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# S&T POST

JAN-MARCH 2017

## Harmonizing
## RESEARCH AND DEVELOPMENT

## EDITORIAL

# Harmony

More often than not, we relate harmony with the melodious sounds of the earth – from birds singing about their freedom to leaves rustling with every breath of mother nature. And every so often, we associate harmony with music. Not surprisingly, the dictionary defines harmony as a consistent, orderly, or pleasing arrangements of parts; it is synonymous to congruity.

Perhaps, this is the inspiration of the Department of Science and Technology or DOST in coming up with the Harmonized National R&D Agenda (HNRDA) 2017-2022. This important document aims to ensure that results of S&T activities are geared towards and are used in areas of maximum economic and social benefit for the people. The HNRDA came about after the DOST did rounds of consultation with government and private research institutions, academe, industry, and other concerned agencies.

Looking closely, one would easily notice that the document was formulated in line with the mandate of the DOST – providing central direction, leadership, and coordination of scientific and technological efforts in the country. Also, it is aligned with AmBisyonNatin 2040 and is anchored on three pillars: Malasakit (enhancing the social fabric), Pagbabago (reducing inequality), and Kaunlaran (increasing potential growth). AmBisyonNatin 2040, meanwhile, is this administration's long-term vision to "triple real per capita incomes and eradicate hunger and poverty by 2040, if not sooner."

For this reason, the first quarter issue of the S&T Post in 2017 focuses on stories that fall within the agenda. These include articles from various R&D institutions of the department but have been treated differently so that readers can relate to them with ease and appreciation.

It is expected that this harmonized document would help elucidate national policies and serve as guide for public investment in R&D. The HNRDA is organized into five sectors: Basic Research; Agriculture Aquatic and Natural Resources; Health; Industry, Energy, and Emerging Technology; and Disaster Risk Reduction and Climate Change Adaptation. It was formulated by the National Research Council of the Philippines; Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development; Philippine Council for Health Research and Development; Philippine Council for Industry, Energy and Emerging Technology Research and Development; Philippine Institute of Volcanology and Seismology; and Philippine Atmospheric, Geophysical and Astronomical Services Administration in cooperation with stakeholders in the respective sectors.

It is truly noteworthy that in 2017, the DOST has a budget of P5.8 billion geared for R&D, all aimed at eradicating inequality, creating opportunities, and accelerating development.

For this, DOST Sec. Fortunato T. dela Peña and other officials of the department have called on researchers to take advantage of the R&D agenda, saying that there is budget for a host of research topics that support four of the 10 national socio-economic agenda of the Duterte administration. These four are advancement of science and technology (S&T); business sector's increase competitiveness; promotion of rural value chain development; and investment in human capital development.

With all the notes becoming in synch, who can be out of tune?

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


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DOST-Science and Technology Information Institute-DOST (Library)
DOST STARBOOKS





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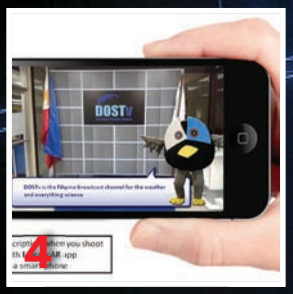







## OUR COVER


A mix of different musical notes played together to create a pleasing sound is not so different from a harmonized research and development (R&D). Harmonizing R&D helps achieve a common goal more efficiently and effectively, maximize resources, and develop trust among all stakeholders. The guitar on the cover is an example not only of a musical instrument that helps achieve harmony. It is a "Gitara ni ð an" producta– n example of a harmonious R&D collaboration of four institutions to come up with a locally-developed guitar made from local wood that produces sound quality comparable with expensive imported pieces. (Photo by Henry A. de Leon | Gitara ni ð an guitar courtesy of the College of Music and the Electrical and Electronics Engineering Institute, both of UP Diliman; and the Forest Products Research and Development Institute and the Philippine Council for Industry, Energy and Emerging Technologies Research and Development, both of the Department of Science and Technology)


## Main features



## Feature stories



## From the Regions

# Beyond index cards and online access
# Augmented reality experience at DOST-STII library

**By FRAMELIA V. ANONAS,** *DOST-STII*

**GENERATION XERS** will have to stow their library cards and Millennials will soon go beyond online access as the Department of Science and Technology gears up to give an enhanced experience to library researchers within the year.

This levelling up of library experience will start at the DOST- Science and Technology Information Institute (STII) which holds the largest collection of S&T information materials in the country.

STII gave a preview of the augmented reality experience to Sec. Fortunato T. de la Peña during the 30th anniversary celebration of DOST-STII on February 27, 2017 at the Manila Hotel.

STII, established in 1987 through EO 128, is the information and marketing arm of the DOST. Particularly, STII is tasked to provide S&T information services which include information reference services through its library.

The app, called the STARLibrary or the Science and Technology Augmented Reality Library, will "add new creative dimension to the experience of DOST visitors, library users, and even beneficiaries," said STII Director Richard P. Burgos.

"We will redesign the library user experience by incorporating augmented reality," Burgos revealed. "The DOST-STII library will be the first library to use augmented reality in the country."

"We will also include virtual reality and gaming in the experience of a science and technology library without physical books," he added.

Augmented reality is a technology that adds computer-generated enhancements into a real environment in real time to make the experience more meaningful by interaction. It blends digital components into the real world to enhance each other.

Virtual reality, meanwhile, is an artificial, computer-generated simulation or recreation of a real life environment or situation. The technology makes users feel like they are experiencing the simulated reality firsthand through vision and audio stimulation. This is usually experienced in video and computer games, 3D movies, and even in training for real life environments such as flight simulators for pilots.

Virtual reality presents a digital recreation of a real life setting, while augmented reality mixes virtual elements as an added layer to the real world.

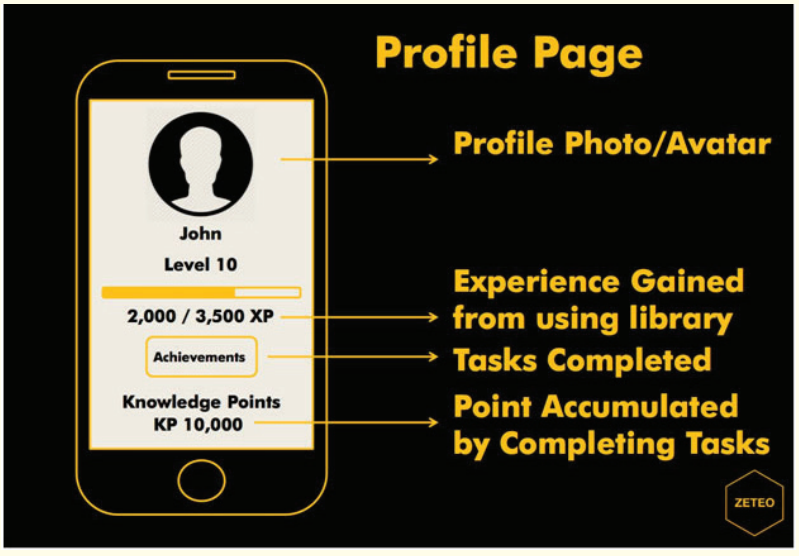
One example of this virtual reality experience, according to Alan C. Taule, chief of STII's Information Resources and Analysis Division which handles the STII Library, is the popping-out of a description when a smart phone installed with the STARLibrary app is used to shoot a certain part of the library.

"The app may also run a 2D or 3D animated object with an audio," he said.

Taule also said that the enhanced experience through virtual reality will start with STII materials and selected locations at STII and will be expanded to include the whole of DOST Complex in Bicutan, Taguig City.


Pop-up description when you shoot the area with Library AR app installed in a smart phone

This is a preview of what library researchers can expect using STARLibrary, an app that gives an enhanced experience to library researchers at the DOST-STII.




STARLibrary also has a gaming component that encourages guests to visit the library and read books for more points.

# InfoSerbilis for faster, more accurate info on DOST services

**By ESPIE ANGELICA A. DE LEON,** *DOST-STII*

**SOMEDAY, EACH** Department of Science and Technology (DOST) agency will have an information kiosk containing information on all basic DOST services. At the same time, an online one-stop portal will be available where services offered by all DOST agencies will be searchable. Guidebooks, directories, brochures, and maps will be available as well.

With all these tools, DOST information officers and the rest of the workforce will be more responsive and accurate when responding to inquiries about DOST services whether or not the inquiry is about their own agency's products and services.

The quick response is expected to lead to a higher level of client satisfaction and trust for DOST.

A group of Master of Science Development Communication students from University of the Philippines Los Baños (UPLB) actually had this as the goal as they worked on a project for their DevC 2018 class on "Communication Approaches in Development Programs." The group comprises DOST information officers on scholarship under the DOST-Human Resource Development Program off-campus program.

Composed of Salvador R. Serrano (team leader, FNRI), Haziel May C. Natorilla (STII); Ullyann C. Garcia (PCHRD); Charyl C. Apuyan (NAST); Mary Charlotte O. Fresco, George Robert E. Valencia III , and Ma. Estrella B. Valle (NRCP); and Ana Ciaren H. Itulid (PCHRD), the group launched a communication campaign for this project dubbed "DOST InfoSerbilis" last December 12, 2016 at the Philippine Science Heritage Center auditorium in Bicutan, Taguig City.

DOST InfoSerbilis aims to gather support from the entire DOST community in raising the level of awareness and basic knowledge of all employees on all DOST agencies' services.

Basically, it envisions a unified information delivery service via various strategies such as an interactive information kiosk at every agency; an online one-stop portal; the development of print materials such as a general guidebook, directories, brochures, and maps; and video tutorials, among others.

DOST's Science and Technology Information Institute (STII), through Information Resources and Analysis Division Chief Alan V. Taule, declared its support for InfoSerbilis which is aligned with the proposed new tagline for DOST-- "Science for the People."


Velasco and the MS DevCom students under the DOST-HRDP scholarship during the turnover of the InfoSerbilis policy brief to to Alan C. Taule, chief of DOST-STII's Information Resources and Analysis Division *(Photos by Henry A. de Leon, S&T Media Service, DOST-STII)*

During the launch, the students turned over InfoSerbilis' policy brief to Taule who represented STII Director Richard P. Burgos.

"I am certain that many, if not all, DOST agencies have their own respective initiatives to highlight the importance of science to the Filipino public. So I feel that the time is right for us to harmonize and converge these efforts into a comprehensive package," Taule said in his message.


UPLB College of Development Communication Dean Dr. Ma Theresa Velasco

"We need knowledge workers," he added. "The important thing here is knowledge at the moment of value. So we must be organizationally able to deliver such services."

UPLB College of Development Communication Dean Dr. Ma Theresa Velasco also delivered a message while team leader Salvador R. Serrano explained the concept of DOST InfoSerbilis.

Capping the program was the announcement of the InfoSerbilis Online Quiz winners. They are Melissa Bulao (PCHRD), Roselle Martonito (PCHRD), Carla San Diego (PCHRD), Abbie Padrones (FNRI), Erwin Don Racasa (NRCP), Nico Parungao (PCHRD), John Apolinario (DOST Zamboanga), Erika Barias (NAST), Sab Elechosa (PCHRD), Morris Pioquinto (MIRDC), May Ann Devanadera-Gironella (FNRI), Vannizsa Ibañez (FNRI), Jose Gepanaga (PCHRD), Hazel Tolentino (FNRI), and Sheila Punzalan (PCHRD).

# Pisay-CAR studes get gold in China for robot soccer operation skills

**By FREDA M. WONG**, *PSHS-CAR*

**PHILIPPINE SCIENCE** High School (also called "Pisay") students from the Cordillera Administrative Region Campus, Caleb Joshua R. Abrazaldo (Grade 11) and Rei Arion Videl D. Buena (Grade 10), bagged the gold medal during the 8th ASEAN + 3 Student Camp and Teacher Workshop for the Gifted in Science (ACGS) held in Beijing, China last January.

Abrazaldo and Buena who made an edge over other participants from 12 countries got the gold for their performance in the workshop. They were rated in various aspects such as recitation, speed in disassembling and assembling the soccer robot, and poster presentation.

During the student camp, the participating students had a two-day lecture-workshop on assigned subject tasks then presented their outputs through posters.

Meanwhile, three other grade 9 students from PSHS Ilocos Region Campus got their share of silver and bronze medals. Adrian Charles Tiu Lao clinched the silver while Kristine Marie C. Jardiolin and Elizabeth Rae S. Peralta got bronze medals.

The 8th ACGS is participated in by 11 Asian nations, namely Brunei, Cambodia, China, Indonesia, Laos, Malaysia, Myanmar, Philippines, Republic of Korea, Thailand, and Vietnam. Sweden was a guest country for this year's event.

The 8th ACGS focused on innovation. The student camp was grouped into five subject tasks: Bridge Model Design and Making, Model Airplane Design and Making, Soccer Robot Operation, Small Rocket Model Design and Making and 3D Print Study. Abrazaldo and Buena were assigned to the Soccer Robot Operation.

The ACGS, established to discover young intelligent students, is participated in by high school students who are gifted science and are 15 years old and below.

Organizers of the 8th ACGS are the Children & Youth Science Center of CAST, Beijing No. 35 High School, and China Association of Children's Science Instructors. It was hosted by the Department of International Cooperation under the Ministry of Science and Technology of the People's Republic of China, and the Department of International Affairs under the China Association for Science and Technology.

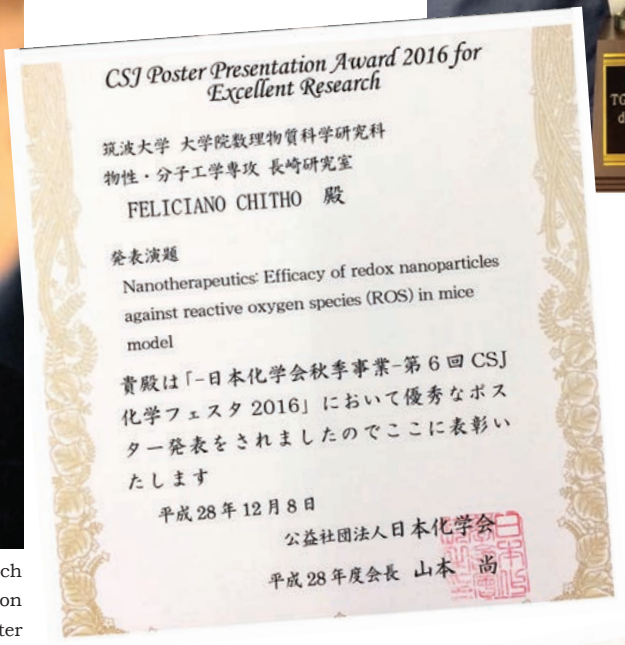

Bemedalled | The Philippine delegates with their medals (L-R): Elizabeth Rae S. Peralta, Adrian Charles Tiu Lao, Rei Arion Videl D. Buena, Caleb Joshua R. Abrazaldo and Kristine Marie C. Jardiolin.

Buena and Abrazaldo explain to the judges what the soccer robot can do.


Buena and Abrazaldo with Freda M. Wong who served as escort of the Pisay students.

# DOST researcher bags awards on nanotherapeutics in Japan

By **HANS JOSHUA V. DANTES**, *DOST-PNRI*



CSJ Poster Presentation Award 2016 for Excellent Research

筑波大学 大学院数理物質科学研究科
物性・分子工学専攻 長崎研究室
FELICIANO CHITHO 殿

発表演題
Nanotherapeutics: Efficacy of redox nanoparticles against reactive oxygen species (ROS) in mice model

貴殿は「-日本化学会秋季事業-第 6 回 CSJ 化学フェスタ 2016」において優秀なポスター発表をされましたのでここに表彰いたします

平成 28 年 12 月 8 日
公益社団法人日本化学会
平成 28 年度会長 山本 尚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Poster Award

This is to certify that

Chitho P. Feliciano (2P-045)

has been awarded
Best Poster Presentation Award
at AsiaNANO 2016 Conference on
Nanoscience and Nanotechnology
Sapporo, Japan
10–13, October 2016

Martin Vacha, Ph.D
Editor-in-Chief
NPG Asia Materials

Masahiko Hara, Ph.D
Conference Chair
AsiaNANO 2016

NPG asia materials

Mr. Chitho P. Feliciano of the PNRI Biomedical Research Section wins the De Silva Prize for Best Oral Presentation (middle left) in Tsukuba, Japan; the Best Poster Presentation Award during the AsiaNANO Conference in Sapporo, Japan; and the Best Poster Presentation Award at the Chemistry Society of Japan Festa (extreme right) in Tokyo, Japan.

**CHITHO FELICIANO,** a senior science research specialist from the Department of Science and Technology-Philippine Nuclear Research Institute, recently bagged the De Silva Prize for Best Oral Presentation at the Interdisciplinary Workshop on Science and Patents during the Tsukuba Global Science Week held in Tsukuba, Japan.

Feliciano's study, which was done in collaboration with his Japanese professor, aims to use nanoparticles to improve the therapeutic effect of nitroxide radicals. The study also aims to reduce the effects of skin aging, skin lesions, and other skin inflammatory disorders caused by ultraviolet rays and other forms of ionizing radiation, as well as radiation-induced reactive oxygen.

This doctoral student in Biomaterials Science at the University of Tsukuba in Japan further proved his study's winning streak by subsequently pocketing two Best Poster Presentation awards at the Asian Conference on Nano-science and Nanotechnology in Sapporo and then again at the 6th Chemistry Society of Japan Festa held in Tokyo last year.

DOST officials and personnel managing the DOST-OneLab project nationwide were on hand to receive the BCYF Innovation Award.

# DOST's OneLab Project bags BCYF Innovation Award

**By BON PADAYHAG**, *DOST-IX*

**THE ONELAB** Network, a platform developed by the Department of Science and Technology (DOST), was recently awarded the Benita & Catalino Yap Foundation (BCYF) Innovation Award under the government category.

The BCYF recognizes innovative products, services, technologies, or initiatives that transform organizations through improvements that are sustainable, demonstrable, and measurable.

DOST Regional Directors Dr. Anthony C. Sales (left) and Dr. Julius Caesar V. Sicat (right) with representatives of DOST officials who pushed for the realization of the DOST OneLab project.

The OneLab Network is an innovation in the service delivery of laboratories in the DOST system. The platform integrates DOST's regional and research institutes' laboratories, including selected non-DOST laboratories all over the country, into a network that provides easy access to testing and calibration services for the manufacturing and other industries, entrepreneurs, and the public in general.

The networking of laboratories through the DOST-OneLab project enables DOST regional offices to coordinate laboratory transactions with other DOST regional offices that are capable of doing tests required by clients. Such set-up facilitates the testing requirements of clients who no longer have to travel from one testing center or laboratory to another to complete their testing requirements.

Laboratory services are critical in the product development and quality assurance requirements of the micro, small, and medium enterprises. Public institutions and local government units likewise need laboratory services in addressing public welfare concerns and consumer protection. The academe too needs laboratory services for research and development activities.

The OneLab Network portal makes transactions easier and quicker, and allows customers to track the status of their requests. The customer portal, available in three online platforms (Web, Android and iOS), can be accessed through the internet address onelab.ph.

Former DOST-IX Regional Director and now DOST Undersecretary for Regional Operations Brenda L. Nazareth-Manzano, DOST-Industrial Technology Development Institute Director Dr. Ma. Patricia V. Azanza, and cluster heads Dr. Julius Ceasar V. Sicat (Northern Luzon), Dr. Alexander R. Madrigal (Southern Luzon), Engr. Rowen R. Gelonga (Visayas), and Dr. Anthony C. Sales (Mindanao), Regional Directors of DOST III, IVA, VI and XI respectively, pushed the OneLab project to become internationally recognized and accredited to ISO 17025:2005 "General Requirements for the Competence of Testing and Calibration Laboratories."

OneLab project's ISO accreditation ensures customers of accurate and complete instructions regarding their testing requirements.

Since it went online on October 2015, DOST's OneLab Network has facilitated 153 referrals of 434 samples across the country requiring 575 tests and calibration.

For more information on OneLab, please call (062) 991-1024 or text 0917 722 4118 and look for Rosemarie S. Salazar or email us at dost9info@gmail.com or visit our Facebook page at www.fb.com/DOSTRegion9.

# DOST's S&T library-in-a box wins Anvil Awards

**By FRAMELIA V. ANONAS,** *DOST-STII*


Left: DOST-Science and Technology Information Institute Director Richard P. Burgos receives the Gold Anvil Award for STARBOOKS, library-in-a-box that makes science and technology (S&T) information materials available to students and researchers even in remote areas. Receiving the award with Dir. Burgos is DOST Asst. Secretary Leah J. Buendia representing DOST Secretary Fortunato T. de la Peña.

Below: Two Anvil Awards this year for DOST-Science and Technology Information Institute's STARBOOKS.


**A LIBRARY-IN-A-BOX** that offers science and technology (S&T) information materials to students and researchers even in remote areas recently knocked two awards in the recent 52nd Anvil Awards at Shangri-La Makati. STARBOOKS, or the Science and Technology Academic and Research-Based Openly Operated Kiosks, got the Gold in the Anvil Award for Public Relations Program: Directed at Specific Stakeholders, Students, Entrepreneurs, LGUs, Communities, and Indigenous Peoples; and Silver in the Anvil Award for Public Relations Tool: Multimedia/ Digital.

STARBOOKS also made it to the top three contenders in the Grand Anvil, the highest category aimed by 402 entries from brands, media, and PR agencies.

"It was the first foray of DOST's Science and Technology Information Institute (STII) into the competitive world of excellence in public relations," revealed STII Director Richard P. Burgos.

