country's rich biodiversity, our research team embarked on the discovery and development of health products (DDHP)," Dr. Amor said.

Researchers went around the country to collect plant samples from the following sites: Mt. Isarog in Camarines Sur; Mt. Makiling in Laguna; Cordillera

region; the provinces of Aurora, Davao, and Negros; and the University of the Philippines Diliman. For the second phase, researchers will collect plants from Palawan, Sierra Madre mountain range, Eastern Samar, and Panay Island.

To assure quality, researchers authenticated the plants collected. Further, they assessed safety by evaluating against liver and kidney cell lines. "After drying, the sample is extracted in ethanol and the resulting alcoholic extract is tested in a primary screen using a system associated with a disease," explained Dr. Amor.

For diabetes for example, researchers tested against the alpha-glucosidase enzyme, the inhibitors of which prevent the release of broken down glucose into the bloodstream.

"The generated non-toxic active alcoholic extracts that are the output of this research program feeds into the other DDHP research programs that will produce herbal supplements, herbal drugs, and lead compounds for drug development," said Dr. Amor.

She added that through this research program, collaborating institutions were capacitated as their laboratories were equipped with needed machines and their research assistants and students participated in training activities.

"In the next years, you can look forward to safe and standardized herbal supplements and herbal drugs, and lead compounds that can be the next miracle drug," concluded Dr. Amor, who presented the results of the research project at the recently concluded 3rd National Research and Development Conference held at the Philippine International Convention Center in Pasay City.

The research project is a collaboration among the following institutions: University of the Philippines, Benguet State University, Aurora State College of Technology, Palawan State University, University of Eastern Philippines, Herbanext, and Leonie Agri Corp.

photo: inquirerlifestyle.inquirer.net

photo: iherbanext.com

ARE YOU READY?
DO-IT-YOURSELF REDAS FOR DISASTER PREPAREDNESS

by **Sheila Marie Anne J. de Luna** , *DOST-STII*

Did you know that if you want to assess the potential risks and impacts a certain disaster will bring to your area, you can do so with easy to use, free software that has been around since the 1990s?

Called REDAS or Rapid Earthquake Damage Assessment System, this software developed by Department of Science and Technology-Philippine Institute of Volcanology and Seismology (DOST-PHILVOCS) helps promote emergency or disaster preparedness in communities. With REDAS, communities or local government units (LGUs) that are prone to earthquakes and other disasters would quickly know the risks and possible effects of said disasters to their communities.

"Our goal is to promote the use of REDAS Software in emergency preparedness, contingency planning, and mainstreaming disaster risk reduction in the development planning for safe and prepared communities," said Dr. Maria Leonila P. Bautista of DOST-PHIVOLCS.

Dr. Bautista explained that REDAS teaches communities to learn by doing, specifically on how to determine their own impact results using science-based disaster preparedness. She said that it also teaches stakeholders self-help and self-reliance, and teaches communities to understand, accept, and own impact results.

As a do-it-yourself hazard and impact estimation software, REDAS can produce hazard and risk maps before and immediately after an earthquake. It can compute hazards like ground shaking, liquefaction, landslides, tsunami, and severe wind. It can also be used to prepare

Photo: thesummitexpress.com

for scenarios and compute risks or impacts that are associated with a certain emergency or disaster.

"With REDAS, static maps of various hazards can be integrated. These include module for developing exposure data for schools, bridges, urban areas, and houses. The data can be updated by the local government," said Dr. Bautista.

One of its modules is the REDAS Seismic Hazard Assessment (ShaKe) that estimates earthquake hazard impacts such as building damage, casualties, and economic loss. The results can be tabulated per province, city, and barangay. Meanwhile, the REDAS Swift (Severe Wind Impact Forecasting Tool) estimates impacts from severe wind hazard, such as those caused by typhoons. To calculate impacts from flood hazard, REDAS FLoAT (Flood Loss Assessment Tool) is the module to use.

REDAS is being used by LGUs, national government units, state universities and colleges (SUCs), church groups, private companies, and non-government organizations (NGOs).

As of date, 73 provinces, 610 towns/cities, 17 government institutions, 32 SUCs, one church group, 69 private companies, and eight NGOs use REDAS.

REDAS was developed after the 7.8 magnitude earthquake that struck Northern Luzon in 1990 and has been shared with Philippine communities and stakeholders since 2006.

Dr. Bautista discussed REDAS and how it can be used for emergency preparedness at the recently concluded 3rd National Research and Development Conference held on 20 April 2018 at the Philippine International Convention Center in Pasay City.

PHIVOLCS monitors aftershocks in Leyte.
Photo: news.abs-cbn.com

DEWS
Weather forecasting made easier

by Judy Q. Aca-Saclamitao, *DOST-STII*

The onset of rainy season in the Philippines officially began last 08 June 2018 as declared by the Department of Science and Technology-Philippine Atmospheric Geophysical and Astronomical Services Administration (DOST-PAGASA). The occurrence of widespread rainfall especially in the western parts of the country, Metro Manila included, saw residents, motorists, and commuters wading through flash floods.

In 2009, we witnessed the devastation caused by Tropical Storm Ondoy as it submerged various parts of the metro in deep floodwaters. Also known as Typhoon Ketsana, it left the country with 10.45 billion worth of damages with 464 killed and 4.9 million lives affected. Tropical Storm Sendong (international code name Washi) also wrought havoc in the country in 2011 and was considered to be the strongest typhoon that hit the Philippines that year. One of the most affected cities in Mindanao was Cagayan de Oro which was placed under a state of national calamity along with Iligan and Dumaguete cities a few days before Christmas. The storm left 1,002 dead, with P998 million worth of damages, and affected 65,067 families in 13 provinces.