STII, DOST's information and marketing arm, developed STARBOOKS to enable more efficient access to S&T information materials even in areas that are without Internet. To date, STARBOOKS is already available in more than 1,200 sites nationwide through the DOST Regional Offices that deploy the units to respective communities.

"Kaalaman sa Kahon: The Story of STARBOOKS"is DOST-STII's first and lone entry to the Anvil Awards.

"We thank the Public Relations Society of the Philippines for giving us this great honor," Dir. Burgos said. "Team STII shares this honor to our deployment officers in the regional and provincial DOST offices, our partners and collaborators in the STARBOOKS project for working hard and well to deserve the recognition."

STARBOOKS earlier won the 2015 Presidential Citation for Innovative International Library Projects by the American Library Association and the 2015 Outstanding Library Program of the Year Award by the Philippine Association of Academic/Research Librarians Inc.

Since its inception in 2011, STARBOOKS has exemplified DOST's thrust "Science for the People" for being able to bring S&T information to the countryside and to communities that lack library facilities and internet connection. (Awarding photo courtesy of Dir. Richard Burgos/ Trophies photo by Henry A. de Leon)

# 11 Filipino researchers recognized for their

**By GERALDINE BULAON-DUCUSIN and JOSELITO A. CARTECIANO**, *DOST -STII & NRCP*

**ELEVEN FILIPINO** researchers received recognition for their contributions to the country's development at the recent Annual Scientific Conference and 84th General Membership Assembly of the Department of Science and Technology-National Research Council of the Philippines (DOST-NRCP).

The conference washeld on 22 March 2017 at the Philippine International Convention Center, Roxas Boulevard, Pasay City.

The researchers were cited for their various contributions in the areas of science education, environmental studies, pharmaepidemiology, maternal health care, research on natural products and toxicology, cost-effective biofungicides for important tropical crops, biotechnology, eco-industrial energy systems, languages, statistical mechanics, industrial and health application of carrageenan, rainfall forecasting and veterinary immunology and public health and others.

This year's conference theme is "Philippine Development: Foregrounding Ethical and Moral Values." Rev. Fr. Albert E. Alejo, SJ, PhD, inspired and enlightened the participants to the conference on the issues of researches. He posed questions, such as, "Am I a better person by becoming a researcher?" Sharing his research engagements in Mindanao, especially in the conflict areas of Basilan, he enlightened and inspired the hundreds of guests, most of whom were researchers from various areas in the country.

Recognized for their exemplar contributions were the following:

- **Dr. Socorro E. Aguja** for her contributions to science education, environmental studies, human capital development and citriculture, as well as for her active involvement in science education and teacher mentorship.

- **Dr. Godofreda R. Vergeire-Dalmacion** for her effectual influences on the areas of pharmacoepidemiology, pharmacovigilance, and maternal health care.

- **Dr. Jovencio G. Apostol** for his pioneering research on natural products and beneficial contributions to vascular pharmacology, toxicology, pharmacogenomics, pharmacy education, clinical pharmacy and pharmacy practice.

- **Dr. Dionisio G. Alvindia** for his groundbreaking work in the development of natural and cost-effective bio fungicides for banana, mango, and other important tropical crops, which led to the reduction of worker and environment exposure, as well as industry dependence on harmful pesticides.

- **Dr. Danilda Hufana-Duran** for her pioneering research and accomplishments on the development and use of advanced reproductive biotechnologies, and establishing laboratory standards and protocols that resulted in the production and propagation of genetically superior water buffaloes.

# contributions to PH dev't

- **Dr. Kathleen B. Aviso** her work in the development of modeling techniques for the design and planning of eco-industrial and energy systems.

- **Dr. Alfredo C. Robles, Jr.** for his widely published scholarly work on ASEAN-EU relations and on the ASEM (Asia-Europe Meeting) process, characterized by its retrospective and prospective focus, its rigorous and synthetic theoretical approaches, and its broad empirical scope in terms of sources and languages.

- **Dr. Jose Perico H. Esguerra** for his numerous contributions to the statistical mechanics of self-gravitating systems, random walks, Brownian motion, and first passage processes, applications of fractional calculus in physics, and mathematical methods for nonlinear and quantum systems along with his two decades of educating students and professionals in Physics, his mentorship of Philippine teams in international Olympiads.

- **Dr. Annabelle V. Briones** for her studies on various innovative techniques on the use of carrageenan for an array of industrial and health applications; indigenous sources for new products; and her initiatives on the development of DOST Mosquito Ovi-Larvicidal Trap System.

- **Dr. Carlos Primo C. David** for his innovative contributions in short-term rainfall forecasting in the Philippines as well as scholarly works on hydrology, climate change, and environmental geology; and active participation in climate change-related research focusing on water resources, along with his service to youth education and scientific community.

- **Dr. Claro N. Mingala** for his contributions in the fields of veterinary immunology, microbiology, molecular biology, and public health; as well as the development of DNA-based and rapid diagnostic tools for economically important animal diseases, for which he has gained national recognition.

Each awardee received a cash reward of P25,000.00, a medallion of excellence, and a plaque of recognition.

The conferment ceremony was led by the NRCP President and National Scientist Edgardo D. Gomez and DOST Undersecretary for S&T Services Dr. Carol M. Yorobe assisted by the NRCP Executive Director Dr. Marieta Bañez Sumagaysay.

NRCP is a collegial and S&T advisory body of the Department of Science and Technology with more than 4,000 member-researchers, scientists, and technologists across the country and around the world.


This year's awardees during the Annual Scientific Conference and 84th General Membership Assembly of the Department of Science and Technology-National Research Council of the Philippines (DOST-NRCP) are the following (L-R): Dr. Socorro E. Aguja, Dr. Godofreda R. Vergeire-Dalmacion, Dr. Jovencio G. Apostol, Dr. Dionisio G. Alvindia, Dr. Danilda Hufana-Duran, Dr. Kathleen B. Aviso, Dr. Alfredo C. Robles, Jr., Dr. Jose Perico H. Esguerra, Dr. Annabelle V. Briones, Dr. Carlos Primo C. David, Dr. Claro N. Mingala, Dr. Other awardees for the Outstanding Institutions and member emeritus include Dr. Hope Sabanpan-Yu of Cebuano Studies Center; Dr. Elda B. Esguerra of the Postharvest Horticulture Training and Research Center; and Dr. Resil B. Mojares. (Photo by DOST-NRCP)

# CALABARZON food industry gets needed boost in DOST-DTI Laguna SPU partnership

**By RODOLFO P. DE GUZMAN,** *DOST-STII*

**C-FoSH Spray Dryer.** A spray dryer is a food processing equipment that uses hot gas to produce a dry powder after rapidly drying a liquid or slurry. The spray dryer works by separating the solute or suspension particles as a solid and the solvent as vapor. It has a spray nozzle that disperses the liquid into a controlled drop size spray. It is used to produce dry solids and form powdery substances or granules usually applied in pharmaceutical products, beverages, food, and plant extracts. This spray dryer is found in the CALABARZON Food Solutions Hub or C-FoSH at the Laguna State Polytechnic University in Sta. Cruz, Laguna provided by the Department of Science and Technology (Text & Photo by Rodolfo P. de Guzman, DOST-STII)

Secretary Fortunato T. de la Peña (in *barong*) converses with a student of the Laguna State Polytechnic University (LSPU) during his project visit to the CALABARZON Food Solutions Hub or C-FoSH, a facility housed at the LSPU campus in Sta. Cruz, Laguna. This facility caters to food processing companies that require the use of special equipment like spray dryer to manufacture innovative food products.

**THE DEPARTMENT** of Science and The Department of Science and Technology (DOST) Region 4A based in Los Baños, Laguna is on high gear as it pushes for full adoption the services of the CALABARZON Food Solutions Hub or C-FoSH located at the Laguna State Polytechnic University in Sta. Cruz, Laguna.

C-FoSH is a beneficiary of the Share Services Facility (SSF) program being implemented nationwide that aims to empower the micro, small, and medium enterprises or MSMEs. The program is a partnership among DOST, the Department of Trade and Industry, and the Laguna State Polytechnic University in Sta. Cruz, Laguna were the facility is located.

One important cooperator of the C-FoSH is the Association of Laguna Food Processors or ALAFOP that include among its members, Bugong Foods Corporation, Escaba Sweets, Forest Wood Garden, Sustalicious, Costales Farms, and Villa Socorro.

According to DOST Secretary Fortunato T. de la Peña the C-FoSH will be able to create added value products that could command better prices because of its high quality standard that can compete in the international market. C-FoSH serves as a capacity building venture that empowers micro enterprises to avail of the state-of-the-art and industry compliant manufacturing plant that conforms to high grade food safety. The facility will enable the food processors from Laguna and nearby provinces to increase their production capacity and produce export quality products. The C-FoSH will also serve as a laboratory for food innovation and provide support to entrepreneurs to come up with new products that are needed in the market.

The LSPU facility has several equipment, such as the large scale spray dryer that can convert fresh food produce to powder form like pineapple that can be made into instant powder juice drink. There is also the packaging machine that allows the printing of product labels faster and with more consistent quality.

Operational since 2013, the SSF program promotes inclusive growth particularly in the regions with the establishment of some 1,702 SSFs nationwide with accumulated funding of Php 776.53 million from 2013-2014. In the process the program has so far benefitted 17,095 MSMEs and 72, 619 potential businessmen all over the country.

# "Bridge"

## DOST connects R&D to people via a coffee table book


By **ALLAN MAURO V. MARFAL, RODOLFO P. DE GUZMAN, AND FRAMELIA V. ANONAS,** *DOST-STII*

**DOST, through "Bridge", now links R&D to people via stories written in common, everyday language to give the public a view into the world of Filipino science researchers and how their studies can help improve lives.**

**WHO WOULD** have thought that the carageenan from the seaweeds that is usually used as a binding agent in toothpaste and shampoo can actually be an effective plant growth promoter?

Recent research found that carrageenan, through modified irradiation technology, can make plants more robust and healthy. In fact, it can boost rice yield by 65 percent because it makes rice stem stronger and improves rice resistance to lodging. It is also compatible with farmers' practice, thus giving higher grain yield. It also makes rice resistant to tungro virus and bacterial blight. Further, it is environment friendly as it has no harmful effects on natural enemies or beneficial insects.

This research output, when commercialized, will greatly help farmers in the country to have access to less expensive but highly effective plant growth enhancers. They will also have more opportunities to improve their harvest and increase their income.

This helpful research was made possible through DOST's attached agencies, the Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development and the Philippine Nuclear Research Institute in partnership with University of the Philippines Los Baños. These three institutions worked together for this important study on carrageenan, an indigestible carbohydrate (polysaccharide) extracted from edible seaweeds.

In the province of Isabela, farmers are gradually witnessing the tremendous help of this research in their own rice fields.

Efren Tagacay, a rice farmer, has already harvested crops sprayed by carageenan. "At first, I harvested 120 sacks per hectare, but now I am already reaping 140 sacks per hectare. Thus, my reaping goes up by 20 per hectare," he revealed. "We, farmers, are happy that we have been given the chance to try this carrageenan product because our yields have increased, and we are hoping that it will continue with the help of DOST."

Meanwhile, another rice farmer, Engr. Isagani Concepcion, also became interested with the carrageenan plant growth promoter when it was introduced in their area last January 2016.

"I saw the effect, my harvest increased. Previously, I was harvesting just 523 sacks of rice from my four-hectare field. Now, I am already reaping 583 sacks of rice. My harvest has increased by 16 percent," said Engr. Concepcion.

### Issues in healthcare

Meanwhile, in other parts of the country, access to healthcare services is also a big problem. Take the case of Teena Rosales, a 19-year-old single mother in Uyugan, Batanes. Tina observed that the lack of medical equipment and few experts willing to serve the countryside are two of the greatest challenges in the healthcare services in far-flung areas like Uyugan.

Teena shared that, in their community, there are mothers who die unnecessarily because they are poor and cannot afford the high out-of-pocket cost of health care. Moreover, local health centers and nearby hospitals have inadequate medical supplies and life-saving equipment.

### RxBox saves mom and baby

When Teena was about to give birth, she thought she would be just one of the statistics. But she and her baby were saved from danger with the help of RxBox, a biomedical telehealth device capable of capturing and transmitting physiologic signals across distances. Through the RxBox with its built-in medical sensors that measured her blood pressure, temperature, pulse rate, heart activity, womb contractions during labor and delivery, and even the baby's heart rate, her vital signs were recorded and sent via Internet to a doctor located


in the city. Thus she was able to deliver her baby aided efficiently by the health worker under the guidance of the doctor.

Because of its life-saving features, the RxBox may be one of the most important tools generated by the research community.

Funded by the DOST through its Philippine Council for Health Research and Development and developed by the National Telehealth Center in UP Manila, RxBox addresses the inequity in access to health care by enabling health providers and managers to use technology in diagnosing and treating patients, and in managing health systems better.

The RxBox and the carrageenan plant growth enhancer are just two of the thousands of local research outputs that can be used to improve people's lives. Researches supported by the DOST have a broad range: traffic system, coral reefs, health of senior citizens and other sectors, wind energy, emergency shelter, complementary food, drug development, hazard maps, and many other interesting subjects that have very practical uses.

These researches are done by local researchers and scientists who have geared their studies for practical application. However, the huge challenge is on how these research and development outputs can reach their intended beneficiaries—Filipinos and their communities.

## Bridging knowledge and products to people

To make people, especially those outside the science community, appreciate research and development projects better in language understood by most, DOST, for the first time in its history, produced a coffee table book featuring stories on research and development (R&D).

Called "Bridge," the book was launched on the 30th anniversary celebration of DOST- Science and Technology Information Institute (STII) last February 27, 2017 at the Manila Hotel.

The said coffee table book contains 83 stories culled from R&D projects funded by DOST from 2010 to 2015, particularly in the areas of agriculture and aquaculture; health and nutrition; and industry and emerging technologies. As researchers wrote their own articles, they were able to share significant insights as they were working on their respective R&D projects.

"Bridge" would not only serve as a very useful information resource, but also as an inspiration and motivation to our scientists, engineers, and researchers as we pursue our purpose – 'Science For The People'," said DOST Secretary Fortunato T. de la Peña.

Meanwhile, former DOST Secretary Mario G. Montejo, who laid out the idea of this book back in 2015 said, "We owe it to the citizens of the Philippines to bring these products of scientific inquiry to the public, written in laymanized language that they could understand."

By publishing "Bridge," we hope we could help raise awareness and appreciation on how hard and conscientious our researchers work, and how the fruit of their scientific inquiry could help us have a better life, he said.

Aside from DOST's R &D projects, articles on some of the most successful beneficiaries under DOST's Small Enterprise Technology Upgrading Program, as well as stories of former DOST scholars, are also included in said coffee table book.

## Informing the public on S&T

STII, as the information and marketing arm of the DOST, continues to find noble ways to bring science and technology closer to the people through various modes across platforms. Last year, it launched DOSTv, the Filipino Weather Channel that was aired through YouTube. This platform enabled STII to broadcast weather news and updates, documentaries on different DOST technologies and innovations, S&T news, interviews of scientists and experts in different S&T fields, S&T trivias, and other features. It airs from 11:00AM to 12:00Noon, Monday to Friday at http://www.dostv.ph.

STII also developed the Science and Technology Academic Research Based Openly Operated Kiosk or STARBOOKS, the first Filipino library in a box that contains thousands of S&T materials in full text, video and audio files ideal for schools in remote areas with no internet access. STARBOOKS was conferred the American Library Association Award for Innovative Library Project in February 2015 in San Francisco, California.

STII also led the advocacy of the Philippine Standard Time that has become a law under R.A. 10535, with PAGASA as the official timekeeper. Every January, STII leads the DOST family in the observance of the PST with different activities from hosting events to promoting the advocacy on radio and television. The ongoing campaign is dubbed Juan Time, Pinoy Ako, On Time Ako!

Moreover, STII, in partnership with DZRH of the Manila Broadcasting Company produced Handog ng Agham para sa Bayan, a radio drama series that started airing last year as a segment of the primetime radio program Radyo Henyo anchored by Angelo Palmones and Ruby Cristobal every Sunday from 4:00-5:00 pm. The drama series featured success stories of individuals whose lives were made better by science and technology.

STII also embarked on various campaigns such as Iba na ang Panahon: Science for Safer Communities to promote disaster preparedness among local government units; Ignite the Mind to raise the level of unity within the DOST family; and Science Nation Tour to bring DOST programs and projects to the regions.

# Pisay campuses get attuned in DOST branding

**RODOLFO P. DE GUZMAN,** *DOST-STII*
Photos by â hn Philip R. de Leon, DOST-STII

**BRANDING DOST** is currently one of the priorities in the communication strategies of the Department of Science and Technology. As an official family with about 5,000 workers, 21 agencies, 17 regional offices, and 81 provincial offices, plus 16 regional campuses of the Philippine Science High School (PSHS) system, DOST needs to prime itself as one agency with one identity going into one direction.

With its 16 campuses, the PSHS system, or Pisay, saw the need to reinforce branding into the system not only to have a unified identity as DOST institution but also to harmonize its communication plan. Thus was the reason for Pisay to attune all of its campuses on DOST branding.

The kick off exercise was conducted March 1 at the Pisay main campus in Quezon City. Attendees to the branding exercise were the respective Pisay administrators from the 16 campuses all over the country.

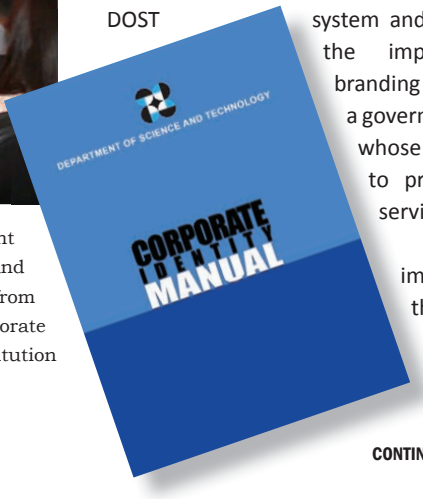
Dr. Aristotle P. Carandang, chief of the Communication Resources and Production Division (CRPD) of STII, a veteran communicator and one of the initiators of the corporate branding, was the resource person.

**Pisay takes on corporate branding seriously.** The Philippine Science High School (PSHS) System of the Department of Science and Technology takes corporate branding seriously as different regional PSHS campus representatives attended a corporate branding seminar held at the PSHS campus in Quezon City on March 1, 2017. Shown in photo are the teachers from regional Pisay campuses with Dr. Aristotle P. Carandang, (11th from left), the resource speaker, Chief of the Communication Resources and Production Division of the Science and Technology Information Institute and PSHS Deputy Executive Director Rod Allan A. de Vera (12th from left).


**DOST corporate branding.** Dr. Aristotle P. Carandang, underscores that it is vital for a government institution like the Department of Science and Technology to properly identify the clear role and mandate of the institution towards standardization of all marketing and promotional materials from logo to letterhead and business cards. Dr. Carandang points to the need for DOST of a Corporate Identity Manual that will serve as its bible in maintaining uniformity in presenting itself as an institution to its various publics.

The branding seminar was designed to provide Pisay working tools and knowledge resources to come up with their own corporate branding activities in line with their strategic communication plan to reach their target audiences effectively.

Dr. Carandang gave a short briefing on STII and its function in the entire DOST system and emphasized the importance of branding especially for a government agency whose mandate is to provide public service.




"It is very important for the DOST to make people aware of its programs

CONTINUED NEXT PAGE

# Agritech on fairness opinion prior to transfer

**By ALANDY N. BUAN**, *DOST-TAPI*

**IN A** landmark move, two government agencies partnered to transfer government-funded research projects that amount to P25 million.

"This partnership was never done in the government sector before." Engr. Edgar I. Garcia, TAPI's Director, said during the inception meeting between the Technology Application and Promotion Institute (TAPI) and the Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (PCAARRD), both of the Department of Science and Technology (DOST).

TAPI is the patenting and licensing arm of DOST while PCAARRD funded said projects that are due for transfer and geared towards Fairness Opinion issuance.

Under Republic Act No. 10055, also known as the "Philippine Technology Transfer Act of 2009", any government-funded research is required to secure a Fairness Opinion from the Secretary of the DOST, particularly in licensing agreements and spinoffs, before it is transferred.

Two of these projects, technology assessment and IPR protection, aimed to file at least 25 patents and utility model applications and assess 100 technologies in two years. According to Caezar Angelito E. Arceo, supervising science research specialist at TAPI and a registered patent agent, technology assessment shall be done in the areas of technical and industrial feasibility, intellectual property (IP) potentials, and market readiness of PCAARRD-funded research projects and technologies.

Another project on IP and technology valuation, led by Atty. Marion Ivy D. Decena, chief of the Invention Development Division of TAPI, intends to assess the market value of at least 16 technologies in two years. Valuation is relatively new in the country and TAPI is presently building up capacity along this area, while recently outsourcing IP valuation assistance under a different project.

Meanwhile, a project to assess the Freedom to Operate (FTO) of PCAARRD's technologies was successfully proposed by Teresita O. De Vera, supervising SRS. The fifth project on Fairness Opinion issuance is being led by Director Garcia. FTO is also a relatively unexplored area in commercializing DOST technologies, with some technologies initially being evaluated under a separate TAPI project.

Dr. Melvin B. Carlos, director of PCAARRD's Technology Transfer and Promotion Division, and Noel A. Catibog, manager of the newly created DOST-PCAARRD Innovation and Technology Center in Los Baños, Laguna, along with Dir. Garcia, all agreed and expressed optimism that after PCAARRD-funded projects pass the Fairness Opinion Board (FOB) evaluation, proposed transactions will be prepared through these projects in order to have better chances for successful technology transfer and commercialization. This was also expressed by Dr. Reynaldo V. Ebora, PCAARRD's Executive Director, in a previous meeting.