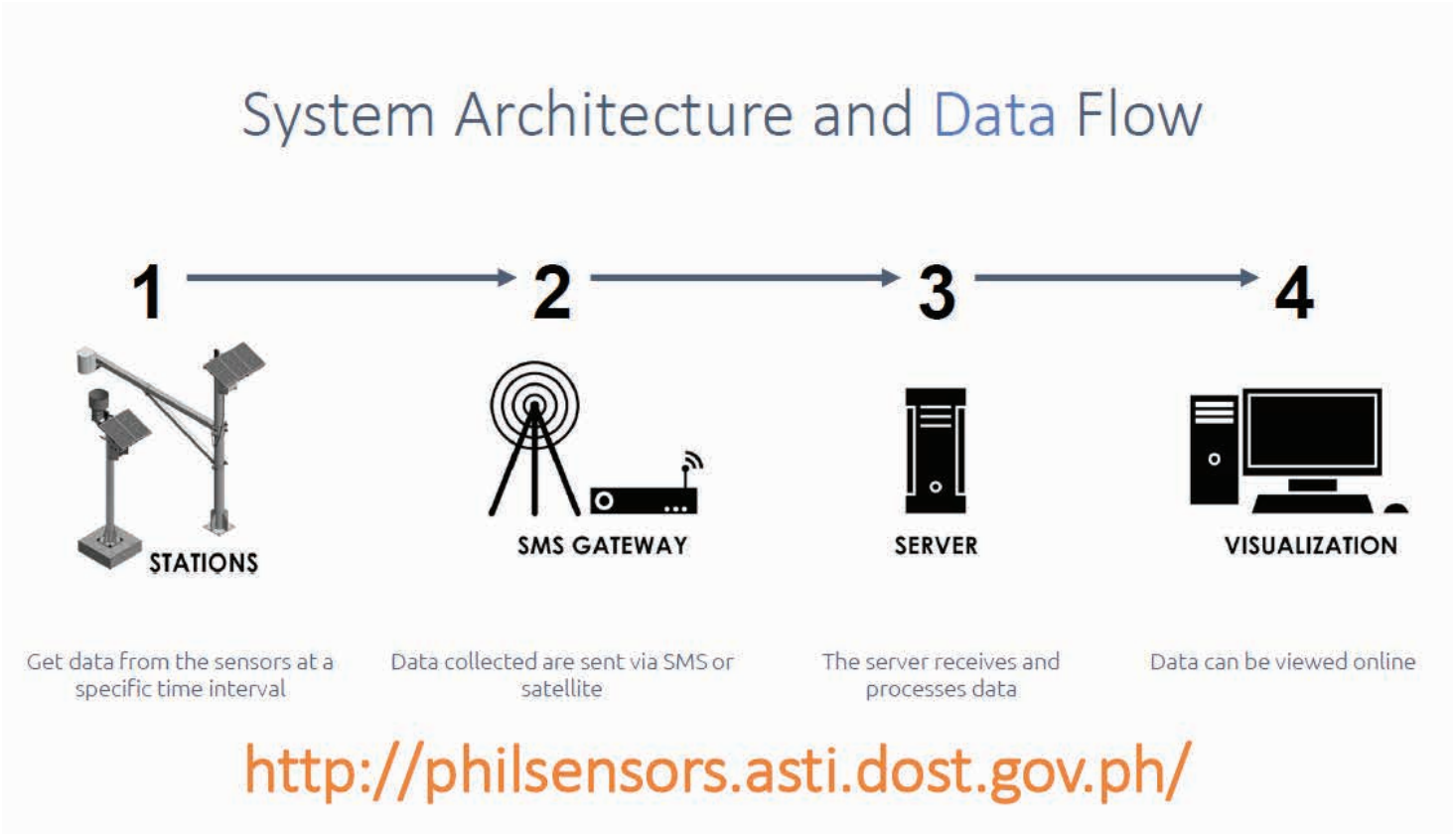
Such devastations showed the need to be a step ahead through timely and accurate weather forecast. One project that responded to the need of the times is the Deployment of Early Warning System in Disaster-prone Areas or DEWS, a collaborative effort among several DOST agencies namely the Philippine Atmospheric Geophysical and Astronomical Services Administration, Advanced Science and Technology Institute, and the DOST-Regional Offices.

The DEWS Project aims to deploy hydrometeorological devices (hydromets) and warning stations in selected hazard areas in the country for disaster preparedness and mitigation.

"Installation of hydromets such as Automated Rain Gauge and Water Level Monitoring Station in different river systems and secondary tributaries will enable us to obtain data that will be useful in protecting the lives, property, and livelihood in various communities," quipped May Celicious-Cayaban of the DOST-ASTI during the 3rd National

Photo: Joseph Albert Lledo, DOST-VIII

Photo: Francis Barquilla, DOST-Calabarzon



Research and Development Conference held at the Philippine International Convention Center last 20 April 2018.

Complementing these modern hydrometeorological systems of devices are traditional early warning systems such as sirens and beacons. Celicious-Cayaban added that "the use of sirens or beacons as early warning of natural hazards is one of global best practices in informing unsuspecting communities thus improving disaster risk reduction."

The DEWS project has accomplished a lot since its inception on 01 July 2014 and lifted many local communities from disaster vulnerability. As part of its initiative to publicize technical information, it has also conducted a series of Information, Education, and Communication (IEC) campaigns in selected areas and flood drill activities in Regions III and VIII.

"Remarkably, with the onslaught of Bagyong Seniang (international name: Jangmi) in 2014 and Bagyong Pablo ("Bopha") in 2017, respectively, zero casualties were recorded in Region X," reported Celicious-Cayaban. Data generated from the sensors helped much by pointing out exact vulnerable locations from weather turbulence, as well as in guiding policy makers in crafting local environmental regulations. Installation of early warning stations indeed is a big step in the Philippines' weather forecasting technology.

As of 2017, nine IEC campaigns were conducted while 500 hydromet devices and 500 warning stations were deployed nationwide. Likewise, a new monitoring website was created and can be accessed through http://philsensors.asti.dost.gov.ph.

Making use of data to improve disaster preparedness

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

"We are sitting on a lot of data, but how to translate these data into useful information was the next challenge for ASTI," Jelina Tanya Tetangco.

Photo: DOST-ASTI

"We are holding critical weather data that can be useful for a variety of areas," said Jelina Tanya Tetangco of the Department of Science and Technology-Advanced Science and Technology Institute (DOST-ASTI).

Tetangco was referring to the environmental data captured by DOST-ASTI's 1,200 sensors deployed nationwide and transmitting information every 10 to 15 minutes to the Institute's storage servers via Global System for Mobile Communications or GSM technology.

The sensors were part of the ICT for the Environment Program in 2011 when DOST-ASTI developed prototype automated weather stations (AWS) with sensors capable of real-time monitoring of weather parameters such as wind speed and direction, air temperature, air humidity, air pressure, rain amount, duration, and intensity. The program came at the heels of the various devastating typhoons that ravaged the country such as Ondoy in 2009 and Sendong in 2011.

Photos: www.ugnayan.com

According to Tetangco, the AWS were installed in critical flood-prone areas nationwide.

With all the data generated by the AWS which can also be helpful in different fields, DOST-ASTI established the Computing and Archiving Research Environment (CoARE) to enable multiple data integration from DOST-ASTI-initiated and collaborative projects with other agencies that have high requirements for data storage and high-performance computing.

The data generated by DOST-ASTI's AWS can be used as input data to other research application work, like weather and climate modeling, storm surge modeling, urban and rural zone planning, even agricultural land planning. The data can likewise be used for policy decision support in disaster management. Further, DOST-ASTI can distribute and share all the generated data to those who need it, such as researchers, scientists, and policy makers.

The CoARE facility is located at the back of DOST-ASTI office in Diliman, Quezon City. Tetangco said that DOST-ASTI commissioned a contractor to fabricate a 40-foot container van and turn it into a data center. It is modest compared with other data centers and supercomputing facilities abroad, but it serves the purpose. CoARE facility has been operating since 2014.

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Relevant use of remote sensing data to every Filipino

Tetangco emphasized that acquisition of data from satellite images stations and other remote sensors do not have any kind of value for every Filipino, until they understand and appreciate the direct benefits to them.

"We are sitting on a lot of data, but how to translate these data into useful information was the next challenge for ASTI," said Tetangco.

Thus, Remote Sensing and Data Science Help Desk or DATOS was born. DATOS leads data processing and distribution needs to ensure timely communication of relevant disaster information to key agencies and intended users. It can likewise be used for critical activities on disaster mitigation, analysis, and advice before, during, and after disaster events.

Tetangco cited that the DATOS team was able to detect changes around Mt. Mayon before, during, and after its recent eruption. All the needed information they gathered were provided to DOST-Philippine Institute of Volcanology and Seismology (DOST-PHIVOLCS) for them to give warning advice to the local government units and communities.

"Aside from monitoring the activities of different volcanoes in the country, DATOS can also aid in urban and rural flood detection for disaster risk assessment and recovery efforts as well as in damage assessment to help in rebuilding efforts," Tetangco said.