Atty. Decena explained that three of the projects for IP, FTO, and valuation are important in preparing technologies for pitching and negotiation. In turn the documents and information to be generated from these projects are needed to secure Fairness Opinion.

"All of the five projects will complement TAPI's mandated functions as patenting and licensing arm of DOST and being the secretariat of the FOB," said Atty. Decena, who is also assigned as the focal person of the five projects.

Dr. Carlos and Catibog expressed high hopes that PCAARRD-funded technologies will be efficiently rolled out in the market through the five TAPI programs.

DOST-TAPI is mandated to serve as the FOB Secretariat, with Director Garcia as chair with Atty. Decena, Arceo, and Engr. Richelle D. Cahanap as members. Under the law, the FOB must be constituted within 30 days from the formal request, and Fairness Opinion must be issued within 60 days from the constitution of the FOB. A fast-tracked mechanism was recently innovated by TAPI to trim down the required 90 days to at least one to 15 days to obtain Fairness Opinion. As of this writing 20 out of 64 proposed transactions were already issued with Fairness Opinion, three of which are biofertilizers, 12 are food processing machines, and one is an agricultural machine.

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PISAY CAMPUSES . . . FROM PAGE 15

and services across all sectors and let them know that science and technology is made available to them to help them improve their lives, simply put we want the public to know that indeed science is for the people," Dr. Carandang said. In fact, the DOST now carries the tagline "Science for the People" as its battle cry in helping attain equitable distribution resource, wealth and development, particularly in the countryside.

Further on, Dr. Carandang discussed the information channels being used by STII to strengthen the DOST brand that cut across different platforms. He discussed the initiatives in coming up with print media releases, the radio drama series in DZRH, the DOSTv being aired via YouTube channel, regional events, S&T caravans, promotional activities, creation of an official mascot called Smarty and many more.

He also showcased the different DOST brands and advocacies that have been in the market for some time like the Project NOAH, SETUP, One Store, One Lab, ADMATEL, Juan Time, STARBOOKS, among others.

As part of the branding exercise, Dr. Carandang presented the DOST Corporate Identity Manual (CIM) that puts in writing the do's and don't's of using the DOST name and logo as a brand in various media like print, official letterhead, signage, and other applications. Dr. Carandang is one of the authors of the CIM together with Dr. Anthony C. Sales, DOST Region XI director with inputs from DOST top management, agency heads and regional directors.

"I would just like to stress that in branding our projects or services, we must always remember who our target audiences are, what they need and what we are offering because just like any ordinary consumer product, we need to know consumer preferences and behavior in order to meet our objectives," Dr. Carandang said.

In creating a brand name like "Pisay" we must also come up with a tagline with strong recall. At STII we came up with a simple one, "Inform to transform." It will not be hard for the PSHS to coin one catchy phrase, Dr. Carandang concluded.

# Writeshop inspires future science writers

**By EULA MAE CARLA D. OLOD**, *DOST-STII*

**"I WANT** to pursue my writing skills especially in science because it has a vast content which is not limited only to one area but to broad subjects," said Samuel Pariñas, communication student at Urdaneta City University (UCU).

"I feel motivated in a way that this serves as another way for us Mass Comm students (to realize) that we can go beyond writing about crime news. We have the chance to go into Science journalism, " Mae Calizo, also a UCU communication student, revealed.

These are just some of the feedbacks of communication students in UCU who joined the Science Journalism Writeshop at Urdaneta City, Pangasinan in March.

With the title "#Sciencejournoako @ UCU", the seminar-writeshop was conducted through the partnership between UCU and the Department of Science and Technology-Science and Technology Information Institute (DOST-STII).

Rhea M. Agibuay, dean of the College of Arts and Languages in UCU, stated that the purpose of the writeshop is to advocate science and technology in the region.

"Region I is very rich in its culture. It is also rich in different aspects of technology which are indigenous to the region but these are not being promoted. When we partner with DOST-STII, we know that we will have a platform in order to really recommend those who have the technology, those who have the skills and knowledge and we could advocate this through our partnership," she said.

The seminar-writeshop had two major topics (environment and disaster preparedness communication) which were discussed by Shaira F. Panela, a freelance writer, and Timothy James M. Dimacali, GMA News Online SciTech editor.

Panela motivated the participants by encouraging them to write about science as "science needs to have story tellers or communicators that will relay its relevance to people."

"It is not just about a lot of science stories. These are the stories that we need to and we must know. It is because it has relevance to our lives. They address certain problems and certain issues," she said.

Meanwhile, Dimacali talked about, among others, the importance of the headline in capturing the readers' attention. He also discussed the importance of a good image or photograph that will go with the article.

DOST-STII staff receive the Certificate of Appreciation from the Urdaneta City University for a very productive collaboration for the writeshop.

Resource persons Shaira Panelo (left) and TJ Dimacali (right) share their thoughts during the critiquing portion of the writeshop.

When asked on the possibility of embarking on more projects in partnership with DOST-STII, Dean Agibuay said, "We want to take it further. The different phases of this program will also ensure that we don't just create awareness but also application of what we learned in this writeshop. This will not only be promoted in Region I but also in the entire Luzon."

About 100 students from different colleges such as communication, education, and midwifery students joined the seminar-writeshop. Some professors from different universities and schools also participated.

Science Journalism Writeshop started as part of the celebration of the National Science and Technology Week in July 2015, followed by campus-based writeshop at Adamson University. It is now the third campus tour and seventh writeshop conducted nationwide. DOST-STII welcomes partnerships with schools, LGUs, and institutions in organizing science journalism writeshops.

Writeshop participants think of possible leads to their articles as they apply ideas learned from the resource persons.

# Assisted reproduction leads to more milk, better carabaos

By **ESPIE ANGELICA A. DE LEON,** *DOST-STII*

www.pinterest.com

**THE PHILIPPINES** is only one percent sufficient in milk. This means 99 percent of dairy products being consumed in the country are imported.

Cattle provides 64 percent of the total local milk volume while buffalos contribute only 34 percent.

One of the Department of Agriculture's (DA) major programs is its milk feeding program.

"But where will we get this if we are only one percent sufficient?" asked Dr. Eufrocina DP. Atabay of the DA's Philippine Carabao Center (PCC) during her talk on "The Role of Assisted Reproduction in Dairy Industry Development" at the S&T Agri-Biotech Forum held recently.

"What aggravates this situation is that there is a low number of dairy herd population both in buffalo and cattle. Another problem is that the animals are being left unproductive for a long time and this will result to low reproduction efficiency and economic loss," added Atabay who specializes in reproductive biotechnology.

Hence, the need for the development of the dairy industry is obvious, especially with the increasing human population both on a global and national scale. This suggests an increasing demand for food sufficiency and agricultural sustainability.

At the core of this mission is PCC, through its program "The Role of Assisted Reproduction in Dairy Industry Development."

Specifically, Atabay and her team's objective is to increase dairy herd buildup in the Philippines, to increase in terms of quantity, and to improve the herd's genetic quality.

One of the technologies that Atabay and her team employ for dairy herd buildup is artificial insemination (AI). This process of simulated reproduction involves extracting sperm from a quality male buffalo and injecting the sperm into the reproductive tract of a female buffalo.

PCC's AI services are done nationwide by trained private village-based AI technicians as well as technicians of LGUs, among others. AI is used to breed animals with higher productivity for both milk and meat by harnessing select animals' excellent genetic materials.

Two months after the AI, the team checks the presence of fetus inside the carabao. The team also uses pregnancy test on the animal to determine if the breeding is successful "so we can detect non-pregnancy at the soonest time possible," said Atabay. This helps to prevent animals who can be productive to be unproductive for too long. This scenario (unproductivity of animals for extended periods), according to Atabay, would be costly for farmers and breeders.

Another technology for enhanced genetic improvement for better quality carabaos is embryo transfer. The scientists collect quality embryos from one female buffalo for transfer to another female buffalo. The actual transfer is undertaken using AI as well.

They also do in vitro fertilization, or the incubation of the sperm and egg in a petri dish. After this, they do further culture and then perform embryo transfer.

Sometimes, the group induces the buffalo to produce more eggs in order to produce more embryos in order to produce more offsprings. Excess embryos are preserved for future use.

"So there are many ways of producing the embryo," said Atabay.

Some of these processes are aided by ultrasound technology such as in ovum pick-up, a process in which scientists collect immature egg cells from a superior carabao via aspiration with the help of ultrasound.

"As we employ these technologies, we are ensuring the sustainability of the production of our local dairy animals so we can avoid the importation of live animals, avoid the importation of some diseases...for a sustainable and globally competitive dairy industry," Atabay concluded.

# PH, KR co-verify Korean technologies

**By DELIA DELICA GOTIS,** *DOST-ITDI*

**ENVIRONMENTAL TECHNOLOGY** Verification (ETV) Philippines through DOST-ITDI, turned over to G&G Technology Co. Ltd., a Korean firm, the ETV report and ETV statement for its PackOuting Groundwater System technology on February 7, 2017. This, after concluding the co-verification process conducted jointly with ETV Korea through KEITI (Korea Environmental Industry and Technology Institute) which is supported by the Korea Ministry of Environment.

ETV is the process of developing and implementing a real world test and demonstration to verify or prove the performance of a particular technology with regards to all relevant parameters.

Environmental Technology Verification or ETV is one way of evaluating the performance of innovative air, water, pollution prevention, and monitoring technologies. It aims to reduce uncertainty and increase confidence in the performance of such technologies. "While it does not certify, ensure, or warrant that a technology will meet a standard or expected criteria in the future, still, ETV provides a level-playing field among technology competitors through standardized tests and reports," ETV Philippines says.

ITDI and KEITI provided technical and logistical support to the ETV panel of experts in co-verifying the claims of G&G Technology Co., Ltd., for its PackOuting Groundwater System. Both are also members of the International Working Group on ETV which was organized to exchange information and knowledge on environmental performance verification of technologies and aim to achieve mutual recognition and global acceptance of ETV results.

Meanwhile, the PackOuting Groundwater System, which is the subject of the verification, is an underground protective wall grouting packer device and grouting method. It prevents contaminated water inflow from the upper part of a deep well to its lower part. A compressible packing technology, it consists of an inner compressing tube and outer compressing tube sliding with each other. In addition, a compressive packer made of flexible silicon rubber effects a sealing action.


ETV Philippines turned-over the ETV Report and ETV Statement to Dr. Heuy-Nam Cho and Sunnam Cho of G&G Technology Co. Ltd. for the PackOuting Groundwater Systemin the presence of Engr. Soon-Goo Kim, senior researcher of the ETV Team of Korea Environmental Industry and Technology Institute (KEITI). The ETV Report and ETV Statement is a result of the recently concluded co-verification process conducted by ITDI and KEITI for the technology. Also present during the turn-over were Engr. Reynaldo L. Esguerra, Chief of the Environment and Biotechnology Division (EBD) and Philippine ETV Team led by Chief Lorna M. Egay.

The performance of the technology under local conditions was co-verified by DOST-ITDI and KEITI through a series of actual tests in a new deep well that was constructed in Brgy. Bañadero, Calamba City. This was made possible through a partnership with the management of Calamba Water District represented by its General Manager Engr. Restituto B. Sumanga, Sr. and Board Member Exequiel A. Aguilar, Jr. The results of the actual tests conducted in Brgy. Bañadero proved promising and can be possibly replicated in other areas under the same conditions.

Present during the turnover held at DOST-ITDI were Engr. Reynaldo L. Esguerra, chief of the Environment and Biotechnology Division (EBD) of ITDI, and the ETV Philippine Team led by Lorna M. Egay, EBD-supervising science research specialist; and their Korean counterparts, G&G CEO Dr. Heuy-Nam Cho and Sunnam Cho; and Engr. Soon-Goo Kim, senior researcher of the ETV Korean Team from KEITI.

The technical team presented the ETV results for the PackOuting Groundwater System in the ETV Stakeholders Forum held at Crimson Hotel, Alabang, Muntinlupa on November 25, 2016.

Meanwhile, another Korean technology is scheduled for joint verification by DOST- ITDI and KEITI this year, called Up-flow Filtration Technology Using High Elasticity Fiber Media's Compression of BlueGreenLink Co., Ltd.

ETV Philippines is implemented by DOST-ITDI's EBD. The group works to establish or prove the truth of the environmental performance of a technology per established protocols or specific requirement. Technology areas covered include: wastewater treatment and safe disposal, cleaner production and pollution prevention, environmental monitoring and analytical systems, best environmental technologies, and drinking water systems.

To avail of ETV Philippines services, inquire through Engr. Reynaldo L. Esguerra, chief of the ITDI-Environment and Biotechnology Division at telephone nos. 837-2071 to 82 local 2273 or email him at ebd@itdi.dost.gov.ph.

# UK-PH partnership earmarks P620M grant for research and innovation

**By JANINA MYN VILLAPANDO,** *DOST-STII*

**THE SUCCESS** of science is borne on collaboration and partnership, so says British Ambassador Asif Anwar Ahmadasthe UK government, through the Newton Agham programme, provided over £10 Million or Php 620 Million for collaborative projects.

The Newton Agham programme, now on its third year, is a partnership among The British government together with the Department of Science and Technology (DOST), Commission on Higher Education (CHED) and the Philippine Rice Research Institute (PhilRice). The partnership continues to co-develop and implement programs that strengthen science and innovation capacity and create solutions to development challenges in the country.

For 2017, the programme awarded 16 institutional grants and 23 individual grants under six components: BBSRC - PhilRice Sustainable Rice Programme, British Council – CHED Institutional Links, British Council – CHED PhD scholars, RCUK – DOST Research Partnerships Programme, Royal Academy of Engineering – DOST Leaders in Innovation Fellowship and Met Office – DOST PAGASA Weather and Climate Science for Service Partnership.

DOST Secretary Fortunato T. de la Pena's message, delivered by Undersecretary for Scientific and Technological Services, Carol M. Yorobe, highlighted that the key principles of the Newton Agham programme are part of the Philippine Government's new 10-point economic agenda.

"These key items of our economic agenda, centered on creating genuine, positive change in our nation, through Science and Technology underlies our renewed and reinvigorated determination to continue support for the Newton-Agham Programme," he said.

Awardees under the Research Councils UK – DOST Research Partnerships Programme are Michael Angelo Promentilla and Aileen Huelgas-Orbecido of De La Salle University and Ronald del Castillo of the University of the Philippines-Diliman.

The 15 Leaders in Innovation Fellows with the UK Royal Academy of Engineering are Mary Donabelle L. Balela, DJ Darwin R. Bandoy, Glenn N. Baticados, Nilo T. Bugtai, Drexel H. Camacho, Clarissa Yvonne Jueco-Domingo, Hidelisa P. Hernandez, Ma. Carmen A. Lagman, Prospero C. Naval, Jr., Jonathan N. Nayga, Arturo M. Ongkeko, Jr., Edgar A. Orden, Chelo S. Pascua, Janice A. Ragaza and Rosula San Jose-Reyes.

The Philippine Atmospheric, Geophysical and Astronomical Services Administration will also be working with the Met Office to advance scientific understanding and forecast modeling capabilities to deliver services to protect lives and livelihoods in the Philippines and across South East Asia.

The awardees were regonized in a reception held at the British Ambassador's Residence on February 7, 2017.

# Working together to boost STARBOOKS content & deployment

**By ALLAN MAURO V. MARFAL,** *DOST-STII*


**STARBOOKS THROUGHOUT THE PHILIPPINES** | Department of Science and Technology-Science and Technology Information Institute (DOST-STII) Director Richard P. Burgos (2nd from right, seated), Children's Hour Senior Associate Ovynania J. Javier (leftmost), Department of Information and Communications Technology (DICT) Director and Tech4Ed Program Manager Maria Theresa M. Camba (second from left), and Frontlearners Inc Co-founder Leo R. De Velez (rightmost) signed a Memorandum of Agreement last February 27, 2017 at Manila Hotel to enrich the content and deployment of STARBOOKS. DICT, through its Tech4ED program, and Children's Hour will help DOST-STII identify and prioritize its deployment sites while Frontlearners, Inc. will provide additional content to STARBOOKS for free. Also in the photo are (standing, L-R) DOST-STII's Science Research Specialist Marievic V. Narquita, DOST-STII's Communication Resources and Production Division Chief Dr. Aristotle P. Carandang, and Frontlearners, Inc. Co-Founder Elaine De Velez to witness the signing of the agreement. (Photo by Frontlearners, Inc.)

**THE DEPARTMENT** of Science and Technology-Science and Technology Information Institute (DOST-STII) forged separate partnerships with the Department of Information and Communications Technology (DICT) and Frontlearners, Inc. to boost the content and broaden the base of STARBOOKS beneficiaries in the country.

Representatives of the three institutions formally agreed to the respective partnerships through the signing of memorandums of agreement during DOST-STII's 30th anniversary celebration last February 27, 2017 at the Manila Hotel.

STARBOOKS, which stands for Science and Technology Academic and Research-Based Openly Operated Kiosk Station, is the first digital science library in the country. It was developed by DOST-STII which infused into each unit tons of information on science, technology, mathematics, and livelihood, all of which are encoded thru text, photo, and video formats. Using STARBOOKS can be offline, thus it does not require internet connection to access its materials.

Under the MOA, DICT will provide STARBOOKS-enabled computers to selected beneficiaries as part of its Tech4ED Program. As such, the DICT will shoulder the necessary expenses on the deployment of STARBOOKS to beneficiaries.

Tech4ED is a program of DICT that aims to harness ICT to enable, empower and transform society, creating an inclusive, integrated and equitable countryside through providing opportunities for employment and empowering entrepreneurs.

Meanwhile, DOST-STII will be responsible for the installation and maintenance, through DOST Regional Offices, of the STARBOOKS system and the mandatory training of technical staff/ librarian/kiosk clerk for the operation of the Kiosks. Aside from that, DOST-STII will regularly update the contents of the STARBOOKS system every six months.

"This collaborative effort of DOST-STII and DICT, through the Tech4ED Program, is about synergy. DOST-STII has the content and DICT has the Tech4ED centers nationwide. Through this partnership, both parties will

WORKING TOGETHER FROM PAGE 21

be able to have a greater impact to their respective end users which are mainly students," said Alan C. Taule, chief of DOST-STII's Information Resources and Analysis Division.

On the other hand, the agreement signed between DOST-STII and FrontLearners, Inc. will center on providing additional content for STARBOOKS.

Frontlearners is a ready-to-use, cost effective e-School-in-a-Box with interactive K12 lessons that can be used even without internet. It contains thousands of lessons and exercises aligned with the DepED K12 curriculum and works with or without the internet, thus is ready-to-use by any school.

According to the agreement, Frontlearners, Inc. will provide DOST-STII the digital copy of its BlendEd Learning collection as added materials in the STARBOOKS database Frontlearners, Inc. will also promote the use and disseminate the benefits of using STARBOOKS. The institution will also be responsible for the collection of S&T materials of their affiliated institutions or agencies and libraries for possible inclusion in STARBOOKS.

For its part, DOST-STII will ensure that proper attribution is followed, allotting a module to feature Frontlearners BlendEd Learning as a special collection.

"This partnership with DOST-STII will allow us to add the Frontlearners' e-Learning materials into the STARBOOKS servers. These will be installed in more than 1,000 public schools nationwide this year through the partnership of DOST with DICT Tech4Ed and Children's Hour," said Leo De Velez, founder of FrontLearners, Inc.

Meanwhile, DOST-STII also partnered with the Children's Hour, a non-profit organization that supports projects on education, health and nutrition, and child welfare and development for the benefit of disadvantaged Filipino children nationwide. The Children's Hour will donate STARBOOKS-enabled computers in various local government units and public schools, mostly in southern part of the Philippines.

In recent years, STARBOOKS has been receiving various recognitions, locally and internationally. Among of them was the Presidential Citation for Innovative International Library Projects awarded by American Library Association last June 29, 2015 at the International Librarians Reception at the San Francisco Library in San Francisco, California.

Currently, STARBOOKS has 1,358 sites all over the country. The Super STARBOOKS version is available online and a mobile application is already being developed to make STARBOOKS more accessible to more people.

For more information about STARBOOKS, email all inquiries to dost.starbooks@gmail.com or starbooks@stii.dost.gov.ph or call telephone numbers (632) 837-2071 local 2135, (632) 837-2191 to 95 local 105/106, (632) 837-2071 local 2130.

# PH, TH ink accord to strengthen S&T cooperation

**By FRAMELIA V. ANONAS,** *DOST-STII*

newsbytes.ph

**SCIENTIFIC AND** technological (S&T) activities in the Philippines and Thailand recently got a big push as science and technology leaders in both countries signed a legally binding agreement to work together in promoting the development of S&T cooperation between said countries.

Representing the Philippines and Thailand are Department of Science and Technology Secretary Fortunato T. de la Peña and Ministry of Science and Technology Minister Atchaka Sibunruang respectively.

According to the agreement, the Philippines and Thailand shall carry out S&T cooperation in joint research and development; exchange of scientists, specialists, and representatives of academic, research, industrial, and trade organizations; exchange of technical documentation and information; arrangement of bilateral conferences and symposia on subjects of mutual interest; and other forms of cooperation in the field of science and technology.

The two governments also concurred to include visits and exchanges of S&T specialists in fields beyond the agreed areas in the current agreement.

According to Sec. de la Peña, representatives of both Philippines and Thailand shall meet as soon as possible to negotiate the programmes and approve the areas and terms of S&T cooperation. They shall also agree on ways and means to accomplish programme items and discuss other matters related to the cooperation.

The Philippine-Thailand agreement shall also pave the way to link up organizations, agencies, universities, and firms in both countries, and conclude implementing arrangements. To run for five years, the program shall start this March 2017 and end in March 2023.

**The Harmonized National Research and Development (R&D) Agenda gives us the R&D direction from 2017 to 2022. With a projected budget for R&D that will reach P672 billion by 2022, like a father who reminds his children to spend wisely, DOST Secretary de la Peña told researchers to come up with studies that are world class, relevant, and useful—consistent with DOST's direction of advancing science for the people.**

# World class, relevant, and useful R&D (2017-2022)

By **FRAMELIA V. ANONAS,** *DOST-STII*

When Department of Science and Technology Secretary Fortunato T. de la Peña charged science and technology researchers to come up with research that are "world class, relevant, and useful", he had an ace on hand for them-- a whopping P5.8 billion budget for 2017 research and development (R&D) alone.

Spending for science R&D for the next six years will be guided by the Harmonized National R&D Agenda which DOST presented to stakeholders during the 2nd National R&D Conference held at the Manila Hotel on February 15, 2017.

DOST has geared its programs and projects, including R&D, to support four of the 10 national socio-economic agenda of the Duterte administration, according to DOST Undersecretary Rowena Cristina L. Guevara.

Said four areas in the national agenda include the advancement of science and technology (S&T), increase of competitiveness in the business sector, promotion of rural value chain development, and investment in human capital development.

DOST aligned its programs to the attainment of Pres. Rodrigo R. Duterte's 25-year long-term vision to achieve progress and development.

According to Usec.Guevara, all of DOST's projects and programs "at the end of the day will actually address inequality, address more opportunities that will hasten our development."

During the conference, DOST's four councils and the Disaster Risk Reduction and Climate Change Adaptation (DRR/CCA) cluster acquainted researchers on the sectors' respective research priorities to guide them in crafting their studies.

The councils which detailed the priority areas in their respective fields were the Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development; Philippine Council for Health Research and Development; Philippine Council for Industry, Energy and Emerging Technology Research and Development; and the National Research Council of the Philippines. While the Philippine Institute of Volcanology and

Seismology (PHIVOLCS) and the Philippine Atmospheric Geophysical and Astronomical Services Administration (PAGASA) led the detailing of priority areas of the DRR/CCA sector which cuts across all sectors such as geology, hydro-meteorology, IT, health, agriculture, energy, communication, and others.

The Harmonized National Research and Development Agenda for 2017-2022 and the details per area are in the next pages.

## Science for Change Program

Also at the conference was Albay Rep. Joey Sarte Salceda, author of the House Bill "Science for Change Program (S4CP) Act".The proposed bill aims to boost the country's scientific innovations and inventions, research and development towards social progress and global competitiveness. The S4CP, with the theme "Science for the People," proposes an R&D budget that would reach the P672-billion mark by 2022.

The S4CP has four components and one of these is the Accelerated R&D Program for Capacity Building of Research and Development (R&D) Institutions and Industrial Competitiveness.

To beef up its R&D efforts, DOST came up with four new programs, namely: 1) Niche Centers in the Regions for R&D (NICER); 2) R&D Leadership Program (RDLead); 3) Collaborative R&D to Leverage PH Economy (CRADLE) for RDIs and Industry; and 4) Business Innovation through S&T (BIST) for Industry.

NICERs will be established in consultation with the academe, industry and members of the Regional Development Council to help build the capacity of academic institutions in the regions and to help improve the regions'industrial competitiveness.

RDLead, meanwhile, will help capacitate and strengthen the institutions and human resources in the regions, upgrade facilities, and improve S&T services. There will no longer be studies just lying on the shelves as the RDLead will improve and hasten the use of research results. RDLead ensures that findings of studies will contribute to the socio-economic development of the country and help address pressing challenges.

Further, CRADLE will bridge the academe and the industry to make a seamless flow of research outputs to practical applications, and stimulate collaboration to meet the needs of both the academe and industry. CRADLE will support collaborative basic research based on industry demand, academe-industry joint commissioned R&D, product development stage, and promotion and access to technologies for industry competitiveness.

BIST, the fourth program, is designed to strengthen the S&T innovation activities and technological capacity of private sectors. It will also provide funds for the purchase of relevant high-tech equipment and machinery, technology licensing, and acquisition of patent rights.

## Running toward UNESCO recommendation

According to the United Nations Educational, Scientific and Cultural Organization (UNESCO), for a country to be industrialized, it should have 380 researchers, scientists and engineers (RSEs) per million population doing R&D studies. It should also invest one percent of its GDP in R&D.

The 2013 R&D survey of DOST found that the Philippines has 270 RSEs per million population, which indicates that we need to increase the number by 110 in the coming years.

The same DOST report reveals that Filipino RSEs have







significantly increased from 180 in 2009 to 270 in 2013, while the budget of DOST has risen from P5.7 billion in 2009 to P20.8 billion in 2017. The R&D budget allocation also went on an upswing from P1 billion in 2009 to P5.8 billion in 2017.

Meanwhile, things are also sunny in the area of building up human resource for S&T. The Philippine Science High School (PSHS) now has 16 regional campuses nationwide from 11 in 2009. From 1,840 PSHS scholars in 2009 to 8,083 in 2017 and is expected to further rise to 9,500 in 2021.

Moreover, the DOST Science Education Institute (SEI) reported that there were 1,250 freshmen scholars in 2010 which has increased to 5,590 in 2015.

Also, the Technology Application and Promotion Institute (TAPI) reported that there were 18 Intellectual Property applications filed through the assistance of TAPI in 2010 which increased to 219 in 2016.

With the evidently increasing government support to R&D this 2017, local researchers are gearing up to be more competitive, innovative, and creative in the world arena. The investment will expectedly return a thousandfold as R&D workers go forth and multiply their deeds.

# Harmonized National R&Development Agenda (2017-2022)

## R&D Priority Areas and Programs

| National Intergated Basic Research Agenda | Health | Agriculture, Aquatic and Natural Resources Sector | Industry, Energy and Emerging Technology | Disaster Risk Reduction and Climate Change Adaptation |
|---|---|---|---|---|
| • **WATER SECURITY**<br>• Watershed studies, water quality, accessibility and availability<br>• **FOOD AND NUTRITION SECURITY**<br>• Food safety, biodiversity studies<br>• **HEALTH SUFFICIENCY**<br>• Fundamental studies on potential sources of natural products, basic veterinary studies, social dimensions on health<br>• **CLEAN ENERGY**<br>• Alternative energy<br>• **SUSTAINABLE COMMUNITIES**<br>• Vulnerable ecosystems, data analytics on natural phenomena, environmental and anthropogenic activities<br>• **INCLUSIVE NATION-BUILDING**<br>• Documentation of indigenous knowledge, data collection on social phenomena, education, national security and sovereignty, arts, history and culture | • Drug Discovery and Development<br>• Diagnostics<br>• Functional Foods<br>• Hospital Equipment and Biomedical Devices<br>• Information and Communication Technology for Health<br>• Dengue<br>• Nutrition and Food Safety<br>• Disaster Risk Reduction - Health<br>• Climate Change Adaptation – Health<br>• Molecular Technologies for Health | **Agriculture**<br>*Crops*<br>• Germplasm research; Varietal improvement and selection; Good quality planting materials (QPMs); Cultural management and crop production systems; Postharvest processing and product development<br>*Livestock*<br>• Animal improvement; Improved reproduction, feeding and nutrition; Conservation and improvement of native animals; Vaccine, biologics and diagnostics; Detection of chemical residues and antimicrobial resistance; Decision support systems; Product development and processing<br>**Fisheries and Aquaculture**<br>• Applied genomics; Culture systems; Culture of new cultivable species; Fish health, disease diagnostics and management; Nutrition, feeds and feeding systems; Postharvest handling, processing and product development; Automation of feeding, water and culture management and post production; Fishkill warning and mitigation systems and environmental management; Management of fisheries<br>**Forestry**<br>• Development and sustainable management of tree plantations; HYV development of priority timber species; Production protocols for the production of QPM; Sustainable cultural management practices, harvesting and postharvest techniques and marketing strategies<br>**Natural Resources and Environment**<br>• Biodiversity; Watershed management and utilization; Soil management and rehabilitation; Agricultural and forest waste-based product development; Climate change strategies and decision support tools; Resource assessment and monitoring; Habitat management; Marine environmental management; Innovative systems for unique landscapes and ecosystems.<br>**Technology Transfer**<br>• Upscaling of technology transfer and commercialization; New and innovative extension modalities; Technology business incubators<br>**Socio-Economic and Policy Research Capacity Building**<br>**Industry, Energy and Emerging Technology**<br>• Food and Nutrition Security<br>• Countryside Development<br>• Competitive Industries<br>• Delivery of Social Services<br>• Intelligent Transportation Solutions<br>• Renewable Energy and Energy Storage Solutions<br>• Human Security<br>**Disaster Risk Reduction and Climate Change Adaptation (DRR CCA)**<br>• Observation and Monitoring Networks<br>• Technology Development and Application for Monitoring<br>• Modelling and Simulation for Improvement of Monitoring and Forecasting<br>• Hazards, Vulnerability and Risk Assessment<br>• Warning and Risk Communication<br>• Technology Development and Application for Climate Change Mitigation and Adaptation<br>• Technology Development and Application for Disaster Risk Management<br>• Policy Research | Food and Nutrition Security<br>Countryside Development<br>Competitive industries<br>Delivery of social Services<br>Intelligent Transportation Solutions<br>Renewable Energy and Energy Storage Solutions<br>Human Security | Observation and Monitoring Networks<br>Technology Development and Application for Monitoring<br>Modelling and Simulation for Improvement of Monitoring and Forecasting<br>Hazards, Vulnerability and Risk Communication<br>Technology Development and Application for Climate Change Mitigation and Adaptation<br>Technology Development and Application for Disaster Risk Management |

# DOST Harmonized National Research and Development Agenda 2017-2022

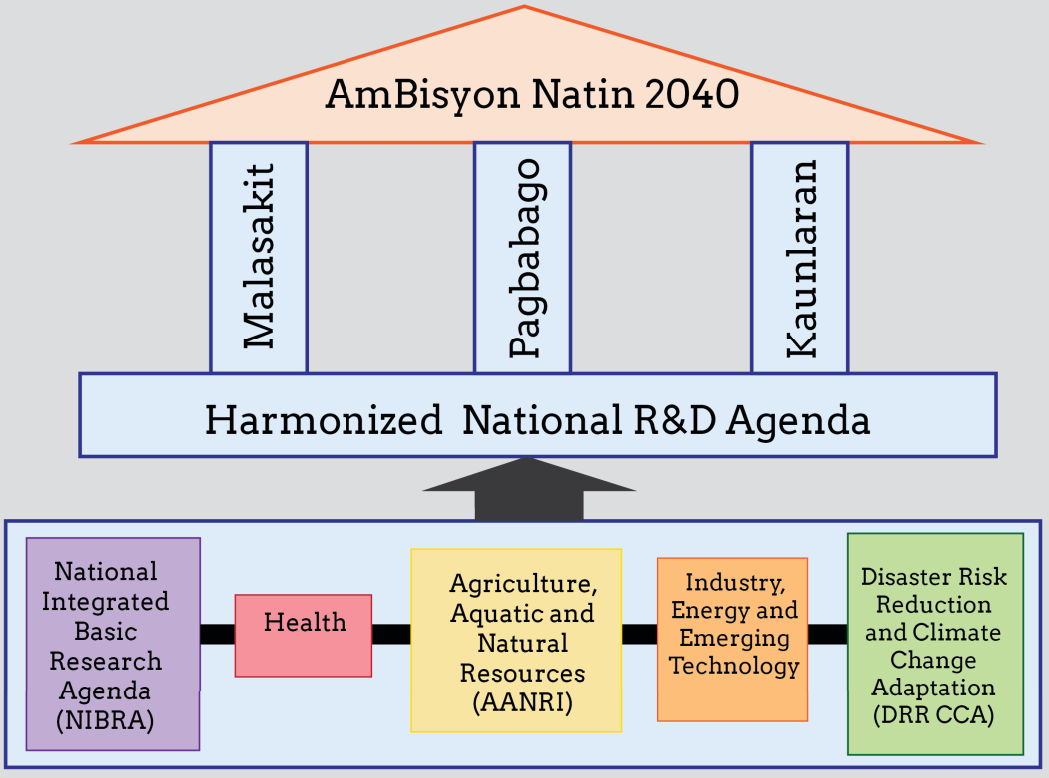
The DOST, in consultation with government and private research and development institutions, the academe, industry and other concerned agencies, prepared the Harmonized National R&D Agenda (HNRDA) 2017-2022 to ensure that results of S&T endeavors are geared towards and are utilized in areas of maximum economic and social benefit for the people. The formulation of the HNRDA is in line with the DOST's mandate of providing central direction, leadership and coordination of the scientific and technological efforts in the country.

The HNRDA is aligned with AmBisyonNatin 2040: matatag, maginhawa at panatag na buhay para sa lahat. It has three pillars: Malasakit (enhancing the social fabric), Pagbabago (reducing inequality), and Kaunlaran (increasing potential growth). AmBisyonNatin 2040 and the three pillars form the foundation for more inclusive growth, a high-trust and resilient society, and a globally competitive knowledge economy.

On 21 October 2016, the DOST hosted the 1st National R&D Conference (NRDC) to harmonize the country's research and development priorities and align them with the thrusts of the current administration. Comments and recommendations raised during the 1st NRDC were considered in the final version of the HNRDA which was presented to stakeholders during the 2nd National R&D Conference on 15 February 2017.

One of the outcomes identified in the Philippine Development Plan 2017-2022 is to increase the country's potential growth by building the foundation for a globally competitive knowledge economy where accelerated technology adoption and stimulated innovation are envisioned to be achieved. The HNRDA, therefore, articulates our national priorities and will serve as guide for public investment in R&D while ensuring a cohesive convergence and integration of R&D efforts towards the shared goal of inclusive socio-economic growth and a better life for Filipinos.

The HNRDA is organized into five sectors: Basic Research; Agriculture Aquatic and Natural Resources; Health; Industry, Energy and Emerging Technology; and Disaster Risk Reduction and Climate Change Adaptation. The Agenda was formulated by the National Research Council of the Philippines (NRCP), Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (PCAARRD), Philippine Council for Health Research and Development (PCHRD), Philippine Council for Industry, Energy and Emerging Technology Research and Development (PCIEERD), Philippine Institute of Volcanology and Seismology (PHIVOLCS), and Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) in cooperation with stakeholders in the respective sectors.




The Harmonized National Research and Development Agenda (HNRDA) is divided into five (5) sectors. It is aligned with AmBisyon Natin 2040, and is founded on the three pillars of Malasakit, Pagbabago and Kaunlaran.

# National Integrated BASIC RESEARCH (NIBRA) Agenda (2017-2022)

**Presented by DR. MARIETA B. SUMAGAYSAY**
*Director, DOST-NRCP*

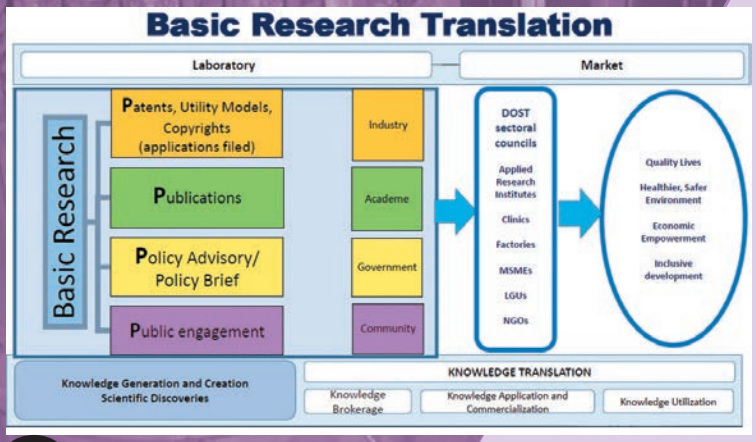
The National Research Council of the Philippines (NRCP), a collegial body of over 4,000 researchers, scientists, and experts, is mandated to promote and support fundamental and basic research in the country as provided in the 9th Philippine Legislature Act No. 4120 passed on 8 December 1933. It is likewise mandated to provide advice on problems and issues of national interest.

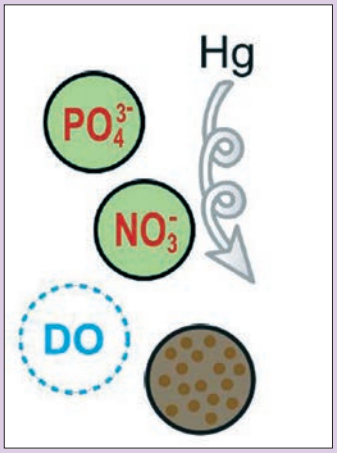
Along this line, the NRCP supports research that is directed primarily towards developing a new and fuller scientific knowledge or understanding of any subject which may or may not have practical applications. Basic researche results from intellectual curiosity aimed at proving the unknown, or it may seek new knowledge required for practical application in the future (Ref: Science Act of 1958 as amended by RA 3589).

For 2017-2022, the NRCP's National Integrated Basic Research Agenda (NIBRA) will prioritize fundamental research in support of the Philippine Development Plan, the National Security Plan, and the Science for Change Program led by the Department of Science and Technology. It has six issue-based NIBRA programs, namely:

A. Water Security – TUBIG Program (Tubig ay Buhayin at Ingatan)
B. Food and Nutrition Security – SAPAT Program (Saganang Pagkain Para saLahat)
C. Health Sufficiency – LIKAS Program (Likas Yaman sa Kalusugan)
D. Clean Energy – ALERT Program (Alternative Energy Research Trends)
E. Sustainable Community – SAKLAW Program (Saklolo sa Lawa)
F. Inclusive Nation-building – ATIN program (Ang Tinig Natin)

Among these six, the top three priority areas for 2017-2019 are SAKLAW, ATIN, and LIKAS Programs. Outputs of NRCP-funded research are journal and scholarly publications,



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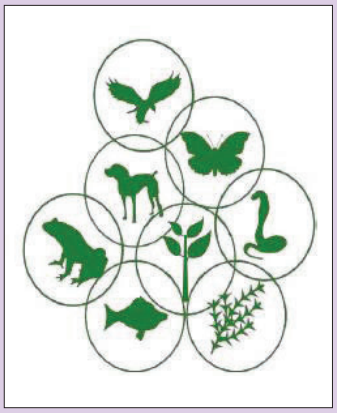


policy advisories, patent applications, and products used for community and public engagements such as books, manuals, monographs, among others.

The NIBRA is a product of a series of consultations and forums which started in 2016. The 13 disciplinal Divisions of NRCP generated their respective basic research agenda. These are the Divisions of Governmental, Educational and International Policies (Division I), Mathematical Sciences (Division II), Medical Sciences (Division III), Pharmaceutical Sciences (Division IV), Biological Sciences (Division V), Agriculture and Forestry (Division VI), Engineering and Industrial Research (Division VII), Social Sciences (Division VIII), Physics (Division IX), Chemical Sciences (Division X), Humanities (Division XI), Earth and Space Sciences (Division XII), and Veterinary Medicine (Division XIII).

The divisions' basic research agenda were further harmonized by the NRCP clusters before the NIBRA was approved by the Governing Board and confirmed by the General Membership Assembly.

## A. Water Security

TUBIG Program (Tubig ay Buhayin at Ingatan)

1. Watershed studies
   a. Biological, chemical and physical characterization
   b. Water supply stress index
   c. Population growth impacts on water resource availability
2. Water quality, accessibility and availability
   a. Pollutants/Contaminants (surface and ground waters)
   b. Analysis of historical flows, sediment, and toxicity loads of lakes and rivers
   c. Weather modification for increasing water supplies in special localized areas

***Priorities for 2017-2019***

Ensuring an adequate supply of quality water that is accessible to a growing population is TUBIG Program's priority for 2017-2019. Specific topics include:

a. Characterization of water resources (ground water)
b. Impact of various climate change scenarios on water supply

***Priorities for 2020-2022***

Studies on rivers, reservoirs, dams and other surface water resources will be the priority for 2020-2022 which will include:

a. Characterization of water resources (surface water)
b. Impact of various climate change scenarios on water supply

## B. Food and Nutrition Security

SAPAT Program (Saganang Pagkain Para sa Lahat)

1. Biodiversity studies
   a. Biological Pollution
   b. Biology and population dynamics of pests, diseases, and natural enemies
   c. Taxonomy of flora and fauna
   d. Environmental scanning of physical marine and terrestrial resources (taxonomy, systematics, ecology)
   e. Genetic analysis (biochemical, cytogenetics, molecular)
   f. Taxonomy of eco-friendly species (e.g., arthropods and microorganisms) for Integrated Pest Management
   g. Exploring allelopathic potentials of indigenous botanicals
2. Food safety
   a. Safety analysis of food supplements and cosmeceuticals in the market
   b. Livestock and poultry diseases (epidemiological studies, re-emerging and emerging diseases)
   c. Diseases and pathogens of important crops
   d. Identification and characterization of food/feed contaminants
   e. Epidemiology of food- and feed-borne contaminants

***Priorities for 2017-2019***

Basic research along two strands is SAPAT Program's priority in the next three years.

a. Taxonomy and systematics of flora and fauna for food. Specific topics include genetic analysis, morphological analysis, and allelopathic analysis.
b. Safety analysis of cosmeceuticals and food supplements. Specific topics include epidemiology, microbiology, chemical analysis, cost-benefit, and socio-economic studies.