Photo: Philihappy.com

Bioremediation
Re-greening mine tailing areas

by Alexander Medrano and Framelia V. Anonas, *DOST-STII*

Researchers have found a way to rehabilitate mined out areas and save our natural resources that have been destroyed due to mining, and reduce the risk produced by their waste products.

In order to restore the mined out areas, the Department of Science and Technology-National Research Council of the Philippines (DOST-NRCP) and the University of the Philippines Los Baños, National Institute of Microbiology and Biotechnology has developed microbial biofertilizers that will re-green brown barren mine tailing areas, and reduce the exposure to cancer-causing heavy metals. The research was conducted at Barangay Capayang, Mogpog, Marinduque.

Mine tailing areas consist of ground rock and process effluents that are generated in a mine processing plant, and therefore known as the dumpsites of mining wastes. Mined out and mine tailing areas are brown due to the acidity of the soil and heavy metal contaminants that do not allow plant life to survive.

The mine tailing area where the research was conducted is surrounded by various ecosystems such as mangroves, marine bodies, agricultural lands, and communities. Moreover, primary schools are built at the foot of the stockpile of the mine tailing areas. The health and safety of these areas could be compromised due to exposure to heavy metals or if these metals from the mined out area enter the food chain.

In this study, the research group led by Dr. Nelly S. Aggangan developed microbial biofertilizers such as MYKOVAM, MYKOPLUS, MYKOGROE, and BioN. These biofertilizers help absorb water and nutrients, prevent root infection by pathogens, increase plant tolerance to drought and heavy metals, and provide vitamins and nutrients to enhance growth and development.

The researchers planted fast growing and premium wood quality producing tree species such as narra, *Acacia mangium*, and *Eucalyptus urophyllia* at the project site. The seedlings were applied with beneficial soil fungi and good bacteria, and were planted in soil mixed with lime compost.

Results show that after a year the treated seedlings showed an impressive growth rate with a 95 percent survival rate, while the untreated seedlings had stunted and unhealthy growth with only a 50 percent survival rate. After 22 months, the treated seedlings consistently showed a healthy growth with still a 95 percent survival rate. On the other hand, the untreated seedlings only had a 26 percent survival rate.

"The beneficial soil microbes in this bioremediation technology can hasten the rehabilitation and transformation of barren mine tailings that has been unproductive for many decades into a productive one," Dr. Aggangan stated.

Excited about the technology, Dr. Jose Leviste, director for Environment and Climate Change of the Philippine Chamber of Commerce and Industry, recommended that the private sector should "mobilize our resources to make it happen."

He said that this technology of the DOST can address President Rodrigo Duterte's concerns on open pit mining. Thus, he said that he will reach out to his network to help promote for the application of this technology.

Photo: Bureau of Agricultural Research

Photo: Alcazar.com

Into the Deep

Checking into PH's coral reefs

by **Laurence M. San Pedro,** *DOST-STII*

The Philippines is located at the apex of the Coral Triangle and is among the top marine biodiversity hotspots on the planet. The country's coastline that runs to 36,000 kilometers makes it the fifth longest coastline in the world. As such, the country has an estimated coral reef area of 27,000 square kilometers, making it the second largest in Southeast Asia.

To some,coral reefs are "only rocks" that may cause cuts and bruises. But actually, the coral reefs are the forest of the sea. They are habitat for marine life and act as natural barriers that protect the coast from strong waves. They also serve as good source of raw materials and provide livelihood and eco-tourism jobs to people living near the shore.

'Better' coral reef assessment system

Like all natural resources, our coral reefs must be monitored and assessed regularly.

Tools for coral reefs visualization help us know where and how large the marine resources are, including their conditions. Thus, having accurate information can guide coastal resource managers and marine ecologists to put up measures to conserve the reefs.

A rapid reef assessment technique called "manta tow" can show a closer view of the underwater environment. The technique can also be taught to non-specialists.

However, even though it gives fast reef assessment, it is labor intensive because it requires specialized training. It is also expensive because of the use of scuba equipment and waterproof cameras.

Such concerns paved the way for the creation of the Automated Rapid Reef Assessment System (ARRAS). Funded by the Department of Science and Technology (DOST), this program developed tools that would ease and hasten the assessment of coral reefs.

The ARRAS Program is comprised of two projects: the Multi-Sensor Reef Assessment headed by Dr. Cesar L. Villanoy of the University of the Philippines (UP) Marine Science Institute, and the Coral Reef Assessment and Visualization headed by Dr. Maricor N. Soriano of the UP Diliman's National Institute of Physics (NIP).

In three years, the ARRAS program was able to create three technologically mature tools for fast and cost-efficient monitoring of coral reefs.

"So our solutions are the banca-towable platforms, a stitching software, and kite aerial photography. These are easy to use, easy to repair, and we hope that communities can use these," said Dr. Soriano during her presentation at the 3rd National Research and Development Conference.

The banca-towable platforms, such as the "Teardrop" and "Towpedo", allow coastal resource managers to make rapid and frequent surveys of their reefs at affordable cost.These platforms use motor engine-powered small boats (banca) that can hold an underwater camera and echo sounder.

The Teardrop can house a waterproof video camera and other sensors. With an attached underwater camera inside, the Teardrop is a diverless video-transacting tool for capturing coral reefs on video. On the other hand,Towpedo is a neutrally buoyant, torpedo-shaped platform that can reach a depth of 30 meters below water and can also capture videos underwired with an attached underwater camera.

Since Teardrop and Towpedo are both diverless, capturing video of the reef can run continuously as long as there is ambient light and spare batteries for the camera.

Further, a stitching software called "Kiko&Stitch" is developed so that the recorded video from the banca-towable platforms can be converted into a panorama or mosaic of the seafloor. Through Kiko&Stitch, the coral mosaics are geotagged and can be opened on the Google Earth map.

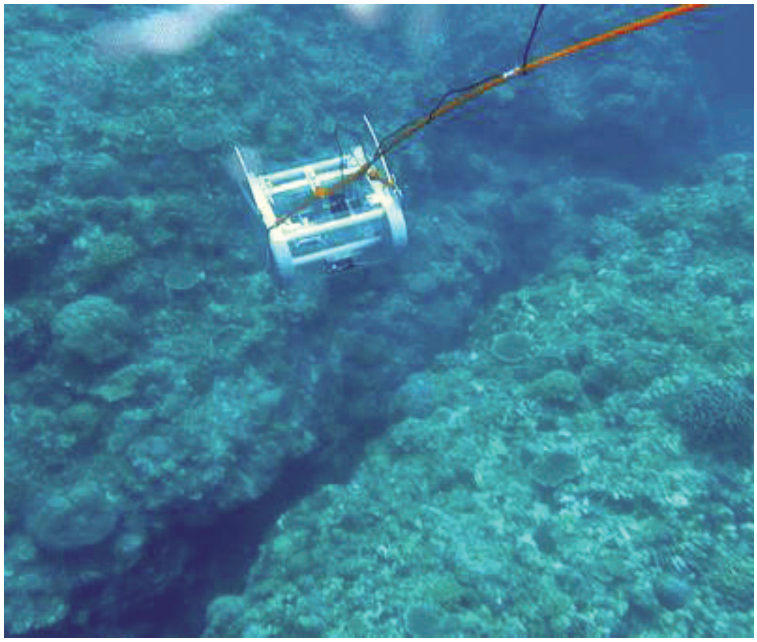
"We have developed a stitching software because the existing stitching softwares are not available underwater," she added.