***Priorities for 2020-2022***

There will be the same priorities in 2020-2022, but focus will be on:

a. Bio-ecology studies of flora and fauna for food
b. Safety analysis of raw and processed food products

### C. Health Sufficiency

LIKAS Program (Likas Yaman sa Kalusugan)

1. Fundamental Studies on Potential Sources of Natural Products
   a. Bioprospecting (e.g., marine organisms for biomedical use)
   b. Bioinformatics
   c. Characterization and structure elucidation of plants or foods/food components
   d. Pharmacogenomics and toxicogenomics
2. Basic Veterinary Studies
   a. Economically important animal diseases and those transmitted to humans
   b. Characterization, isolation, and bioassay of novel antimicrobial compounds from indigenous sources and plant species
   c. Herbal veterinary pharmacopeia
   d. Identification and characterization of zoonotic diseases
3. Social Dimensions on Health
   a. Filipino perceptions and concepts on health
   b. Herbal and folkloric medicine
   c. Models for good governance in health management

***Priority for 2017-2019***

Fundamental studies on potential sources of natural products in various ecosystems such as marine sediments, rivers, and rare environments (e.g., caves, mangroves, mined out areas, mesophotic reefs) is the priority of the LIKAS Program. This primarily includes bio-prospecting studies for medicinal applications with focus on marine ecosystems in 2017-2019.

For the basic veterinary studies, priority will be on zoonotic diseases.

***Priority for 2020-2022***

The same type of studies will be prioritized in 2020-2022, but focus will be on the other types of ecosystems, specifically rare environments as potential sources of natural products for medicinal use.

For basic veterinary studies, research will focus on the other economically important diseases.

### D. Clean Energy

ALERT Program (Alternative Energy Research Trends)

1. Alternative Energy
   a. Identification and characterization of alternative sources of energy (wind, solar, biofuels, hydro)

***Priority for 2017-2019***

In the next three years, NRCP will support the conduct of resource assessments of potential alternative sources of energy.

***Priority for 2020-2022***

By 2020, priority will be on conduct of commercial viability studies of the potential alternative sources of energy identified from previous studies.

### E. Sustainable Communities

SAKLAW Program (Saklolo sa Lawa)

1. Vulnerable Ecosystems
   a. Lakes, rivers, and wetlands
   b. Oceans and marine studies
   c. Soil science
   d. Carrying capacity models of ecosystems
   e. Environmental scanning of physical marine and terrestrial resources
   f. Endangered species
   g. Economic valuation of ecosystems, natural capital, and cost-benefit analyses
   h. Evaluation of adaptive socio-ecological systems in a changing environment
   i. Assessment studies on the resource sustainability of various ecosystems
   j. Models and frameworks for enhancing adaptive capacities of vulnerable communities
2. Data Analytics of Natural Phenomena
   a. Database of pollutants present in abandoned mined out areas (terrestrial and aquatic)

b. Computational and numerical modelling and simulations for ecological processes
c. Simulations for applications in physical and life sciences, and in complex systems
d. Regional climate modelling and sensitivity analysis

3. Environment and Anthropogenic Activities
   a. Geogenic health hazards
   b. Processes in heavy metals sequestration from mine tailings, agriculture, farms, etc.
   c. Impact studies of anthropogenic activities on the environment (e.g., mining and resource extractive industries)
   d. All-systems risk modelling for DRR/CCA
   e. Human dimensions research on climate change (drivers, impact, responses, adaptive capacities)
   f. Risk assessment of mining wastes and effluents
   g. Bioremediation studies

**Priorities for 2017-2019**
SAKLAW Program is the topmost priority of NRCP for 2017-2019 and it will focus on the following topics:

a. Lake assessment studies -- carrying capacity models and metrics; water quality parameters and baseline studies; resource assessment and valuation; resource utilization and management; socio-economic and policy studies. Both big lakes and small lakes in the country will be included in the program.

b. Coastal vulnerabilities -- risk assessment; geohazard mapping; adaptive capacities; marine geology; computational and numerical modelling. The focus will be on DENR-identified highly vulnerable ecosystems.

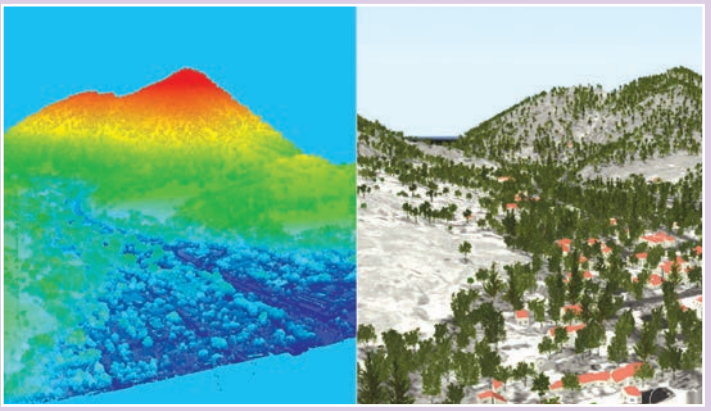
c. Resource extractive industries – fundamental studies of all types of mining areas

***Priority for 2020-2022***
Similar types of basic research will be supported but focus will be on rivers and other bodies of water, and other ecosystems.

## F. Inclusive Nation-Building

ATIN program (Ang Tinig Natin)

1. Data Collection and Analysis of Social Phenomena
   a. Computational and numerical modelling and simulations for social processes
   b. Indigenous knowledge systems and practices on DRR and CCA
   c. Gender in nation-building and DRR/CCA
2. Documentation of Indigenous Knowledge
   a. Documentation of traditional health practices in the Philippines
   b. Extant cultural heritage of ethnolinguistic groups
   c. Dictionary of cultural metaphors
   d. Retrieval and documentation of indigenous technology in Filipino expressive culture
   e. Documentation of indigenous sustainable farming, fishing, and aquaculture practices
   f. Early human life and civilization in the Philippines



3. Education
   a. Pedagogies in Philippine educational system
   b. Mathematics, language, music in indigenous Filipino expressive culture
   c. K12 studies
4. National Security and Sovereignty
   a. Peace studies and conflict resolution
   b. Sovereignty issues
   c. Human security (community, political, health, economic, environmental, personal)
5. Arts, History, and Culture
   a. Extant cultural heritage of ethnolinguistic groups
   b. Filipinnovation in music, theatre, dance, literature, performing arts
   c. Codification of endangered Philippine languages

***Priorities for 2017-2019***
ATIN Program is the second priority for 2017-2019. Among the five themes above-mentioned, the topmost priority will be:

a. Documentation of indigenous knowledge (art and art forms, practices, technologies, early human life and civilization in the Philippines)

b. National security and sovereignty -- to include studies on internal conflict and peace, human security as well as maritime and geopolitical studies.

***Priority for 2020-2022***
For 2020-2022, the same topics will be supported in addition to new developments that may arise.

For all the NIBRA programs, basic research on the cross-cutting themes of gender, KAPS (knowledge, attitude, practices, skills), policy studies, valuation and cost benefit-analysis, impact studies, and DRR/CCA dimensions will be considered.

# Health Research and Development Agenda (2017-2022)

**Presented by DR JAIME C. MONTOYA**
*Executive Director, DOST-PCHRD*

Republic Act No. 10532 or the Philippine National Health Research System (PNHRS) Act of 2013 recognizes and mandates the Philippine Council for Health Research and Development (PCHRD-DOST) as the national coordinating body for health research in the country. Together with the PNHRS core agencies: Department of Health (DOH), Commission on Higher Education (CHED), and National Institutes of Health – University of the Philippines Manila (NIH-UPM), the National Unified Health Research Agenda (NUHRA) was developed. The NUHRA serves the following purposes: it is the national roadmap for health research in the Philippines; it provides focus and direction for health research and development efforts; it guides policy makers, funding, and donor agencies and researchers; it provides evidence-based solutions to pressing health problems; and it serves as basis for maximizing resource utilization and minimizing duplication of research efforts.

The research priorities for health research and development (R&D) is a product of consultations with experts and stakeholders from the private and public sectors including other line agencies of government, academe, and industry. Consultations were done through meetings, workshops and focus group discussions. The research priority setting activities were guided by the DOST's S&T thrusts, emerging and re-emerging health concerns and other national and global development concerns. The health R&D priorities comprise the health S&T component of the NUHRA.

## RESEARCH PRIORITIES for HEALTH RESEARCH and DEVELOPMENT

A. Diagnostics
B. Drug discovery and development
C. Functional foods
D. Hospital equipment and biomedical devices
E. Information and communication technology for health
F. Dengue
G. Nutrition and food quality and safety
H. Disaster risk reduction
I. Climate change adaptation
J. Molecular technologies for health (Platform technology across research priorities)

### A. Diagnostics

- Development of diagnostics for early detection and/or prediction of disease and mortality, utilizing existing technologies, and/or novel technology. Such technology will also look at the genetic or biological markers associated with lifestyle diseases like diabetes mellitus, cardiovascular diseases, and cancer.

***1. Priority diseases:***

a. Communicable diseases
   - Neglected tropical diseases
   - Emerging infectious diseases
   - Organisms associated with Multi Drug Resistance
   - HIV AIDS
   - Gastro urinary tract (GUT), Gastrointestinal tract (GIT), and Hepatitis
   - Respiratory diseases
   - Tuberculosis, all forms

b. Non-communicable diseases
   - Malignant neoplasms, all sites
   - Neurodegenerative and mental health disorders
   - Metabolic diseases, diabetes, and other endocrine-related disorders
   - Autoimmune/ immunologic diseases or deficiencies
   - Cerebrovascular disease
   - Diseases of the cardiovascular system

***2. Specific topics:***

a. Point of care
   - Diagnostic test done at the time and place of patient care

b. Screening / confirmatory / prognostic
   - Screening to detect early disease or risk factors for disease
   - Confirming the presence or absence of disease
   - Prognosticating and predicting the likely outcome of disease, susceptibility, and chances of recovery

c. Technologies
   - Latex agglutination
   - Lateral flow assay/ Dipstick
   - Isothermal technology
   - Biosensors/Chemical sensors
   - Nucleic Acid Testing
   - Immunochemistry
   - Lab-on-a-chip (microfluidics, paper technology, nanotechnology, aptamers or a combination)
   - Immunoassay
   - Radio-labelled assays

***Priorities for 2018***

Proof of concept for screening, confirmatory and prognosis for 13 priority diseases (tropical diseases; malignant neoplasms; emerging infectious diseases; neurodegenerative and mental health disorders; diseases associated with multi-drug resistance; metabolic diseases, diabetes and other endocrine-related diseases; auto-immune/immunologic diseases and deficiencies; cerebrovascular; diseases of the cardiovascular system; GUT, GIT and hepatitis; respiratory; and tuberculosis)

***Priorities for 2019-2022***

Target identification and validation, prototype development, laboratory performance testing, and field testing of diagnostic kits for 13 priority diseases.

### B. Drug discovery and development

- Development of standardized herbal drugs and discovery of new drugs from local sources for development up to the pre-clinical stage. Drugs will be developed for:

1. Infectious diseases
   - Bacterial infections (*M. tuberculosis*, *Enterococcus faecium*, *S. aureus*, *Klebsiella pneumoniae*, *Acinetobacter baumanii*)
   - Viral diseases (e.g., dengue, influenza)
   - Fungal infections
2. Non-communicable diseases
   - Lifestyle-related diseases (e.g., diabetes, cardiovascular diseases, etc.)
   - Cancer (colon, breast, lung)
   - Respiratory diseases
   - Neurodegenerative diseases

***Priorities for 2018***

- Cultural management/ propagation of priority organisms
- Development of standardized herbal drugs
  - Formulation of standardized herbal drugs for platelet enhancement related to dengue, inflammation, diabetes, gout, hypertension
- Pre-clinical drug development
  - Bioactive hits isolation from marine and terrestrial organisms for identified priority diseases
- Development and/or validation of standard processes and protocols for various stages of drug discovery and development

***Priorities for 2019-2022***

- Cultural management/ propagation of priority organisms
- Development of standardized herbal drugs




- Pre-clinical evaluation of standardized herbal drugs for platelet enhancement related to dengue, inflammation, diabetes, gout, hypertension
- Identification and screening of next set of priority plants for formulation for identified priority diseases

• Pre-clinical drug development
- Lead optimization of candidates from marine and terrestrial organisms for identified priority diseases

• Development and/or validation of standard processes and protocols for various stages of drug discovery and development

## C. Functional Foods

• Food or food components that provide health benefits beyond basic nutrient function

• Determination of health benefits and safety assessment of food or food components in reducing risk for disease occurrence, specifically lifestyle related diseases such as cardiovascular disease, diabetes, and cancer

***1. Priority Foods***

a. Local Fruits (guyabano, tiesa, mangosteen)
b. Local Vegetables (malunggay, okra, saluyot)
c. Rootcrops, tubers, and starchy food (yacon, sago, sweet potato varieties, purple yam)
d. Rice (pigmented)
e. Local berries (duhat, lipote, aratiles, bignay)
f. Herbs and spices (tanglad, pandan, ginger e.g., turmeric)
g. Nuts (pili)
h. Seaweeds (lato, red seaweeds)
i. Edible mushrooms

***2. Specific topics***

a. Characterization of food and food components
b. Safety assessment
c. Establishment of health benefits
d. Product development

***Priorities for 2018***

• Safety assessment of mangosteen, malunggay, sweet potato varieties, and ginger

• Characterization of guyabano (leaves, fruit, etc.) tiesa, yacon, sago, pili, lato, red seaweed, and edible mushroom

***Priorities for 2019-2022***

• Establishment of health benefits and product development of mangosteen, malunggay, sweet potato varieties, and ginger
• Safety assessment, establishment of health benefits and product development of

guyabano (leaves, fruit, etc.) tiesa, yacon, sago, pili, lato, red seaweed, and edible mushroom

• Characterization, safety assessment, establishment of health benefits, and product development of okra, saluyot, purple yam, pigmented rice, duhat, lipote, aratiles, bignay, tanglad, and pandan

## D. Hospital Equipment and Biomedical Devices

• Design and development of affordable, safe, and reliable hospital equipment and biomedical devices

***Priorities for2018***

Design and development of hospital equipment and biomedical devices for the following:

• Respiratory failure support
• Artificial body part replacement (prosthesis)
• Rehabilitation medicine
• Minimally invasive surgical procedures
• Eye health

***Priorities for 2019-2022***

Design and development of hospital equipment and biomedical devices for the following:

• Hemodialysis (consumables)
• Orthopedic surgery
• Post-operative care
• Spinal disorders
• Wound care
• Primary health care
• Persons with disabilities assistive devices
• Hospital waste management
• Personal protective equipment

## E. Information and Communication Technology (ICT) for Health

• User-friendly ICT solutions to accelerate the gathering and processing of health and related information for

policymaking and delivery of quality health care services

***Priorities for 2018***

- Public health surveillance
- Health intelligence system
- ICT-enabled medical devices and services
- Software and applications

***Priorities for 2019-2022***

- Monitoring proximity to predict possible epidemics
- Verbal autopsy system
- Applications development for online nutrition services
- Automatic body mass index assessment

## F. Dengue

- Dengue R&D intends to reduce transmission of dengue and development of an early warning system for the prediction of dengue outbreak.

***Specific topics***

- Vector biology
- Vector surveillance and integrated vector management
- Dengue case management
- Dengue outbreak management

***Priorities for 2018***

Vector surveillance and IVM

- Molecular characterization
- Guidelines for the use of ovitraps
- Insecticide resistance survey

Dengue outbreak response

- Dengue outbreak prediction
- Development of system for yearly monitoring of prevailing dengue serotypes

***Priorities for 2019-2022***

Vector surveillance and IVM

- Epidemiological and molecular survey of mosquito borne viruses
- Genome editing of *Aedes aegypti*
- Gene silencing mosquito spray

Dengue outbreak response

- Intensive profiling of dengue trends using rapid diagnostics

## G. Nutrition and food quality and safety

- Nutrition research seek to address the nutrition problems in the country i.e., micronutrient and macronutrient deficiencies, overnutrition, and nutrition related diseases, and to explore avenues and other opportunities that can be tapped, in order to lessen if not stop these problems.
- Food quality and safety refers to the assurance that food will not cause harm to the consumer when prepared or eaten according to its intended use.

***Specific topics***

- Food fortification
  - Fortified multi-nutrient growth mix products
  - Rice extrudate
- Development/Revision of nutrition tools and standards
  - Nutritional guidelines
  - Food exchange list
  - Body composition assessment
- Nutritional assessment and monitoring
  - In-depth and correlation studies (dietary risk factors to non-communicable
  - diseases)
  - Nutrition surveys
- Designing nutrition intervention programs
  - Nutrition delivery system for complementary feeding promotion
- Food quality and safety
  - Enhancement of food composition database for dietary exposure assessment
  - Exposure assessment of selected nutrients, food contaminants, and food additives in commonly consumed foods

## H. Disaster Risk Reduction

- Based on the Sendai Framework
- Innovations which will reduce risks to health

***Priorities for 2018***

- Innovations for emergency medical care services, water, sanitation, hygiene, and nutrition
  - technology development for search and rescue, triage, and emergency health
  - ready-to-use therapeutic food
  - food for emergencies
  - environmental health (water quality; waste disposal)
- Psychosocial adaptation capacity of communities


***Priorities for 2019-2022***

- Intervention models to reduce prevalence of infectious diseases
- Post disaster solutions to access health care services, e.g., maternal, newborn and child health, sexual and reproductive health, food security, nutrition, housing, education

## I. Health and Climate Change Adaptation

- Covers cross-cutting research on climate change adaptation, which have direct implications on public health

***Priorities for 2017-2022***

- Research relating to human health with hydrologic/ meteorological information
- Climate change sensitive diseases
- Resilience studies at institutional, community, and individual levels
- Implementation science regarding existing tools and interventions on health and climate change
- Green health facilities

## J. Molecular Technologies for Health

- Utilize molecular technology platforms in developing local technologies for the development of personalized medicines, diagnostics, therapeutics as support to health and clinical practice guidelines and policies

## MAIN FEATURES

- Priority diseases based on the top causes of mortality and morbidity (e.g., CVD) malignant neoplasms, pneumonia, and other chronic respiratory diseases
- Prevalent emerging and re-emerging infectious diseases
- Neurological/ Neurodegenerative/ Mental health conditions
- Disease conditions of special interest in the Philippines, e.g., X-linked dystonia-parkinsonism syndrome
- Other applications / Topics of national interest or significance

***Specific topics***

- Omics Technologies for Health and Wellness
- Bioinformatics and Systems Biology
- Novel Technologies for Therapeutics
- Biobanking, Data Mining and Population Studies for Human Health, Ethnicity and Forensic Applications

***Priorities for 2018***

Omics Technologies for Health and Wellness

- Omic research programs on neurological/ neurodegenerative/ mental health conditions (susceptibility and drug response)
- Validation of candidate genomic markers on susceptibility and drug response for CVD and type 2 diabetes mellitus
- Human host and viral markers of dengue severity (knowledge generation on pathophysiological and molecular mechanisms of dengue severity)
- Nutrigenomics

Bioinformatics and Systems Biology

- Development of computational approaches and formulating bioinformatics pipeline to study Filipino genomes
- Data mining for lung or breast cancer tissues

Novel Technologies for Therapeutics

- Development of molecular vehicles for targeted drug delivery

Biobanking, Data Mining and Population Studies for Human Health, Ethnicity and Forensic Applications

- Developing forensic methods used in criminal investigations, kinship analysis and victim identification
- Studies on Filipino DNA markers for forensic applications
- Characterization of Filipino genomic variations (22 regional groups and 24 ethno-linguistic groups- sample collection)
- Establishing a biobanking resource of Filipino samples and their associated data (genomic, proteomic etc.)

***Priorities for 2019-2022***

Omics Technologies for Health and Wellness

- Validation of candidate genomic markers on susceptibility and drug response for neurodegenerative/ mental health diseases
- Omic research programs on rare diseases in the Filipino population (susceptibility and drug response)
- Omic research programs on human host and infectious disease markers of susceptibility, severity and therapeutic response
- Nutrigenomics

Bioinformatics and Systems Biology

- Developing the national capability for bioinformatics, chemoinformatics, computational biology, and big data analytics for the medical and health sciences
- Validation and testing of computational approaches and formulating bioinformatics pipelines to study Filipino genome

Novel Technologies for Therapeutics

- Validation, pre-clinical and clinical testing of molecular vehicles for targeted drug delivery

Biobanking, Data Mining, and Population Studies for Human Health, Ethnicity, and Forensic Applications

- Validation of use of molecular technologies for forensics for the use in criminal investigations, kinship analysis, and victim identification
- Validation of Filipino DNA markers for forensic applications
- Data mining of Filipino genomic variations (22 regional groups and 24 ethno-linguistic groups-sample collection)
- Management of biobanking resource of Filipino samples and their associated data (genomic, proteomic etc.)

For details, visit www.pchrd.dost.gov.ph/

# Agriculture, Aquatic and Natural Resources Research and Development Agenda (2017-2022)

**Presented by DR. REYNALDO V. EBORA**
*Executive Director, DOST-PCAARRD*

| Commodity Focus | | | |
|---|---|---|---|
| Agriculture | | Aquatic | Natural Resources and Environment |
| Crops | Livestock | | |
| Abaca and other fiber crops<br>Coconut<br>Rice<br>Corn and other Grains<br>Fruit crops<br>- Mango<br>- Banana<br>- Other tropical fruits (e.g. durian, jackfruit, pummelo, papaya, pineappple, citrus)<br>Legumes (e.g. mungbean, peanut and soybean)<br>Natural Sources of Dye<br>Pili and Cashew<br>Ornamentals (e.g. cutflowers and foliage)<br><br>Medicinal Plants<br>Plantation crops<br>- Cacao<br>- Coffee<br>- Oil Palm<br>- Rubber<br>- Sugarcane<br>Rootcrops (e.g. sweet potato, cassava)<br>Sericulture and Apiculture<br>Vegetables (e.g. tomato, white potato, mushroom) | Livestock<br>- Swine<br>- Goat<br>- Sheep<br>- Cattle (dairy and meal)<br>- Rabbit<br><br>Poultry<br>- Chicken (meat and egg)<br>- Duck (meat and egg)<br>- Quail<br><br>Native animals<br>- Chicken<br>- Duck<br>- Swine<br>- Goat<br><br>Feed Resources | Inland<br>Mangrove crab<br>Milkfish and other brackishwater fishes (e.g. Kitan, Pompano)<br>Mussel<br>Tilapia and other freshwater fishes (e.g. Goby/Pijango, Pigek)<br>Shrimp<br>Aquafeeds<br><br>Marine<br>Abalone<br>Blue Swimming Crab<br>Cephalopods - cuttlefish, octopus, squid<br>Oyster and other shellfish<br>Sardines<br>Sea cucumber<br>Seaweeds<br>Tuna | <u>Timber</u><br>Tree plantations (e.g. yemane, falcata)<br><br><u>Non-Timber</u><br>Bamboo<br>Rattan<br>Sago<br>Tiger grass<br>Vines and other non-timber<br><br>Biodiversity<br>* Ecosystem (e.g. mangrove, marine, freshwater)<br>* Microbial<br>* Flora and Fauna<br>* Ecotourism |

The Harmonized National R&D Agenda in AANR (HNRDA-Agriculture, Aquatic and Natural Resources) 2017-2022 is an integration of the existing R&D agenda of government agencies conducting R&D in AANR and inputs from various stakeholders.

The HNRDA-AANR 2017-2022 is a product of multi-sectoral consultations. Initially, a Roundtable Consultation was conducted by the Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (PCAARRD) on October 13, 2016 at PCAARRD, Los Baños, Laguna with representatives from government agencies performing R&D functions in AANR. The output of the consultation, an initial draft agenda, was then presented during the National R&D Conference on October 21, 2016 held at Crowne Plaza Hotel Galleria, Quezon City. The conference was attended by representatives from government, the academe, the private sector, and civil society groups. The draft HNRDA-AANR was also presented to the Regional R&D


Consortia during the Joint Regional R&D Consortium Chairpersons and Directors meeting held at PCAARRD on November 28, 2016. In addition, it was sent to heads of agencies involved in R&D in AANR for validation, and further discussed during the 2nd Round Table Consultation held on February 10, 2017 at PCAARRD.

The AANR sector supports the use of advanced and emerging technologies such as biotechnology, genomics, bioinformatics, nanotechnology, nuclear technology, space technology, electronics and automation, and ICT as R&D tools to find S&T solutions to AANR problems or develop new products with significant potential impact to the sector.

The sector supports organic agriculture, halal food production, food safety and traceability initiatives, and the development of genetically modified organisms as long as it is compliant with biosafety rules and regulations.

The AANR sector also supports farm mechanization, as mandated by RA 10601, otherwise known as the Agricultural and Fisheries Mechanization Law, to modernize the sector and increase agricultural productivity, efficiency, and competitiveness.

## RESEARCH PRIORITIES for AGRICULTURE, AQUATIC AND NATURAL RESOURCES (AANR)

A. Crops R&D Agenda
1. Germplasm evaluation, conservation, utilization, and management
2. Varietal improvement and selection
3. Production of good quality seeds and planting materials
   a. Development/ optimization of seed production protocols
   b. Establishment of sustainable seed system
4. Cultural Management Practices
   a. Soil health, nutrient, and water management
   b. Development of biofertilizers and soil fertility enhancers
   c. Development of eco-friendly pest and disease management and control strategies
   d. Development of crop disease diagnostic kits/ techniques and disease management protocols
   e. Organic agriculture
5. Crop production systems research
   a. Smart farming approaches
   b. Off-season production and cultivation
   c. Development of climate-resilient technologies
   d. Decision support systems
6. Postharvest, processing, and product development

***Priorities for 2018-2019***

- Breeding to develop improved crop varieties, including genomic studies to improve yield and other economically important traits of crops
- Development of good agricultural practices
- Optimization of crop production protocols
- Mapping/Surveillance of pests and diseases, including emerging ones
- Use of biologically-based

approaches as well as nanotechnology in crop cultural management (e.g., soil nutrient management, pest and disease management)
- Product development from various crops

***Priorities for 2020 onward***
- Multilocation trials of various technologies
- Mass production of pest and disease resistant varieties of various crops
- Roll out of various mature technologies

## B. Livestock R&D Agenda

1. Breed development and genetic improvement (for meat, dairy, and draft)
2. Reproductive biotechniques for priority livestock species
3. Nutrition, feeds, and feeding system
4. Conservation and improvement of native animals
5. Vaccine, biologics and diagnostics development
6. Detection of chemical residues and anti-microbial resistance
7. Production and management decision support systems
8. Product development and processing

***Priorities for 2018-2019***
- Native animals R&D program
- Application of genomics in breeding and selection
- Improvement of cultural management protocols
- Forage processing, development alternative feed ingredients and feeding systems
- Development of animal breed registry, diagnostic protocols and test kits, traceability systems
- Processing and product development

***Priorities for 2020 onward***
- Development of quality standards for dairy products
- Pilot testing and/or roll out of various technologies

## C. Aquatic R&D Agenda

1. Application of genomics in the study of diseases of aquatic species, improving fish resistance to climate change; molecular phylogenetics; population genetics
2. New cultivable species for culture
3. Development/Refinement of culture systems (broodstock management, hatchery, nursery, grow-out)
4. Fish health, disease diagnostics, and disease management
5. Nutrition, feeds and feeding systems
6. Postharvest handling, processing, and new product development
7. Mechanization and automated systems for feeding, water and culture management, and post production
8. Fishkill warning and mitigation systems and environmental management for sustainable aquaculture
9. Management of fisheries

***Priorities for 2018-2019***
- Genetic studies and marker development, selective breeding
- Bioinformatics analysis, population genomics
- Improving fish health and nutrition, feeds and feeding systems for improved production performance
- Development/ Refinement and field testing of culture technologies on economically important species
- Biology, ecology and stock enhancement, and population studies
- Ecosystem based fisheries management
- Postharvest handling and processing

***Priorities for 2020 onward***
- Pest and disease management/ surveillance
- Product development, including harnessing pharmaceutical and other uses of aquatic species
- Improving the management of fishery resources
- Offshore fisheries and oceanography
- Roll out of various technologies

## D. Forestry R&D Agenda

The following agenda are in support of the government's Enhanced National Greening Program:

1. Development and sustainable management practices
2. Development of high yielding varieties of priority timber species with superior traits
3. Production protocols for the propagation of quality timber and non-timber forest planting materials
4. Development of sustainable harvesting and postharvest techniques/technologies and marketing strategies for timber and non-timber forest species/products

***Priorities for 2018-2019***
- Genomics assisted breeding for economically important traits of forest species
- Germplasm conservation and management of selected indigenous tree species

- Assessment of forest genetic materials of different tree species
- Pest and disease control
- Establishment of nursery facility for plantation trees

***Priorities for 2020 onward***

- Roll out of technologies such as high yielding clones, furnace type lumber dryer, engineered bamboo
- Development of high value products

## E. Natural Resources and Environment R&D Agenda

1. Sustainable utilization, conservation and management of biodiversity in terrestrial, forestry, and marine ecosystems
2. Sustainable watershed management and utilization
3. Management and rehabilitation of problem, degraded, and polluted agricultural soils through remediation
4. Development of high value products from agricultural and forest wastes
5. Strategies/Decision management tools for climate change resilient environment
6. Resource and ecosystems assessment and monitoring
7. Habitat management for fishery and ecosystem sustainability
8. Marine environmental management (to include harmful algal blooms (HABs), coastal integrity/ erosion, fish kills, and eutrophication)
9. Innovative management systems for unique landscapes and ecosystems

***Priorities for 2018-2019***

- Germplasm conservation of endangered plants
- Development of molecular tools for characterizing HABs, including modelling techniques for prediction/mitigation of HABs
- Molecular and phylogenetic studies of marine resources
- Propagation techniques for economically important species
- Economic valuation and accounting of biodiversity
- Community-based ecotourism projects
- Development of biodiversity products
- Adoption of community-based management protocols in watershed monitoring
- Nuclear studies on corals and marine ecosystem and resources
- Deep resource assessment and monitoring
- Oceanographic and connectivity studies, renewable energy studies, and coastal erosion and bathymetric studies

***Priorities for 2020 onward***

- Propagation of economically important plants
- Promotion of livelihood and ecotourism for sustainable watershed management
- Purification of toxins from HAB-selected organisms
- Promotion of community-based PES modules/protocols in selected watersheds
- Pilot testing of biodiversity products
- Proteomic studies on HABs
- New detection and monitoring techniques for HABs
- Development of early warning systems
- Roll out of technologies

## F. Climate Change Adaptation and Disaster Risk Reduction

1. Mitigation and adaptation studies (including protected agriculture, vertical agriculture)
2. Development of smart farming approaches (including organic agriculture, integrated farming, ICT application) and other climate-resilient agricultural production technologies
3. Development of strategies/ decision management tools for climate change resilient environment (e.g., farm diversification)
4. Enhancing sustainable development through lifescape-landscape approach

***Priorities for 2018-2019***

- Development of decision support systems for selected ecosystems
- Rehabilitation strategies for critical mangrove and coastal forest
- Monitoring and detection of ecosystem changes

***Priorities for 2018 onward***

- Rehabilitation of vulnerable ecosystem to climate change
- Enhancement of resiliency of communities

## G. Technology Transfer

1. Development of innovative and improvement of traditional extension modalities for the efficient transfer of technologies to end-users
2. Upscaling of agricultural technology transfer and commercialization

## H. Socio-Economics and Policy Research

1. Continuing review of existing policies affecting the AANR sectors
2. Policy research on natural resources/environment-related issues, agricultural trade, supply chain/ value chain related issues and R&D governance, compliance to standards across the value chain
3. Impact assessment of technologies, AANR programs and projects
4. Socio-economic studies on production and marketing efficiencies, role of social institutions in technology adoption, labor migration, development of social enterprise models, gender and development
5. Agriculture and resource economic studies including market research, agrarian/ asset reform, environmental valuation, economies of scale/collective farming
6. Policy studies on global competitiveness of Philippines AANR sector

For details, visit http://www.pcaarrd.dost.gov.ph/home/portal/

# Industry, Energy and Emerging Technology

## Research and Development Agenda

## (2017-2022)

**Presented by DR. CARLOS PRIMO C. DAVID**
*Executive Director, DOST-PCIEERD*

Seventeen sectors covering various industries, the energy and transportation sectors, and high impact fields like biotechnology and nanotechnology are within the purview of the Philippine Council for Industry, Energy and Emerging Technology Research and Development (PCIEERD-DOST). The overarching objective of DOST-PCIEERD is to strengthen these sectors through research and development (R&D) support, human resource and institution development, information and technology diffusion, and development of enabling policies. These programs contribute to the Department of Trade and Industry's strategy of promoting industry competitiveness - to sustain the tremendous growth in the services and manufacturing sectors experienced over the last six years as well as develop business opportunities in frontier sectors. Such goals are anchored on the government's long term goal of attaining genuine and inclusive growth.

The Harmonized National R&D Agenda (HNRDA) for the Industry Sector for 2017-2022 is formulated through targeted consultations with the private sector, national government agencies (NGAs), and the academe. This was presented during the National R&D Conference in 2016 and finalized in February 2017. The foundation of the HNRDA are the consolidated individual DOST-PCIEERD sectoral R&D roadmaps which were crafted through a consultative process with key stakeholders and aligned with NGA priorities. To ensure its continued relevance with rapid technological changes and an increasingly globalized economy, each R&D roadmap is periodically assessed and updated during the period 2017-2022.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To secure a truly harmonized R&D strategy within government, the DOST-PCIEERD has entered into several memorandum of agreement with NGAs essentially to seamlessly integrate R&D efforts strategically and even fiscally (through co-implementation and co-funding of projects). By mid-2017, partnerships would have been forged with more than a dozen NGAs including the Department of Energy, Department of Public Works and Highways, and Department of National Defense.

Industry competitiveness will focus on micro, small and medium enterprises (MSMEs) and much effort will be provided toward countryside development. Many R&D projects will leverage on existing resources and focus on waste utilization, value-addition of traditional products and efficient manufacturing processes. Lastly, it is noteworthy that four new fields of research are to be included as priority areas for 2017-2022. These are deemed to be emerging industries and critical to national development:

- Space Technology Applications
- Artificial Intelligence and Data Science
- Human Security and Defense Research
- Creative Industries

## RESEARCH PRIORITIES for INDUSTRY, ENERGY AND EMERGING TECHNOLOGY

A. Food and Nutrition Security
Nutritious, safe and affordable food for all, at all times

B. Countryside Development
More MSMEs developing and producing competitive and world class products and services

C. Competitive Industry
More industries enabled by state-of-the-art R&D, technologies and science-based policies, moving up the value chain and


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attracting foreign direct investments

D. Delivery of Social Services
Innovative, accessible, affordable, and efficient social services for all

E. Intelligent Transportation Solutions

F. Renewable Energy and Energy Storage Solutions

G. Human Security
Protection of the country and its citizens against national threats

## A. Food and Nutrition Security

1. Food Safety and Quality
   a. Affordable Tests for Food Contaminants
      - Rapid test kits, electronic sensors for common food contaminants (Microbiological contaminants, histamine)
      - Migration test kit for various food packaging materials (paper and plastic)
   b. Development of Food Safety Rating and Grading System for Food Service Establishments
   c. Safe and Regulatory-Compliant Food Products and Processes
   d. Improvement of Food Shelf-life
   e. Innovative Food Products

***Priorities for 2018***

- Baseline Studies on Microbiological and Chemical Hazards on Food
- Science-Based Quality Assurance System for Priority Products (e.g., fresh and processed banana)
- Value-adding of Fishery By-Products (e.g., fish oil, chitin, collagen)

## B. Countryside Development

1. Agro-Processing, Utilization and Value-Adding
2. Natural Products Development
3. Improvement of Textile Processing
4. Halal Processing Technologies for Food and Non-Food
5. Metrology and Testing Methods for Laboratory Analysis
6. Shop Floor R&D and Innovations
7. Regional Consortia R&D

## C. Competitive Industries

1. ICT, Electronics and Semiconductor
   a. Big Data Analytics
   b. Artificial Intelligence
   c. Internet of Things
   d. Advanced Electronics and Communications (e.g., photonics & opto-electronics devices, semiconductor materials, etc.)

***Priorities for 2018***

- Artificial Intelligence for Industry, Transport, and Education Application
- Big Data Analytics (Government Data Integration)
- R&D for Creative Industries

2. Mining and Minerals - Technologies and processes for small and large scale mining in support to responsible mining
   a. Green Mining Technology
   b. Clean Metallurgical Processes

***Priorities for 2018***

- Development of Value-Adding Technologies for Copper, Iron, Chromite, Nickel, Chromium, and Gold Minerals for Industrial Application

- Geological Assessment of Untapped/Undiscovered Minerals (i.e., Black Sand and Trace and Rare Earth Elements)
- Green Mining Technologies
- Clean Metallurgical Processes
  - Hydrometallurgical
  - Pyrometallurgical
  - Electrometallurgical

3. Metals and Engineering
   a. Advanced Machine-Based or Machine Aided Metalworking and Testing Procedures
   b. Technologies for Disposal, Recycling, and Treatment of Metal Wastes

*Priorities for 2018*

- Cost Efficient Manufacturing Processes and Equipment to Increase Local Content of Aerospace, Automotive, and/or Train Parts and Components
- Design, Development, and Prototyping of Food Processing Equipment for MSMEs

4. Construction
   a. New Construction Materials and Techniques
5. Packaging
   a. Smart and Green Packaging Technology
   b. Appropriate Packaging System for Various Products
6. Industrial Application of Nuclear Technology
   a. Food and Non-Food Processing
   b. Non-Destructive Testing
   c. Product Development
   d. Environment Monitoring

## D. Delivery of Social Services

1. Environment and Pollution Control

a. Wastewater Management

- Cleaner and safer technologies for application to industrial wastewater, waste management, safe and potable drinking water, and other pressing environmental problems
- Field-testing/Application of cleaner technologies for the benefit of the industry, domestic households, and general public
- Materials that detoxify harmful substances in water
- Removal and decomposition of spill contaminants and heavy metals
- Mineralization of pollutants
- Potable water
- Storm water and storage and rainwater technologies
- Waste water remediation
- Materials and processes for desalination
- Alternative materials and processes that will reduce or eliminate hazardous substances in the environment and manufacturing sites
- New wastewater purification technologies and reuse of wastewater purification technologies and wastewater treatment/rehabilitation technologies
- Treatment, control, and monitoring sensors and systems

b. Air Pollution Control and Management

- Reduction of risks of H2S emission in the environmental and industrial sectors
- Emission reduction focusing on efficient and clean technologies
- H2S gas sensor
- Spatial data acquisition and management technologies (i.e., tempospatial distribution of atmospheric particles [transboundary])
- Nuclear techniques for air pollution monitoring
- Zeolite/bentonite applications in pollution control and mitigation
- Alternative anti-pollutant agents
- Development of optical techniques for air quality monitoring
- Development of sensors for air quality monitoring

c. Solid Waste Management

- Impact on emission of pollution from solid waste
- New product development from solid waste
- Solid waste minimization

*Priorities for 2018*

- Water Environment R&D
  - Wastewater management
- Air Quality R&D
  - Air pollution control and management
- Solid Waste Management
- DRR/CCA Proofing Infrastructure Systems and Techniques
  - Urban infrastructure rainfall inflow-outflow modeling and early warning systems
- Hazards and Risk Assessment Tools and Systems Program
  - Liquefaction hazard assessment
- Instrumentation for Early Warning, Monitoring and Rapid Assessment
  - Forecast based financing and weather based insurance mechanism
- Marine Geology and Oceanography Program
- Human Security
- R&D for Unmanned Aerial Vehicles, Airborne and Space Technology

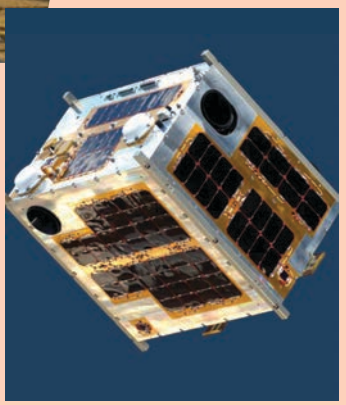
2. Space Technology Application
   a. Development of micro-satellites and space technologies
   b. Use of STA for resource mapping
   c. Application of global navigation satellite system
   d. Airborne and UAV systems for high resolution mapping and other applications

## E. Intelligent Transport Solutions

1. Alternative Mass Transport Systems and Components

a. Land Transport - Develop a sustainable integrated, responsive, effective, efficient, and safe land transport systems

- Cost-effective alternative mass transport systems and components
- Intelligent vehicle-to-vehicle connectivity and information sharing of speed, lane changing, and potential intersection crash warning data for safe vehicle driving
- Digital infrastructure needs assessment for internet of vehicles implementation
- Development of ITS control system
- Expert system for pavement, rail management



- Development of traffic data collection system utilizing CCTV

b. Sea/Water Transport - Develop a safer, cleaner, and efficient maritime transport systems and services

- Cost-effective sea-worthy hull design using alternative lightweight materials for passenger and fishing vessels and standard model design
- Low carbon and improving energy efficiency of water craft, e.g., vessel design and sea craft
- Managing maritime traffic and safety systems, such as development localized prototyped automatic identification system

2. Traffic/Mobility

a. Intelligent Transport Systems

- Commuters and public utility vehicle information systems
- Intermodal and traffic simulation modeling tools
- Automated traffic monitoring, violation detection, public utility vehicle tracking, and safety signaling systems
- Traffic signalization mechanization system

b. Other Modes of Mobility

- Unmanned aerial/ sea surface vehicle for logistics delivery and humanitarian assistance

***Priorities for 2018***

- Intelligent Transport System
  - Vehicle-to-vehicle connectivity and information sharing
  - Road infrastructure-to-vehicle
  - Automated parking space detection system
  - Harmonized radio frequency identification/wireless sensor network using multi-path transmission protocol & cognitive frequency
  - o PUV tracking for fleet management & driving behavior
- Sea Transport Research on Marine Vessels
  - Standard sea-worthy hull design using alternative indigenous lightweight materials
  - Navigational Route Capacity Measurement & Analysis for inter-island connectivity
- Mass Transport Systems (train, PUV)
  - Prototype double decker bus development and fuel efficiency analysis in compliance to Euro 4 Standards
  - Development of Positive Train Control components for railway system

## F. Renewable Energy and Energy Storage Solutions

1. Energy Efficiency/ Alternative Fuels and Conservation
   a. Energy-efficient technologies for industry and buildings
   b. Standards development
2. Renewable Energy (RE) Systems & Bioenergy Technologies -Increase the adaptation and adoption of renewable energy systems
   a. Cost-effective RE technologies and business models integration for sustainable off-grid power supply
   b. Efficient micro-hydro and hydrokinetic turbines
   c. Bioenergy technologies
   d. Wind energy
   e. Solar power concentrators
   f. Solar heating and cooling
3. Functional materials for alternative energy sources and energy conversion and storage - Systems and processes for surface modification of various materials
   a. Superconducting wires, liquid electrode material systems, superconducting transformers
   b. Cost competitive solar cells
   c. Platinum - and palladium - based anode catalyst for direct ethanol fuel cell
   d. Direct ethanol fuel cell-powered LED emergency light

***Priorities for 2018***

- Smart Energy Efficient Systems for Low Carbon Economy
  - Efficient hydrokinetic energy harvesting systems
  - Sustainable urban waste to energy conversion
- Renewable Energy (RE) Systems
  - RE technologies and business models integration for sustainable off-grid power supply
  - Thermo/electro/ biochemical hydrogen production
  - Solar power concentrators
  - Solar heating and cooling

## G. Human Security

1. Food Defense
2. Biosecurity
3. Cybersecurity

For details, visit http://pcieerd.dost.gov.ph/

# Disaster Risk Reduction and Climate Change Adaptation

## Research and Development Agenda

## (2017-2022)

**Presented by DR. RENATO U. SOLIDUM**
*Undersecretary for DRR/CCA, DOST*

The 2017-2022 Harmonized National Research and Development Agenda for Disaster Risk Reduction and Climate Change Adaptation (HNRDA DRR-CCA) represents the priorities of government organizations and stakeholders involved in DRR and CCA, consistent with related local and international development initiatives.