Also, they promoted the use of kites instead of drones. Through kite aerial photography, aerial shots of shallow coral reefs can be easily taken. Kite aerial photography is suited in places where the wind is strong. Once the kite is observed to be stable, an action camera will be attached to the kite line using a pendulum which will limit the sway of the camera and reduce motion blur.

To date, the research team has already covered 2,000 kilometers out of 10,000- kilometer coastlines with reefs across the country.

Existing users of these coral reef assessment tools are the local government units (LGUs), the Department of Environment and Natural Resources (DENR), the World Wildlife Fund (WWF), and a certain number of schools.

Teardrop is a submersible, towable hull that can house an underwater camera. (www.pcieerd.dost.gov.ph)



Beauty with a purpose

Due to man-made threats such as water pollution, dynamite fishing, cyanide fishing, and coral bleaching, the health of the coral reefs is currently at risk.

During the conference, Dr. Soriano called for action as our coral reefs no longer need to be "out of sight, out of mind."

"There is always an algorithm that goes 'out of sight, out of mind'. When we say 'out of sight, out of mind', we tend not to care for things that we have not seen."

She believed that if only more people can see the beauty that lies beneath our waters, then, they would care more about the coral reefs and other underwater resources.

"Coral bleaching is happening all over again and there is so much pollution in the water. We need more people to help in monitoring the coral reefs so that they will understand and appreciate more their beauty [and purpose]," she added.

Time to TELA STORY

by Louella D. Labasbas, *DOST-STII*

As the Philippine textile weaves into the fabric of the Philippine society as a way of life and as a source of livelihood, the TELA story continues.

With some 286,320 hectares of abaca (134,427.24 ha), pineapple (65,224.49 ha), and banana (86,668.45 ha), the Philippines has a wealth of natural textile fiber sources that can weave a beautiful story in the textile industry.

The name of the story is TELA, or Textiles Empowering Lives Anew Pilipinas, a campaign led by the Department of Science and Technology-Philippine Textile Research Institute (DOST-PTRI) to accelerate the country's textile industry. Intertwining the traditional method of weaving and technology to come up with innovative approaches, TELA Pilipinas knots into three directions: yarn production using natural textile fibers, natural dyeing, and handloom weaving.

Yarn production

Yarn production using natural textile fibers is the primary work of DOST-PTRI's Innovation Center for Yarns and Textiles (PTRI-ICYT), a facility of DOST-PTRI that specializes in producing innovative yarns from cotton-pineapple, cotton-abaca, cotton-banana, and the likes using eco-friendly technologies. Recently, PTRI-ICYT in Miag-ao, Iloilo inaugurated its first microscale yarn spinning facility to support the production and development of Philippine tropical fabric in the weaving communities of Iloilo and the whole Panay island group.

Natural dyes

Another initiative that TELA Pilipinas promotes is the use of natural dyes and establishment of a new technology business incubator facility for dye products.

Considering the current status of the environment, Filipino scientists have found ways to lessen the suffering of nature. One of the ways is to avoid the use of synthetic materials and instead use those that can be synthesized from highly pigmented organic sources.

Aside from producing natural dyes, DOST-PTRI also conducts training courses on extracting and applying natural dyes on indigenous fibers. In Kabankalan City, Negros Occidental, locals from the countryside were trained in producing natural dyes and it is expected that they would eventually apply their learning for livelihood purposes.

Handloom weaving

Handloom weaving design patterns are intricately unique in every identified regional handloom weaving innovation centers in the country, highlighting the culture of the locals and their respective provinces.

Likewise, DOST-PTRI launched its modified therapeutic handloom designed for the use of students with special needs and the elderly. Funded by the DOST-National Capital Region, 10 specially-designed handlooms were turned over to Guanella Center Inc., a non-stock, non-profit organization of the missionary religion congregation of the servants of charity based in Quezon City.

Other initiatives

DOST-PTRI just can't stop innovating on the Philippine textile. It also recently came up with one product for health care—the mosquito-repellant textile which is made from natural material that provides longer protection against mosquitoes.

Different prototypes of textile products were also developed such as fabric patch, ID laces, pillow cases, and lamps, for further testing.

As the Philippine textile weaves into the fabric of the Philippine society as a way of life and as a source of livelihood, the TELA story continues.

To know more about TELA Pilipinas, please visit http://www.ptri.dost.gov.ph or through Facebook page @TELA Pilipinas.

A science degree and three square meals a day

By Geraldine Bulaon-Ducusin, *DOST-STII*

It's often true that scholarships change lives. To some, it provides not just a degree, but even food for the entire family.

Ed Jeric Canete-Enpictana is among those whose childhood dream was to become a teacher. As a young boy, he played with his siblings—him as the teacher and them as his students.

They were eight children in the family who often experienced financial and food shortage. Their difficulty was compounded when Ed Jeric's father left the family when he was in his teens. His mother's resourcefulness and cooking skills helped provide for the family's needs,

Photos from Engr. Raimil T. Uy

Ed Jeric Canete-Enpictana (2nd from left at the back) with his mother and siblings.

though. She cooked food which the children peddled to the neighborhood.

"Our stomachs may not be filled with expensive or nutritious food but our hearts and minds were always filled with an advice that 'education is very important. It is the only way to lift our family from poverty and it is the only legacy that we can give to you'," Ed Jeric recalls his mother's words.

Despite some doubts of ever finishing college education, his mother's advice of not letting their poverty hinder them from achieving their goals served as his guide. With his eyes on the goal, he graduated *magna cum laude* from the Eastern Samar State University in Borongan City, then later on passed the Licensure Examination for Teachers.

Ed Jeric is now a Special Science Teacher I at Llorente National High School, Llorente, Eastern Samar. He says that he encounters many students whose lives resemble his when he was young. His goal now is to inspire and encourage others to dream big and work hard.

Ed Jeric's story is just one among several inspiring stories of scholars in the Eastern Visayas region. There are those who shared their allowance to finance the schooling of their siblings and there are those who set aside some amount to augment household expenses. It is not uncommon for scholarship allowance to be spent on the whole families' decent meals. These scholars who generously share their stipends also showed academic excellence by graduating with honors.

Engr. Ramil Uy orients the new scholars on the DOST scholarship policies.

"There are so many Jerics in the implementation of the scholarship program in the region. They are willing to serve the country, and they help the Department of Science and Technology Region VIII in campaigning for the program," Engr. Ramil T. Uy, scholarship coordinator of at the DOST-Science Education Institute in Eastern Visayas region says.

THE SCHOLARSHIP

The Junior Level Science Scholarship (JLSS) is open to 3rd year college students taking up DOST-SEI identified priority courses. Those who pass the qualifying examination can avail of the scholarship and will be eligible for two to three years of financial assistance—two years for those taking less than five-year degree courses and three years for those taking five-year degree courses. Most scholars are below the average or below the values indicator of P156,600 annual gross family income. Currently DOST-VIII has a total of 403 existing JLSS Scholars.

DOST VIII traces their scholars using the DOST-SEI's Tracking Actual Career Experience Report (TRACER).

"Although not 100% of the scholar graduates accomplish this tracking form, we can still surmise that most of our scholars are serving the country. Apart from this report, our regional office also requires the submission of this TRACER form so we can trace the status of our scholar graduates," Engr. Uy said.

Most of the scholars from the region are absorbed by the Department of Education by giving them the opportunity to teach science and mathematics subjects even in the remotest areas in the region. Some are working in other government agencies including DOST VIII.