The HNRDA DRR-CCA consolidates the priorities of the DOST Sectoral Councils, which have conducted multi-sectoral consultations, DOST agencies, and DOST regional offices.The research priorities were evaluated and harmonized by a team from the Philippine Institute of Volcanology and Seismology (PHIVOLCS) and Philippine Atmospheric Geophysical and Astronomical Services Administration (PAGASA) with reference to related national plans, such as the National Disaster Risk Reduction and Management Plan, the National Climate Change Action Plan, and global initiatives such as the Sustainable Development Goals and Sendai Framework for Disaster Risk Reduction. Disaster Risk Reduction and Climate Change Adaptation are cross-cutting concerns in the health, agriculture, environment, energy, and industry sectors.

The **2030 Agenda for Sustainable Development** was adopted by the United Nations General Assembly in September 2015. It sets out 17 Sustainable Development Goals with 169 associated targets and describes a number of international mechanisms for supporting implementation.

DOST supports the Agenda by focusing substantial efforts to contribute to Goals 9, 11 and 13.

Goal 9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

Goal 11. Make cities and human settlements inclusive, safe, resilient, and sustainable

Goal 13. Take urgent action to combat climate change and its impacts

The Sendai Framework for Disaster Risk Reduction (2015-2030) addresses the risk of small-scale and large-scale, frequent and infrequent, sudden and slow-onset disasters, caused by natural or manmade hazards as well as related environmental, technological and biological hazards and risks. It considers climate change as one of the drivers of risk. It aims to guide the multi-hazard management of disaster risk in development at all levels as well as within and across all sectors.

DOST supports the Framework by subscribing to the Four Priorities for Action it identified, namely:

Priority 1. Understanding disaster risk

Priority 2. Strengthening disaster risk governance to manage disaster risk

Priority 3. Investing in disaster risk reduction for resilience

Priority 4. Enhancing disaster preparedness for effective response, and to "Build Back Better" in recovery, rehabilitation, and reconstruction

The research priorities in the agenda are organized into topics that address the four major action themes for Disaster Risk Reduction and Management:

- Monitoring and Forecasting (Observation and Monitoring Networks, Technology Development and Application for Monitoring, Modelling and Simulation for Improvement of Monitoring and Forecasting)
- Hazard and Risk Assessment (Hazards, Vulnerability, and Risk Assessment)
- Warning (Warning and Risk Communication)
- Proper and Timely Response (Technology Development and Application for Climate Change Mitigation and Adaptation, Technology Development and Application for Disaster Risk Management, and Policy Research).

## RESEARCH PRIORITIES for DISASTER RISK REDUCTION and CLIMATE CHANGE ADAPTATION (DRR CCA)

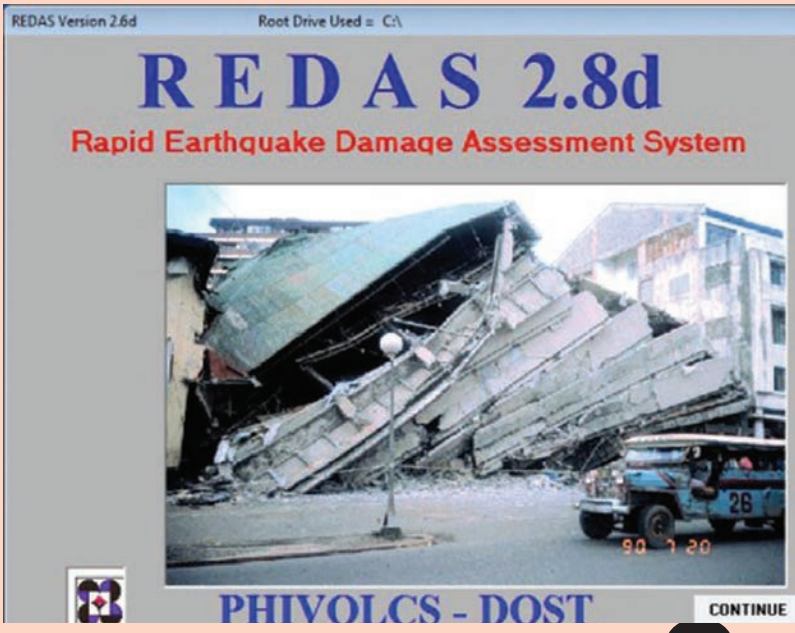
A. Observation and Monitoring Networks
B. Technology Development and Application for Monitoring
C. Modelling and Simulation for Improvement of Monitoring and Forecasting
D. Hazards, Vulnerability, and Risk Assessment
E. Warning and Risk Communication
F. Technology Development and Application for Climate Change Mitigation and Adaptation
G. Technology Development and Application for Disaster Risk Management
H. Policy Research

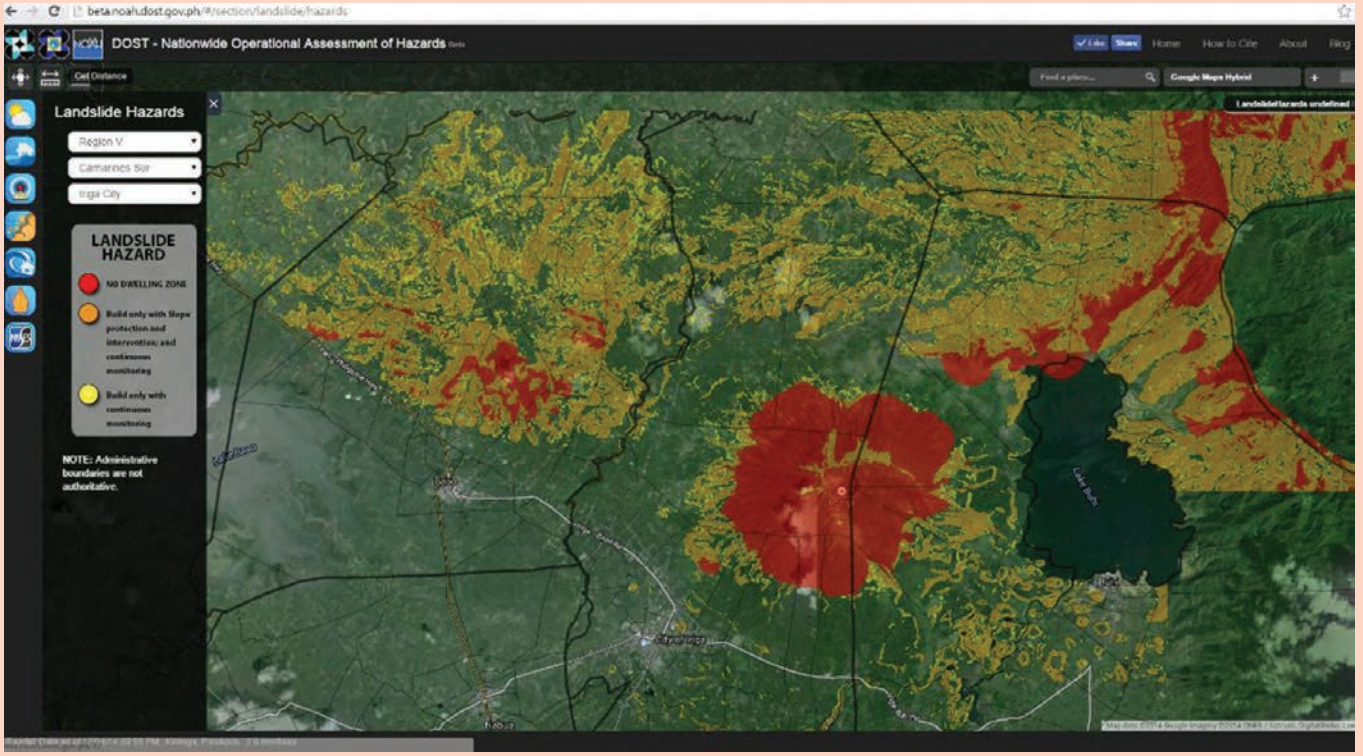
***Priorities for 2017 onwards (Items A to E)***

**A. Observation and Monitoring Networks**

– Development of state-of-the art observation and monitoring systems for weather, climate, geologic and oceanographic processes

1. Weather/Climate observation systems
2. Hydro-meteorological systems
3. Ocean observation systems (including storm surges, waves)
4. Volcano (seismic, geodetic, geochemical)
5. Earthquake (seismic, intensity meter, accelerometers)
6. Tsunami
7. Landslide
8. Sensor networks
9. Space Systems and facilities
   a. Small satellite technology
   b. High- to fine-resolution, multi- and hyperspectral sensor payloads
   c. Synthetic aperture radar
   d. Integration and testing facility
   e. Ground control stations






**B. Technology Development and Application for Monitoring** – Development of instruments and data processing and analysis systems, application of technologies for improved monitoring of weather, climate, geologic, and oceanographic processes.

1. Hydro-meteorological and oceanographic Instruments
2. Volcano, earthquake, tsunami, and landslide monitoring instruments
3. Instrument test bed facilities
4. Radar data processing technologies
5. LiDAR data processing technologies
6. Remote sensing (airborne, space) technologies
7. Data assimilation system for in-situ and remotely-sensed data

**C. Modelling and Simulation for Improvement of Monitoring and Forecasting** – Modelling and simulation for improved forecasting and simulation of disaster and climate scenarios

1. Numerical weather, sub-seasonal and seasonal climate prediction, climate change projection
2. Quantitative precipitation forecasting using numerical weather prediction models
3. High-impact weather forecasting and warning
4. Projecting future 1.0°C and 1.5°C Philippine climate using regional climate models and their impacts to different sectors (health, food security, water resources, etc.)
5. Data analytics and predictive modelling for flood monitoring and management
6. Geophysical, geochemical, geodetic, and related modelling and simulation for geological hazards monitoring and warning
7. Potential for large-scale eruptions, earthquake, tsunami, and landslide generation

**D. Hazards, Vulnerability and Risk Assessment** – Assessment of hazards, development and update of exposure data base, assessment of vulnerabilities of exposed elements such as communities and specific sectors, structures, livelihood and economy, and potential impacts and losses due to natural disasters and climate change; development of appropriate tools for hazard, vulnerability and risk assessment

1. Hazards assessment (geological, hydro-meteorological, climate-related, etc.)
2. Exposure information, database, and tools
3. Vulnerability, capacity and risk assessment
4. Climate risk (by sector)
   a. DRR/CCA for Agriculture (vulnerability to food insecurity, diversified farming, livelihood, impact assessments, food resiliency in emergencies, etc.)
   b. Climate Resiliency of highly vulnerable groups and communities (women, fisherfolks, indigenous people, coastal communities, etc.)

**E. Warning and Communication of Information** – Development and use of warning and information systems and protocols, determination of stakeholder information needs, for improved warning and communication of information of impending hazardous events and impacts for appropriate preparedness and response

1. Warning communication (geological, hydro-meteorological, climate-



related hazards, and impacts)
2. Impact-based/risk-based modelling and forecasting
3. Philippine unified meteo-hydrological information system
4. Web-based and mobile phone-based warning and information
5. Geological disaster information portal
6. Risk communication
7. Community traditional media systems
   a. Expansion of lexical domain (i.e., IEC materials)
   b. Indigenous knowledge systems and practices
8. Communicating uncertainties of climate change projections for DRR/ CCA

*Priorities for 2018 onwards*
(Items F to H)

**F. Technology Development and Application for Climate Change Mitigation and Adaptation**
– Development and application of instruments, tools, systems, protocols to mitigate climate change by reducing greenhouse gas emissions and to adapt to climate change in all sectors, including food, water, health, environment, businesses, infrastructure, and settlement towards a climate change resilient society
1. Reduction of greenhouse gases emissions
2. Bio-fuel from forest residues
3. Energy-efficient products, non-fossil fuels
4. Microbial biotechnology for sustainable waste management and alternative energy source
5. Resource efficient and cleaner production for industries
6. Advanced Transport
7. Food, water, health security
8. Decision management tools for climate change-resilient environment

**G. Technology Development and Application for Disaster Risk Management**
– Assessment of people's hazards, climate change and disaster risk perception, gaps and needs and development and application of appropriate options for risk management, development and application of instruments, tools, protocols, and products in all the phases of risk management, from preparedness, mitigation, response and recovery
1. Stakeholders-needs and disaster-information gap assessment and bridging for disaster
2. Hazards and risk perception or behavior
3. Institutional or social preparedness and response
4. Projections and impact scenarios for preparedness to respond and recover
5. Interactive and dynamic platform for products and services
6. Tools (including software) for mainstreaming DRR-CCA into contingency planning and local development and planning process
7. Technologies and products for disaster mitigation (disaster-prone) and recovery (disaster-stricken) of communities
8. Technologies for addressing drought (i.e., cloud seeding)
9. Climate and disaster resilient infrastructure
10. Climate and disaster resilient livelihood / business (business continuity)
11. Gender equality and integration in science and technology for DRR and CCA partnership

H. Policy Research – Development of policies for climate mitigation and adaptation and disaster risk management
1. Policy research for climate change mitigation and adaptation
2. Policy research for disaster risk management

For details, visit http://www.phivolcs.dost.gov.ph/ http://www.pagasa.dost.gov.ph/

# Unearthing health gems in Negros Island

**BY DR. CHRISTINE C. HERNANDEZ**
*Institute of Chemistry, UP Diliman*

*“...it is time we divert our attention to mining these ‘health gems’ from our own backyard.”*

We may still be behind our Asian neighbors in the area of drug discovery and development. But with our abundant natural resources and growing pool of skilled researchers, the Philippines has a chance. And it is time we divert our attention to mining these “health gems” out of our own backyard.

A few years ago, the DOST-Philippine Council for Health Research and Development started to fund programs for drug-discovery. The gist of the programs is simple: Look for potential drug candidates from plants and other organisms found in the Philippines.

One of these programs is called Discovery and Development of Health Products (DDHP) which started in 2013. Under this program are joint projects between two institutions. The program aims to build a library of plants, develop a unified extraction protocol, and create a bioassay facility where the extracts will be subjected to different tests. Said tests are meant to see if the extracts potentially contain compounds that can be further developed into a drug.

One of the projects under DDHP is called Herbal Extracts from Negros Island for Bioactivity and ADMETox Assays. This project is a collaboration between the Institute of Chemistry in UP Diliman and Herbanext Laboratories, Inc. This project is hailed as one of its kind within the DDHP program as it teams up a state university with a private institution.

Herbanext Laboratories Inc., headed by Paul Felipe Cruz, will be responsible for preparing around 300 extracts from various terrestrial plants found in Negros Island. The company was established in 2002 initially as a nutraceutical and functional food manufacturing company.

Primary Forest in Negros Island (above); Propagating botanical garden specimen for DDHP Project; project staff in Herbanext Laboratories, Inc. with Paul Felipe Cruz (middle, lower-right photo),

Meanwhile, the Institute of Chemistry in UP Diliman is responsible for setting up a bioassay facility that will test extracts for anti-hypertension, anti-gout, anti-inflammatory, cholesterol-lowering, and fat-blocking activities. This team is headed by Dr. Christine C. Hernandez who currently heads one of the natural products laboratories in the Institute of Chemistry in UP Diliman. She has several similar projects under her belt.

The tests are often called assays in natural products labs like Dr. Hernandez's. Assays, like any other analytical procedure, are developed to assess the presence and/or amount of a target compound (commonly called analyte in Chemistry), except that assays are more common in medical, pharmacological, or biochemical laboratories.

In this project, the assays are enzyme-based. Enzymes are biological compounds (proteins) that allow certain chemical reactions in the body to occur faster. Many of the drugs available in the market today are enzyme inhibitors, which means that these drugs prevent or decrease the activity of enzymes. By inhibiting or preventing the activity of enzymes, a pathogen can be killed or a metabolic imbalance can be corrected. The project only does in vitro assays as of the moment, meaning all assays are done outside a living organism.

Preparing and testing 300 extracts seem to be overwhelming but Cruz and Hernandez willingly accepted the challenge. Their hardest challenge so far was how to acquire the materials and equipment they need in the most efficient way. Most of the equipment and materials they need were mostly available outside of the country but this did not stop them from meeting their objectives. Since the project started, the team had acquired most of the equipment they need for preparing plant extracts. The current bioassay facility of the project houses two microplate readers, the most important equipment in analyzing the plant extracts.

According to Cruz, this is not their first DOST project. A few years back, Herbanext established an extraction and spray-drying facility in Bago City, Negros Occidental with assistance from the DOST SETUP program.

But joining the project under the DDHP program was a vital step for Herbanext to broaden the company's appreciation of Philippine medicinal plants, and enhance its research competency and capability. Joining the project also meant the opportunity of working with and learning from some of the country's top natural products researchers. The long-term goal of this project is "to develop herbal products," as Dr. Hernandez puts it simply.

And if things go as planned, herbal products might not be the only end-product of this project but also more livelihood farming of medicinal plants in Negros Island.

*(Editor's note: This article was written by the research team in early 2015 and was intended for publication in "Bridge", the compendium of DOST-supported R&D stories for 2010-2015)*

By KENNEDY N. BONGON, JME CHUA
WEST PARAISO and MARCO NEMESIO E. MONTAÑO
Seaweed Chemistry Laboratory
Marine Science Institute, University of the Philippines Diliman

# Expanding carrageenan market through product development

***Carrageenan serves as an indispensable ingredient across the food, drug, and cosmetic industries. These industries are consumer driven and earn billions of dollars. Fortunately, our country captures a share of these industries by supplying carrageenan.***

Carrageenan serves as an indispensable ingredient across the food, drug, and cosmetic industries. These industries are consumer driven and earn billions of dollars. Fortunately, our country captures a share of these industries by supplying carrageenan.

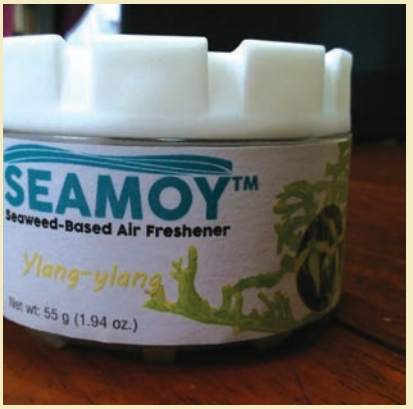
Meanwhile, Filipinos go to groceries to buy stuff like ice cream, jellies, chocolate milk drinks, toothpaste, air-freshener gels, and cosmetic products. Perhaps just a number know that these products all contain seaweeds.

Some seaweeds contain a natural gel substance known as carrageenan. Carrageenan is an ingredient that makes dairy products like ice cream and chocolate milk drinks more creamy and rich. Jellies, sanitary pads, and air freshener gel require carrageenan to hold their shapes and structure. Toothpaste and cosmetic products need carrageenan to bind other ingredients. Some medical drugs are covered in gel capsules made from carrageenan.

The Philippines with its long coastline farms seaweeds that contain carrageenan. In fact, five years ago the country led in supplying carrageenan worldwide. However, other countries such as Indonesia now lead the global supply of carrageenan as reported by the Seaweed Industry Association of the Philippines.

The Department of Science and Technology intervened to address the problem. Academic experts from the Marine Science Institute of the University of the Philippines were tapped to solve the issue. This institution has established the technology in obtaining carrageenan from seaweed in the 1970s. Its expertise has brought the then lowly seaweeds into an essential ingredient of worldwide importance. Today, its competence is called once more to rise with the challenge.

A project was conceptualized with the efforts to strengthen and help the Philippines regain the top spot as the leading exporter of carrageenan. This project aimed to develop


new possible products with more value using carrageenan to serve the growing food and cosmetics market. Moreover, it also targeted possible uses of short chain carrageenan for drug development to prevent or cure various diseases. The long-term goal of the project was to expand products containing carrageenan at a lower cost. This goal could be achieved through commercialization of the products to be developed; hence, the need to boost the carrageenan requirement for local and export needs.

A team of researchers composed of a chemist, a food technologist, and an industrial pharmacist was formed to carry the goals of the project. The team has been developing value-added commodities in parallel with the requirements for healthy and safe goods.

Some value added products includes gummy jelly with enriched vitamins and minerals. The gummy jelly is intended for younger public consumption to support their nutritional needs. Likewise, jellies with herbal extracts are developed for adults and the elderly. Personal care and skin care products have also been developed from carrageenan such as deodorant, moisturizer, beauty creams, and ointment. An air-freshener that is environment friendly has also been made from raw dried seaweeds.