"Believe in yourself, never give up on your dreams, do what you love and above all, always put God at the center of your life." This is Ed Jeric's advice to young people who dream big and who believe that poverty is not a hindrance to success.

(L-R) Provincial Director for Eastern Samar Dr. Arnaldo T. Amosco, Eastern Samar State University Scholarship Coordinator Helen C. Fuentes, Ed Jeric Canete-Enpictana, DOST-VIII Regional Director Engr. Edgardo M. Esperancilla, , and DOST Secretary Fortunato T. de la Peña (Photo credit: Ramil Uy)

Being momshie to DOST scholars down south

By Geraldine B. Ducusin, *DOST-STII*

Vina (third from left) with some of the alumni who shared their experiences and career paths to the new graduates during the recent exit conference. Beside Vina is Dr. Zina Sayson (in black), dean of the Bohol Island State University-College of Engineering and Architecture. (Photo courtesy of Vina R. Antopina)

One of the most life-changing and popular Department of Science and Technology (DOST) programs is on scholarship. Usually, the much awaited events are the qualifying exam, announcement of qualifiers, the graduation, and, yes, the release of the monthly stipend. But other than these events, there are other interesting stories about the scholarship program that seldom hit the headlines.

"It's not all about financial assistance," says Vina R. Antopina, assistant provincial S&T director of DOST-Bohol, when asked about the concerns in handling the scholarship program.

Vina wears a number of hats to the scholars, from being "Ma'am" at DOST, scholarship coordinator, nanny, nanay (mother), momshie (millennial term for one who acts as mother), and eventually ninang (godmother) to their kids and recently at one scholar's wedding. She has been with the scholars in their journey, whether personal or academic.

BEYOND JOB EXPECTATIONS

A lot of scholars have made an impression on Vina over the two decades she's been with the program. But there is one, the very first, that changed her view about her job.

"This scholar helped me understand that doing this kind of job does not end with being 'an in-charge' person only. I realized that I can go beyond what's expected," she says.

There was this scholar whom they assisted from third year college until he graduated with a degree in electrical engineering. He grew up without meeting his father. His mother also lived her own life. There were no grandparents who could assist him and he has two younger siblings who also relied on him. They all subsisted on his stipend.

Aware of the student's circumstances, Vina asked the management if they could allow him to do some cleaning in the office premises during weekends. She offered to pay the scholar with her own money so that he could have an extra income. His stipend was not enough at the time to cover his school expenses.

On his fifth year in college, the guy got into some personal misunderstanding that landed him in jail.

"I felt the need to step in as a parent to him that time when nobody was available to assume that role in his life," Vina tells.

Vina's expertise in doing damage control came in handy. She was able to iron out the glitch some minutes before the hop ring ceremony, in which the scholar, being his department's governor, had to deliver a speech.

Vina called the College of Engineering and requested the dean to present the scholar's department at the last part of the ceremonies to give the scholar time to dress up and travel to the venue.

That the scholar spent the weekend in jail created a buzz in the campus, so almost everybody knew about the story already. "When his name was called, there was a standing ovation from the whole audience, including the school administrators, deans and the system president himself," Vina recounts.

"They all knew of his exemplary academic performance and his kindness towards his peers. When he delivered his speech, he was again given a standing ovation by the parents. Despite the circumstances, nothing was able to put this young man down."

The scholar is now a company president and he named one of his children Vina after the person who became a mother to him in the years he was trying to build a better future for himself and his family.

STIPEND'S WORTH

The DOST scholarship stipend is a lot better today than several decades past. Most scholars coming from really poor families tend to share what they have, big or small, with their family.

There are cases when the stipend is shared with another sibling who's also attending college or shared with the entire family to augment household expenses. In other instances, a portion of the scholarship enabled the family to buy a motorcycle, especially for families living in far-flung areas. Some used a portion of the stipend as capital for a livestock business, or buy important household appliances or even to help in constructing or renovating their houses.

OTHER REALITIES OF THE SCHOLARSHIP PROGRAM AND PSTC'S INTERVENTION

One reality is that high school graduating students are not aware of some of the old and new S&T courses. They rely on their neighbors for information which are not always accurate.

The Provincial Science and echnology Center (PSTC) in Bohol, just like other DOST provincial offices, conducts an S&T career talk for high school students to check what S&T courses are available for them to choose for their career path.

Another ground reality is that the students are intellectually gifted but most of their experiences are confined to school-house routine. Some of them do not have the luxury of knowing what and how it is outside of their usual environment.

For instance, eco-tourism is a big thing in Bohol, but most of the scholars have not even visited the most common tourist spots in the province. The PSTC-Bohol provides exposure activities to the scholars to give them an idea of the world outside of their usual realities. Usually they visit corporate or manufacturing establishments so they would know first-hand the possible jobs that are available to graduates in their field.

PSTC-Bohol came up with other strategies to address common problems of scholars to ease at least some difficulties that may hinder their academic success.

For one, PSTC-Bohol established a computer laboratory in the university premises exclusive for DOST scholars because most scholars do not own gadgets. They tend to stay late working on their projects in internet cafes which expose them to dangers.

They also put up a credit scheme from their association funds to further help the scholars. Likewise, they have a "big brother-small brother" tandem in which an elder scholar is assigned to a newbie to help the latter cope with the rigors of academic life.

And to help curb absences due to illnesses, PSTC-Bohol also makes available to scholars some medicines for common illnesses such as fever, flu, cough and cold, hyperacidity, and others, including vitamins.

They also celebrate an alumni homecoming every five years.

MOMSHIE TO SCHOLARS

Though Vina has been with DOST-VII since 1991, it wasn't until 1993 when she started handling the scholarship program as the science promotion officer of the region. A year later and for almost 25 years now, she's been overseeing the scholarship program of Bohol. She's also a DOST scholar herself, having obtained her Professional Master in Technology Management at the Asian Institute of Technology in Thailand under the DOST Accelerated Science and Technology Human Resource Development Program.

A scholar who's now the president of his own company has this to say about Vina: "Ma'am Vina as scholars' coordinator did it with exemplary performance. She did her work not just by what is in the book but with her heart. She did it with motherly love.

She always keeps her phone open and entertains concerns even beyond working hours.

"There are scholars who need guidance. They need someone to hand-hold them while they are pursuing their dreams, somebody who can teach them about the intricacies of life and make them realize that being good is not confined to having high scholastic marks alone," Vina says.

Like a mother being pampered by her children, Vina says she enjoys the perks of having an A-1 treatment whenever she has transactions in the respective offices of their previous scholars who now hold important positions in many commercial establishments, such as banks and other service institutes.

"I feel respected, pampered, and loved. I'm forever grateful. They didn't learn from me, it's me who learned from them a lot!" she shares.

If there's one thing more that she hoped for, it is for the scholars to imbibe the value of love for country.

"There should be an annual activity that could develop or nurture the sense of patriotism among our young," she says.

The second grand reunion of alumni in 30 December 2014 which Vina posted on her Facebook account with the caption "I'm the happiest nanny in the world!" The next reunion will be on 30 December 2019. (Photo courtesy of Vina R. Antopina)

Diona showing his panel board for electrical wirings which he himself designed and installed.

Nelson Diona shows off his Horizontal Feed Mixer acquired through DOST-SETUP

From laborer to farm owner: A SETUP success story

By Djonna Gay I. Albufera and Jesse M. Pine, *PSTC-Oriental Mindoro, and* **Ma. Josefina P. Abilay,** *DOST-MIMAROPA*

"There was a time when I had to sleep at the ceiling of the school when I was a working student so I can have a place to rest," recalls Nelson Diona, owner of Red Gate Farm Supplies, as he gazed on the houses he built for his workers inside his three-hectare property in Sta. Maria, Gloria, Oriental Mindoro.

A former farm laborer, Nelson now has his own farm and farm supplies business, and employs several stay-in farmhands. "We are like a family and I am like a father to them. These houses I made are for them and their families," referring to the residential structures in his farm.

Red Gate Farm Supplies, whose name was derived from locals referring to his property as the "pulang gate", is also home to farm animals and a milling facility for animal feeds.

FROM HUMBLE BEGINNINGS TO PERSONAL SUCCESS

Looking back, Nelson said his life was not as easy as it is now. He was raised and put into high school by his grandparents. He remembered going down to the rice field to work during his free time just to earn money which he saved to buy cows.

While hopping from one job to another, he managed to put himself through college. He once had to moonlight as a fast craft cleaner and slept at his school's ceiling before attending morning classes. With his diligence, he was able to own 56 cows at the age of 25 which he then sold to invest in hogs.

Working as a farmer at a young age just to make ends meet, he was able to acquire firsthand experiences and knowledge in animal farming that guided him in establishing his own firm in 2007. He took different courses in technology and livelihood education focusing on animal husbandry. He also went through intensive self-study, experiments, and participation in trainings to further his understanding on feed formulation.

Later on, Nelson focused on swine raising where he had his formulated feeds tested to determine its effectiveness. His own formulated feeds were consumed by his domesticated animals—from starter mash to lactating mash which later yielded positive results.

To date, the firm produces 28 bags of assorted feeds daily (seven starters, 14 growers, five breeders, and two lactating) to support the daily feed requirements of its 60 sows and more or less 500 fatteners. He also proudly shared that he even has his own formulation for his acquired cows.

CONTINUOUS LEARNING AND UPGRADING

Whenever asked what made him what he is today, he always tells that one needs to learn from his experience and then continue learning more and more.

Even after his success in formulated feeds, Nelson never stopped learning. He took automotive technology to nurture his interest in machines and equipment. Aside from taking up a degree in Computer Science as his undergraduate course, he also has a certificate in electronics and is also a computer technician.

In 2016, he sought the assistance of Department of Science and Technology

(DOST)-MIMAROPA for technological assistance after he learned about the Small Enterprise Technology Upgrading Program (SETUP). Said program of the DOST helps micro, small, and medium enterprises (MSMEs) to improve production efficiency, product quality, and competitiveness through technical assistance and provision of appropriate technology and equipment.

Before the SETUP intervention, Red Gate Farm Supplies was not capable of mass producing its formulated feeds due to limited production equipment. With the SETUP provision of innovation system support, which includes the horizontal feed mixer, hammer mill, and rotary-type mechanical dryer, the firm was able to produce higher number of quality feeds without going through labor-intensive mixing of raw materials.

With the technology assistance through SETUP, uneven mixing of feeds is no longer a concern, said Nelson. He said that he is proud that his mixer can now uniformly incorporate the least amount of feed ingredient to a large volume of formulation in just a few minutes.

He found his market in other animal raisers who became interested after seeing the effectiveness of the feed formulations on Nelson's farm animals.

This is the truck which Diona considers as a fruit of his hard work after his sales in the farm improved with the help of DOST's SETUP.

The sows and fatteners raised by Nelson Diona are fed with his own feed formulations in Red Gate Farm Supplies.

Stay-in workers of Red Gate Farm Supplies have houses built within the farm area.

While he dreams of venturing into supplying feeds in the whole province of Oriental Mindoro, he knows that he should take it one step at a time. He is confident that with all the knowledge and skills that he has, complemented with the appropriate technology solutions, he will be able to realize his dreams.

GRATEFUL AND INSPIRED

Nelson believes, and would often say, that 90 percent of what he has now is because of the assistance from DOST because he was entrusted with something that he has always aimed for—innovation. He claims that because of the grace period and no interest accrued in monthly refunds, he was able to buy a delivery truck from the profit he acquired from the business. The truck's body and hydraulic system was designed by Nelson himself.

Aside from the truck, Nelson was also inspired to design his very own low-powered hammer mill that can produce one ton of milled ingredient in an hour by using a 10-horsepower single phase motor. His design also includes a built-in separator that segregates milled corn and corn grits.

DOST-MIMAROPA is now encouraging Nelson to apply his invention for Utility Model registration to the Intellectual Property Office of the Philippines to protect his innovation.

With all his successes, Nelson still has dreams not only for himself but for his community as well. "This is just the beginning," he said, as he aspires to give back and share what he has to his community. Aside from accepting invitations to give inspirational talks to students and farmers, he also allows them to visit his farm and learn the proper farming techniques and applications.

But his ultimate goal is to offer scholarships in agriculture to deserving students when he is able. He knows the importance of education and knowledge and also understands how it feels to be the one in need. "When the right time comes, I definitely will fulfill this goal," he confidently said.

DOST supports Marinduque arrowroot producers

By Bernardo T. Caringal, *PSTC- Marinduque* **and Ma. Jose ina P. Abilay,** *DOST-MIMAROPA*

Arrowroot based products are prime commodities and one of the major sources of livelihood in the island province of Marinduque. To further boost arrowroot processing production in the province, the Department of Science and Technology-MIMAROPA (DOST-MIMAROPA) awarded Marinduque's Mongpong Island with arrowroot production technologies.

Mongpong Island is the farthest island from mainland Marinduque, whose locals are still dependent on farming, fishing, and processing arrowroot as their primary sources of living. Arrowroot plant (*Maranta arundinacea*) or colloquially called "uraro" is a perennial plant widely cultivated in Mongpong for its starchy rhizomes which is a good source of arrowroot flour—a primary ingredient of the sought-after delicacy and pasalubong from the province, the arrowroot cookies.

As one of the island's major income-generating activities, the sustainable production of arrowroot cookies is a high priority among the locals. However, even with a stable supply of raw materials, the time-consuming and labor-intensive manual processing of arrowroot limits the capacity of its farmers to produce more and meet demands at all times.

With the Convertible Arrowroot Electric Grinder, washing bath, mechanical presser, and movable solar dryer—all from DOST-MIMAROPA, arrowroot farmers and producers in Mongpong island can now produce arrowroot by-products faster and more efficiently than before.

Since access to electricity in the island is also a challenge, DOST-MIMAROPA also provided Solar Energy Systems (SES) to

Testing of the convertible Arrowroot Electrical Grinder

power the Convertible Arrowroot Grinder. The use of SES will avoid disruption of work due to absence of electricity as well as save production costs by using renewable energy instead of gasoline as its major source of power.

DOST-MIMAROPA also installed SES at the barangay hall and at Mongpong National High School (MNHS)—both of which serves as evacuation centers when needed. The SES also allows students to increase their learnings by maximizing the use of their computers, projectors, and other academic tools. Miguelito E. Ricaplaza, principal of MNHS, described how students' time for learning is being limited by access to electricity and said,"Dati nagagamit lang nila ang mga computers 3 PM to 5 PM, ngayon 8AM to 5PM na. Previously, they could only use the computer from 3PM to 5PM. Now. thay can use it from 8AM to 5PM.

SES installation at the Barangay Hall

Students of MNHS accessing computers powered by SES

IAI 4Kv Air Ionizer: A Winning Science Project

By Mark Anthony I. Cagalitan, *Saint Francis of Assisi College, Dasmariñas, Cavite*

The participants and organizers of the Science Journalism Writeshop organized and conducted by DOST-STII led by Director Richard P. Burgos (middle, seated) for Association of Science and Mathematics Educators of Philippine Private Schools (ASMEPPS). The writer of the article, Mark Anthony I. Cagalitan, is at the leftmost.

WHAT DOES the air ionizer in an air purifier or cleaner do? Should you buy an air purifier with ionizer and is it worth the extra cost?

This is what Kryztelle Ashley R. Herrera, a Grade 6 pupil from Mayapyap Elementary School of Cabanatuan City, Nueva Ecija tried to create and design. Her winning entry in the Science Investigatory Project is entitled "IAI 4Kv". (The name of the prototype apparently stands for Investigatory Air Ionizer or "IAI" and the "4kV" refers to the maximum voltage output of the machine which is the ideal voltage, as pointed out in the study—Editor).

"I conducted this study to create and design an efficient but affordable air ionizer for those who live in cities," Herrera said. Her coach, Maureen I. Junio, gave technical assistance and support in conducting her research.

Kryztelle defended her study to the panel of expert judges from the Department of Science and Technology (DOST). In order to prove her study, two separate tests on cigarette and car smoke were done to the IAI 4Kv to measure the time it takes for the air to be ionized. Also, IAI 4 Kv underwent testing for air pollutants (lead and chromium levels of dust it accumulates) at the University of the Philippines – Diliman from January to December 2017.

Test results show that: IAI 4Kv air ionizer quickly ionized the air inside a chamber filled with cigarette and car smoke compared with commercially available air ionizer and lead and chromium presence in the dust accumulated from IAI 4Kv is higher than the tolerable value which shows its effectiveness in ionizing the air. The IAI 4Kv is also cheaper, costing only P500 compared with the price of commercially available air ionizers. In summary, IAI 4Kv ionizer works more efficiently and helps people breathe better with less pollutants in the air.

As a result of her defense, Kryztelle won in the Physical Science Investigatory Project-Individual Category during the National Battle of Math and Science Champions Year 4 held on 27 January 2018 at the National College of Science and Technology, City of Dasmariñas, Cavite.

This competition was organized by the Association of Science and Mathematics Educators of Philippine Private Schools in partnership with the DOST-Science and Technology Information Institute to showcase various investigatory projects. The projects go through school level to regional level before competing nationally.

Kryztelle, together with her coach, Maureen Junio during the awarding of ASMEPPS medal and certificate.

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Editor's note: This article is one of the outputs during the Science Journalism and Photojournalism Writeshop for teacher-members of the Association of Science and Mathematics Educators of Philippine Private Schools. The writeshop was held 22-23 May 2018 at the Center for the Arts, Science and Technology at the DOST-Science and Technology Information Institute.

Filipino inventors win gold in Geneva Exhibition of Inventions

By Framelia V. Anonas, *DOST-STII*

TWO PROJECTS funded by the Department of Science and Technology (DOST) bagged gold medals at the 46th International Exhibition of Inventions of Geneva (Geneva Exhibit) held on 11-15 April 2018.

Smart Surface, an electronic sensor system that can convert virtually any flat surface into an interactive interface, received the Gold Medal with Jury Distinction Award. Meanwhile, Biotek-M™ Dengue aqua Kit, a dengue diagnostic kit that can detect dengue infection in an hour or less, got the Gold Medal without Jury Distinction Award.

There were 226 entries in all three classes participated in by DOST where 20 were awarded with Gold Medals with Jury Distinction and 95 received Gold Medals without Jury Distinction Award.

Both technologies received support from the DOST-Technology Application and Promotion Institute for their pre-commercialization and Intellectual Property Protection.

DOST's third entry was BioGroe, a biofertilizer with plant growth-promoting bacteria that help increase the yield of vegetables, sugarcane and other crops; promote flowering of orchids; and enhance the rooting of stem cuttings of ornamentals, cassava, and black pepper.

The International Exhibition of Inventions of Geneva is the most important inventions exhibition in the world, with 1,000 new inventions and products, 700 exhibitors from 40 countries, 57,000 visitors from all five continents, 650 journalists, and benefits from the most extensive support and privileges that can be granted to an exhibition. It is under the patronage of the Swiss Federal Government, the State, the City of Geneva and of the World Intellectual Property Organization.

Smart Surface

The Smart Surface system has a number of sensors and a central controller that enable flat surfaces to be tap sensitive. It is a portable, robust, and flexible platform that can virtually convert any ordinary surface into a tap-sensitive device.

The system was invented by Engr. Charles Kevin A. Verdad, a computer engineering graduate from the University of the Philippines (UP) Diliman and Dr. Nestor Michael C. Tiglao, an associate professor at the Electrical and Electronics Engineering Intstitute, College of Engineering, UP Diliman.

The Smart Surface system is a platform technology that can be customized for various applications across industries. It can be used in education, restaurants, and marketing as interactive boards, tables, and walls. Smart Surface is customizable and low-cost with speedy after-sales support.

According to the monitoring agency, the DOST-Philippine Council for Industry, Energy and Emerging Technology Research and Development, this technology addresses the challenge of enhancing the learning environment through interactive activities. The result is a more effective learning experience and more active participation of students.

Biotek-M™ Dengue aqua Kit

The Biotek-M™ Dengue aqua Kit developed by Dr. Raul V. Destura of the National Institutes of Health in UP Manila can quickly detect dengue infection among patients as early as the first day of illness. The quick and accurate results from the test allow doctors to make better decisions for patients, particularly in confirming or ruling out dengue.

Current antigen detection diagnostic tests used to detect illness between 0-5 days are heavily affected by the patients' immunological profile (secondary dengue infection) resulting in reduced sensitivity. Other dengue diagnostic tests that measure antibody response to dengue require patients to wait five days within or after the onset of symptoms for improved sensitivity.

With Biotek M™ Dengue aqua kit, doctors can rule out dengue quickly without having to admit patients who are suspected of having the illness. This is because Biotek-M™ Dengue aqua kit uses a molecular technique that is not directly affected by patients' immunological status (whether primary or secondary infection).

Early diagnosis means early treatment resulting in improved outcome and less cost of care. It also reduces the burden of hospital care since the test can provide good diagnostic sensitivity that will allow patients to be diagnosed with certainty. This leads to informed decision making for either hospital or out-patient case management.

Also funded by the DOST-Philippine Council for Health Research and Development, Biotek-M™ Dengue aqua kit is already available in the market at a much lower cost compared to other molecular-based dengue tests. Its major client is still the Department of Health which plans to deploy the kits in 15 hospitals in three provinces (Ilocos Norte, Capiz, and Zamboanga Sibugay).

Smart Surface (patent pending)

Biotek-M™ Dengue aqua Kit

Pisay studes' project bags gold in int'l invention tilt

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

THE RESEARCH project "Landslide Warning System using Aceduino" by the Philippine Science High School System-Cordillera Administrative Region Campus (PSHS-CARC) won the gold medal award in the Young Inventors' Challenge (YIC) held at Kuala Lumpur, Malaysia.

Rising above a total of 103 inventions from around the world, the research project by Leia Pauline S. Tonga, Beatriz Camila D. Rancho, Allyson Jane C. Mendoza, and Arvi T. Ayson involved development and setting up of sensors that could help in landslide monitoring in Baguio City especially during rainy season.

YIC aims to develop future inventors and give young students the opportunity to experience the inventive cycle from conceptualization to product/prototype. Further, the said competition also gives young students opportunity to contribute and make positive change in the world.

PSHS-CARC's other entry to the tilt was the research project "Using the Repulsive Force of Neodymium Magnets as a Source of Restoring Force in a Shoe Cushion" by John Rowan C. de Guzman, Leejan Rafael S. Nacnac, Dwayne Gavryl B. Villariza, and Daryl B. Dungala.

"The YIC is a good opportunity for our students to showcase their inventions," said Bhazael Anne R. Pelicano, mentor-chaperone of the PSHS-CAR students. She said that inventions range from simple to complex, from big to small, from technology-based to biology-based inventions.

Photo from PSHS-CAR

PH's first certified patent analysts

By Jund Rian A. Domingo, *DOST-TAPI*

(L-R} Caezar Angelito E. Arceo, Eric Khoo of IP Office of Singapore, David Wanetick of Patent Fairness Opinions, and Atty. Marion Ivy D. Decena during the CPVA Program on 1-2 March 2018 at the IP Academy in Singapore. (Photo from DOST-TAPI)

FINALLY, THE Philippines now has its first Certified Patent Valuation Analysts (CPVA) through Atty. Marion Ivy D. Decena and Caezar Angelito E. Arceo who both passed the CPVA course on 17 March 2018 and 27 April 2018, respectively.

Atty. Decena and Arceo are from the Department of Science and Technology-Technology Application and Promotion Institute (DOST-TAPI). Atty. Decena and Arceo enrolled in the CPVA Program on 1-2 March 2018 at the Intellectual Property (IP) Academy in Singapore.

Designed to prepare financial analysts, technology transfer professionals, IP managers, licensing managers, inventors, patent lawyers, and other business development managers with the necessary skill sets to value patents, the CPVA Program also immerses the participants in the Patent Valuation Gauntlet™, a proprietary mark as the world's most thorough methodologies for assessing the strength and value of patents.

A patent is considered an important parameter for innovativeness which creates more value to businesses. It is the intangible asset of a company.

In this context, the assessment of the significance of patents and technologies has never been more crucial and exhaustive with the growing number of patent filings by millions from the 1980s up to present globally according to the World IP Organization (WIPO).

"The training is very essential for a patent practitioner especially in valuing IPs, patent in particular, and in revolutionizing the patent portfolio of DOST-TAPI," said Arceo.

Moreover, Atty. Decena said that the increasing activities of the Department in terms of technology transfer and commercialization makes patent valuation timely and vital than ever.

"Local trainings on patent valuation within the DOST and across the regions will benefit not only patent practitioners but every stakeholder in the Philippines," added Atty. Decena.

Atty. Decena, lawyer-accountant and division chief of the Invention Development Division and Arceo, patent agent and supervising science research specialist, have solid experience in providing support for IP system and business development of inventors and technologies.

"The CPVA Program is one of the major capacity building initiatives of the DOST-TAPI as the Institute pivots from a technical and administrative support agency to a major partaker in the country's technology transfer scene," said DOST-TAPI Director Edgar I. Garcia.

The two-day onsite CPVA Program was attended by 17 participants from Singapore, Indonesia, Malaysia, the Philippines, and Europe.





S&T Journey: 60 years and beyond

13 June 2018





60's
80's


. Dela Peña


S&T Journey
60 Years and Beyond


S&T Journey
and Beyond


Montejo


programs on coconut, biotechnology, and


Regional Offices
Presentation

Science chief champions servant-leadership in DOST

By Jasmin Joyce P. Sevilla, *DOST-STII*

"WHETHER WE are carrying out or coordinating research and development, or whether we are transferring technologies to different beneficiaries, our mandate at the Department of Science and Technology (DOST) requires all our leaders and managers to be servant-leaders."

This was emphasized by DOST Secretary Fortunato T. de la Peña during the third conference series of Serviam Catholic Charismatic Community (CCC) Foundation, Inc. entitled "Servant Leadership in Business", held on 31 January 2018 at the Makati Shangri-La.

The science chief shared his insights on servant-leadership from the perspective of someone who works in the government sector. In his presentation, Sec. de la Peña identified five key challenges that servant-leaders in the government should address, namely, developing human resources, sharing the blessings, contributing to the growth of their sector, partnering with suppliers, and putting social responsibility into action.

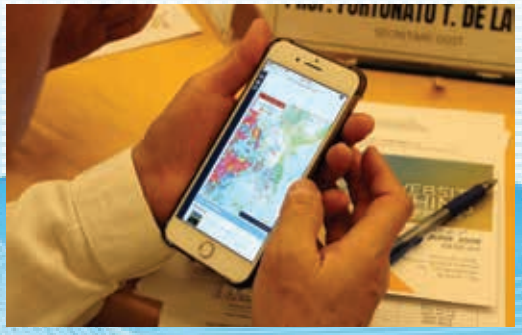
A talk at the 15th Philippine Semiconductor & Electronics Conventionat the SMX Convention Center on 13-15 June 2018.

Ceremonial turnover of modified four-harness therapeutic handlooms to the differently-abled and elderly of Guanella Center, Servants of Charity. (11 June 2018)

Checking out some slippers during a project visit in Oriental Mindoro. (18 May 2018)

In addition, Sec. de la Peña highlighted the importance of continuously providing training to workers and employers and honing their skills, even for those who finished only basic level of education. "We just have to see that they have capabilities and try to help them develop these capabilities," he said. "We have seen firms where some of the workers actually have entrepreneurial competencies and some of them eventually become entrepreneurs," he added.

To end his presentation, Sec. de la Peña proudly shared two DOST programs that serve the business community and enterprise sector—the Community Empowerment thru Science and Technology (CEST) program and the Small Enterprise Technology Upgrading Program (SETUP).



SFTP tries to access the new PAGASA website using his smartphone during the launch.(11 June 2018)

A visit to the DOST-DENR garden. (02 April 2018)

SFTP visits Batanes for the S&T Caravan (13-20 April 2018)

Addressing the audience and partners during the DOST-DTI synergy meeting as innovation partners at the 3M Auditorium. (5 April 2018)

SFTP does some groundwork at the Gawagaway-Yan Festival 2018 in Isabela (3-4 April, 2018)

SFTP is on his way to visit the Philippine Rise (15-16 May 2018)

CEST helps identify marginalized communities by introducing science and technology in various areas of the community (health, sanitation, education, livelihood, and others). For SETUP, DOST assesses the technology improvement needs of a particular micro, small, and medium entreprise (MSMEs), and help them acquire technical training and equipment. The said program also provides MSMEs with financial assistance to acquire equipment needed in their business. "They pay without interest, and when they are fully paid, we transfer the ownership to them," Sec. de la Peña explained.

Other invited speakers during the conference were Uni versity of the Philippines Professor Solita G. Collas-Monsod, and Aurelio Luis R. Montinola III of the Bank of the Philippine Island who discussed their expectations of servant-leadership as part of the civil society and academe sectors, respectively.

In line with Pope Francis' declaration that business is a noble vocation, Serviam intends to propagate the value and importance of servant-leadership in one of the most influential fields in our society – the business sector.

Serviam hopes to create an impact in all segments of our society, may it be in the academe, the youth, media, etc. through various activities including a series of seminars on servant-leadership. In 2013, Serviam conducted the first conference entitled "Servant Leadership in the Year of Faith," followed by the second conference in 2015, "Servant Leadership in Public Service."

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