These products are currently under application for intellectual property rights. The application is done to safeguard the interest of the government and the seaweed industry as part of knowledge management practices.

The researchers also studied short chain carrageenan for possible cure against viruses. Moreover, the potential of this short chain carrageenan was analyzed for disease prevention. Among the target diseases that can potentially be prevented by this short chain carrageenan are cancer and heart ailments.

The team encountered several problems in achieving its goals. Chief among the problems is marketability and commercialization of the products. The Office of the Vice-Chancellor for Research and Development of the University of the Philippines helped in marketing the products. The office attended several trade and science fairs to hasten the commercialization of the products. Through trade and science fairs, the products were exhibited to potential investors for possible large-scale production.

Among the value-added products, the environment friendly air-freshener (with the trademark Seamoy™) is currently on negotiation with an international company for possible technology transfer. The product is marketed as all natural and eco-friendly. This marketing strategy is in line with the consumer needs for greener products.

The products made from this project are of great value in extending the use of carrageenan as ingredient in various products across different markets. The project was completed in mid-2015. The team is optimistic that the products can be commercialized for public use. With the continued commitment of the government, the Seaweed Industry Associations of the Philippines, and the academe, the goal towards commercialization can be accomplished. It is with great hope that the fruits of this study may help our country recapture the top spot of the world carrageenan market.

*(Editor's note: This article was written by the research team in early 2015 and was intended for publication in "Bridge", the compendium of DOST-supported R&D stories for 2010-2015)*

# Improving flood warning using LiDAR

**By ALAN E. MILANO**
LiDAR 1, MSU-IIT

***Preparednessa d ea lyw a ningof a incomingf loodi sa b tters olutiont ha focusingon r escue effortsw hent he floodc omes.***

We commonly experience flooding. This is because our country is a major pathway for typhoons and with topography dominated by steep slope mountains, narrow flood plains, and loose soils that gets easily detached during heavy rains. This is made worse by the decreasing forest cover and climate change. According to reports, an average of 20 typhoons visit our country yearly, most of which pass through Visayas and Luzon, and recently with increasing occurrences in Mindanao. The effect of destructive typhoons is tremendous loss on lives, properties, services, and livelihood. One horrible example of this was Typhoon Sendong which hit Cagayan de Oro City and Iligan City last December 17, 2011, leaving more than 2,000 people dead and many missing. The effect of that typhoon shocked not only the Filipinos but also the whole world.

A key ingredient in keeping us safe from flood is for us to avoid the exposure to flooding. Flood avoidance requires our ability to accurately predict flood. Flood prediction means that when the amount of rainfall, land cover and soil is known, we should be able to know in advance when flooding comes, which area will be flooded, and how deep the flood will be.

Flood prediction is a tall order. But this is made possible through the technology called LiDAR (Light Detection and Ranging). LiDAR emits a radar impulse and as the impulse is bounced back, it is stored and processed into high resolution Digital Elevation Models (DEM). A DEM is a pictorial representation of an elevation (height) data. DEMs generated from LiDAR are used in tracing in detail the flow and direction of water brought by rain. The DEM Raw data is acquired via a LiDAR equipment mounted in an airplane.

The DEM Raw data are then preprocessed using imaging software. This involves replacing the embedded data with the stream data gathered in the actual measurement of the river depth and cross section at 100 to 200 m interval. This actual field measurement which is called the bathymetric survey serves as the base point by which the flood model is calibrated.

LiDAR data processing

Courtesy call at Lala Municipality

Reconnaissance survey at Maranding river

In bathymetric survey, the depth and flow of the river are measured at a point with some distance from the river mouth during rainfall and non-rainfall events. When there is no rainfall, the river is measured an hour in the morning and an hour in the afternoon with an interval of 10 minutes. When there is rainfall, the duration was varied depending on rainfall duration and the rising, peaking and receding of the river depth. The observation interval is 10 minutes.

When all the data are in, we run a flood model using four softwares. The flood model will show the extent, depth, and volume of the flood. Finally, possible losses to lives, properties and livelihood due to flood are quantified and identified using the LiDAR derived DEM, ortho photomaps, and survey questionnaires.

Some challenges we face are the unavailability of automatic rain and stream gauges in some assigned areas. This impedes us in collecting hydrologic data. Second, the rain gauges are not properly placed to result in early warning. Lastly, rainfall is so unpredictable, hence, we have a problem in the estimating the river flow.

In order to address the above challenges, we need to constantly coordinate and follow up with the assigned agencies (DOST and PAGASA) responsible for the installation of rainfall gauges. We also needed to establish an active linkage with the local government units (LGUs) and to the local data collectors to get a real time update on the weather status and to increase the probability in capturing rainfall events.

By the end of 2016, we intend to empower the LGUs and the local barangays in the assigned selected areas of Iligan City, Lanao del Norte, Misamis Occidental, and Zamboanga del Norte in the use of the data derived from LiDAR. Thus, the local officials can give early warning to the people during possible flood and they can execute evacuation plans.

Preparedness and early warning of an incoming flood is a better solution than rescue efforts when the flood has already inundated areas. More lives will be saved when we are prepared and properly informed.

*(Editor's note: This article was written by the research team in early 2015 and was intended for publication in "Bridge", the compendium of DOST-supported R&D stories for 2010-2015)*

Baseflow measurement at Oroquieta City river basin

Baseflow measurement at Oroquieta City and Clarin rivers

# Sen. Legarda keeps up support to DOST's local tropical fibers

By **RODOLFO P. DE GUZMAN,** *DOST-STII*

**Chic uniform.** Senator Loren Legarda looks at the chic office uniform of polo-barong made from tropical fibers developed by the Philippine Textile Research Institute (PTRI) of the Department of Science and Technology. PTRI Director Celia B. Elumba (right) who heads the PTRI FABulous @50 Exhibit at the Philippine Senate said that this exhibit is just one of the activities lined up for the year in celebration of the institutes golden anniversary.

A known advocate of ethnic textile and clothing, Senator Loren Legarda recently congratulated the Philippine Textile Research Institute (PTRI) of the Department of Science and Technology (DOST) for the Institute's untiring work in developing new technologies and promoting the use of natural fibers for clothing and fashion accessories.

Legarda witnessed the fashion creations of different well-known designers in the country as they showed off their unique designs using local natural fibers during the 50th anniversary celebration of DOST-PTRI called FABulous @50, TELA Pilipinas: Beyond Gold held at the Philippine Senate, GSIS Building in Pasay City.

Senator Legarda said that using natural fibers empowers indigenous peoples communities to put their traditional arts and crafts like the *ikat*, the *t'nalak, abel iloko*, the *piña*, and others in the mainstream textile industry.

"We are very grateful for all the support that Senator Legarda has been giving PTRI especially in promoting local textile and in particular the passage of the law on mandating the use of Philippine tropical fibers as government office uniforms. Now, on our 50th year anniversary we are pushing for the promotion of natural fibers and natural dyes from non-traditional sources that are abundant in the countryside," stated PTRI Director Celia B. Elumba.

Exhibited were works of designers who have been PTRI's partner-collaborators for the past years. One of these is Jean Avellanosa-Dee, fashion and textile designer from the DLSU-College of St. Benilde, who showed her "Di-Matinag" (Unwavering) design based on the fashion trend of the 1960s. It is a design using the custom-made fabric of the cotton-abaca blend and handwoven in an ikat-binakol technique.

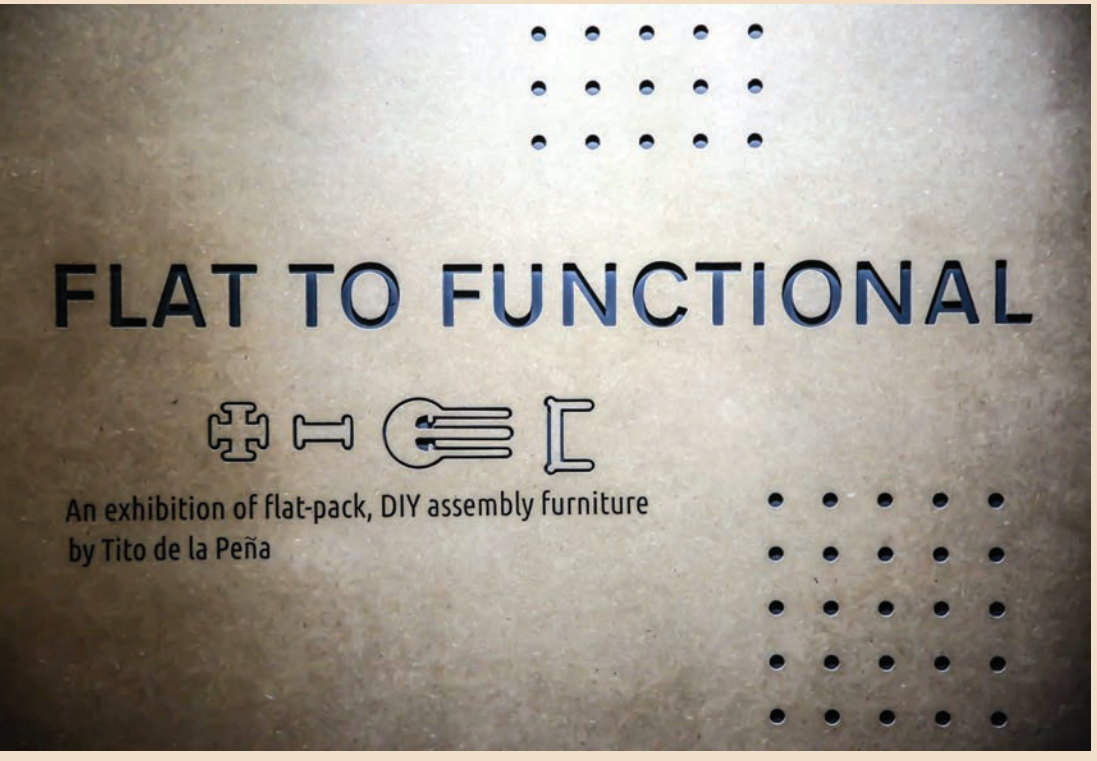
Meanwhile, island wear fashion designer Twinkle Ferraren showed her creations that used natural and indigenous materials with her modern take on the "polo-barong", a staple office wear made from pineapple-abaca-cotton-silk fiber naturally dyed using colorants derived from the talisay *(Terminalia catappa)* tree.

Also on exhibit were Narda's Naturals coming from the highlands of the Cordilleras. Its creative director, Lucia Capuyan-Catanaes, came up with a new product line composed of shawls, ponchos, and fabrics made from homegrown cotton blended with abaca/pineapple leaf fibers and colored with natural mahogany, turmeric, and cogon dyes.

The use of Philippine tropical fibers is fast gaining momentum in the local textile scene with more fashion designers using natural materials like abaca, pineapple, cotton, and silk fabrics for their creations. These locally available materials are woven by indigenous people from different communities in the country.

The PTRI TELA Exhibit was also visited by Senator Cynthia Villar and different stakeholders, such as officials from the National Museum and other textile organizations. (Photos by Gerardo Palad, DOST-STII)

Fortunato B. de la Peña, Jr. with his creations




## Marriage of science and art

# Science empowers the creative arts through research and useful applications

By **ALLAN MAURO V. MARFAL,** *DOST-STII*

**Science and art do mix, and when they do, the result is creativity that empowers people.**

Pieces of art in the form of easy-to-assemble furniture, on exhibit last March 10-27 at the College of Fine Arts of University of the Philippines, used science and technology for their unique and baffling designs.

The artists, who were also faculty members of the said college, shared their finest works to the viewing public, including Fortunato B. de la Peña Jr., more known as "Tito," who teaches industrial design in the university.

For more than an hour, Tito toured this writer around the exhibit area and shared with me a few details about his art works and that of his co-faculty members. He also talked extensively about easy-to-assemble furniture that he designed and manufactured for the exhibit. All throughout our conversation, I only have admiration for the artworks that I viewed.

Knowing well that I am a science writer, Tito told me how various applications of science and technology (S&T) could help in promoting and enhancing the works of our Filipino artists.

"Actually, Filipinos are naturally creative. We just need to empower them in several ways. For example, in my case, the availability of technology and equipment to make my furniture designs more accurate and efficient is very crucial so it will become useful for the people," Tito said.

He related that an artist has the freedom to express his ideas, find his subject, and convey his preferred message. But aside from the aesthetics, it is also important that creative works provide long-term usability which, he said, can be provided by some useful applications of S&T.

### FLAT TO FUNCTIONAL

For more than two weeks, Tito has allowed the public to see and appreciate his designs he called "Flat to Functional" featuring easy-to-assemble furniture.

So, what does "Flat to Functional" furniture design offer?

It basically provides practical solutions to people who are looking for affordable and ready-to-use goods. Because of digital design development and production, people can have the flat-pack furniture design at a reasonable cost- plus no long waiting time, as it can be implemented quickly.

Because of its easy-to-transport features, the Tito's furniture design can be transported to disaster-stricken communities and other offsite places.

Design prototypes featured in the exhibit were 12 sets of furniture for everyday use. The goal, according to Tito, was to produce furniture that do not require adhesive bonding or hardware fasteners. This was achieved by the artists by exploring interlocking joineries. All of his easy to assemble furniture design is made from medium-density fireboard or MDF.

Tito explained that he wants to explore the flat pack model because it is widely used in furniture designs that are mass produced.

"I would like to explore it in a way that I would be able to create my own furniture designs--just like in architecture--called 'joint phase,' in which you don't need to use any tool or hardware to create," he said.

"So I explored the different kinds of joints, then I combined them with the flat pack idea to come up with my furniture thesis. I made use of computer-aided designs and computer-aided manufacturing," he added.

Tito related that though he has previous experience in designing furniture, he has not yet made one for himself. So in order to get on with his project, he made use of Fab Lab which pertains to a place inside their college where the faculty members and students develop their ideas and designs using different machines.

"I used computer-aided designs to develop the thesis and draw the cutting plans. After the design, it is forwarded to CNC router which is responsible in cutting the pieces," he explained.

### DIGITAL DESIGN WORKFLOW

Another tool that he is using to finish his thesis is the so-called "Digital design workflow in the product development."

"The use of Computer Aided Industrial Design (CAID) made the development process very dynamic as it allows efficient evaluation and iteration of designs. I also used a computer-aided manufacturing method called Computer Numerical Control (CNC) router and laser to rapidly produce prototypes. In essence, it is a digital method of production," Tito elaborated.

He also added that in the future, he will need assistance in testing the load capacity of the structure and the

strength of the materials. He also hopes to explore CNC technology and materials manufacturing, and be able to turn waste materials into viable material for furniture.

## USEFUL IN INFRASTRUCTURE PROJECTS AND GOVERNMENT PROGRAMS

As "flat to functional easy to assemble furniture" can be conveniently assembled and transported from one place to another, Tito emphasized that it would not only benefit residents of flood-prone areas but also various infrastructure projects.

"In conducting this study, I have also discovered that you can also apply it in infrastructure, like building, expanding or remodelling a house. It's easier-- you just need to clip the parts, you just need to follow the instructions in the manual," he related.

To some extent, Tito also sees his designs as a useful tool to some government programs that deal on disaster preparedness, relief operations, ion, and housing projects.

## GUITAR MAKING IN THE COUNTRY

It is not only in furniture design that S&T play a pivotal role but also among local guitar makers that build high quality and affordable classical guitars.

The Department of Science and Technology (DOST), through its Philippine Council for Industry, Energy

and Emerging Technology Research and Development, funded the research project of University of the Philippines (UP) College of Music called "Gitara ni Juan."

According to its project leader, Professor Nathan Manimtim of UP College of Music, the project aims to help local guitar makers improve their craftsmanship, their use of technology, and their livelihood by producing quality and affordable local guitars. It is also designed to provide Filipino classical guitar players easy access to quality yet affordable classical guitars made in the country.

But due to inadequate capital of small-time luthiers, they often rely on plywood to make guitars, which, in turn, compromises the quality of the musical instrument. Mainstream Pinoy guitar makers use jackfruit, narra, and Blackwood ebony while imported guitars are made of spruce, cedar, and rosewood which are considered as hard woods known for durability and ability to produce quality sound. But guitars made of these woods are costly.

According to Manimtim, the top portion of a classical guitar should be made of a soft wood. Its back and side areas, he said, should be made of hardwood or other sturdy types of wood. The neck area of the guitar should also be made of hardwood because, if not, it might fall apart from its body when it's being played, as the force of the strings will overpower the neck. He added that the strings can be purchased at various music stores.

"We would like to look for local wood suitable for classical guitar because we are rich in wood resources. We use other types of wood so we need to adjust the design in such a way that it syncs on how our wood moves," he said.

Bernice Go, a musicologist and a member of Gitara ni Juan project, has also shared the steps they are taking to proceed with the project.

"We are looking for a high quality wood on which we will make and standardize an appropriate design," she said. "We have also developed a compendium or manual on which we will compile everything. Afterwards, we will share it to anyone who is interested with our findings," she said.

In order to achieve this, DOST through its Forest Products Research Institute (FPRDI) provides technical assistance in identifying and selecting necessary wood species and machineries in drying wood samples; providing data on the wood properties of the timber species to be tested; and orienting the researchers on the current forest policies regarding restricted and legally available timber species for the wood-based industries.

"We make guitars, but we lack testing. We just use sound test. We allow our guitarists from the UP College of Music to use it. Actually they have read from literature that there are studies made by FPRDI. Afterwards, we have identified the types of wood that can go well with stringed musical instruments," said Forester Robert Natividad , a supervising research specialist at FPRDI.

Ferdie Medina, founder of Sparrow Music Learning Center based in Payatas , Quezon City shared his satisfaction about the Gitara ni Juan prototype design.

"When Gitara ni Juan prototypes were finally made, I said, here is the appropriate measurement. It is beautiful. It feels good when you touch it. Here is the right measurement for my hands, for my height, for the height of a typical Filipino," he said. "The sound produced is very promising, considering that we are just in the initial phase of the project in which we use local wood," he added.

The creative arts industry in the Philippines can definitely prosper even more through the use of S&T. (Photos by Allan Mauro V. Marfal and Henry A. de Leon, S&T Media Service, DOST-STII)

**When Fusarium wilt, also known as Panama disease, wiped out their banana plantation, the Cruz couple and their workers almost gave up, until a DOST study helped them get back on their feet again.**

# Bananas gone bananas? How ComVal farmers fought the deadly Panama disease

By **ARISTOTLE P. CARANDANG, PhD**, *DOST-STII*

Cultures of Fusarium wilt at the USeP laboratory

Newly planted Giant Cavendish Tissue Culture Variant (GCTCV) 219 variety that is resistant to Fusarium or Panama Disease

Fifty-seven-year-old Manang Bebeng has been planting bananas for as long as she can remember.

She is Ma. Natividad C. Cruz married to Benedicto "Manong Ben" P. Cruz. The couple tends their 17-hectare farm planted to banana in Nabunturan, Compostela Valley in the Davao Region of Mindanao. This husband and wife team takes care of a band of 37 workers which also include a number of lumads (non-Muslim indigenous people in the southern Philippines).

For this group of happy people, life was simple and almost problem-free until the dreaded Panama disease or Fusarium wilt eradicated almost all banana plantations in Southern Mindanao in 2012. It was a horrible experience for them. "We almost gave up and thought of quitting," shared Manang Bebeng. The banana variety (Grand Nain) they produce such as cavendish, are mostly for export to Japan, Middle East, and other countries.

Fusarium wilt of banana is a deadly fungal disease caused by the soil-borne fungus *Fusarium oxysporum f. sp. cubense* (Foc).

## TOWNSFOLK, INDUSTRY SUFFERED HEAVILY

It was like a thief cloaked in darkness in the middle of night. Everyone was unaware. Nobody was prepared. Ironically, the infestation came at the time they were rehabilitating their farm after it was devastated by typhoon Pablo in 2012. "As we were replanting, the disease spread so fast that, in no time, the entire plantation was infected," narrated Manang Bebeng.

"Little by little, the banana plants started to wither – leaves collapsed one by one and the pseudostem base split," Manang Bebeng shared. The pseudostem is the part of the banana plant that looks like a trunk. It is formed by the tightly packed overlapping leaf sheaths. And everything withered away. Manang Bebeng said, "We could not do anything."

The farmers actually noticed that the first sign was the yellowing at the margins of older leaves which advanced towards the midrib. They said that the leaves turned brown and became dry. What they saw as symptoms of the disease spread progressively from older to younger leaves until only a few of the youngest leaves remained green and standing. In time, all leaves collapsed.

Daisy Saren and Aldren Paguia, together with the other workers in Manang Bebeng's farm, also shared the sad experience. They said that when the disease started to affect the plantation, they were really devastated. But even amid all the confusion, they were able to manage to hold onto their faith, believing that something good shall emerge in the days to come.

It was a big blow not only to the farmers. What used to be a vibrant industry that was positively contributing to the local economy was gravely affected. It was as if panic ensued.

Data reveal that cavendish banana constitutes 50 percent of the country's banana production and provides

One of the workers in Manang Bebeng's farm

employment to almost 330,000 Filipinos. The incidence of Fusarium wilt caused by *Fusarium oxysporum f. sp.cubense* (Foc) Tropical Race 4 (TR4) in 2012 threatened the million dollar export industry of the Philippines.

Cavendish somaclones were imported from Taiwan and tested on Philippine soil. Somaclones are plants produced through tissue culture. Two of the introduced somaclones showed promising performance in terms of productivity and market acceptability. These are the Giant Cavendish Tissue Culture Variant (GCTCV) 218 and 219. GCTCV 218 produces fingers and yield that are almost similar to Grand Nain (GN), the more popular variety among the banana farmers, at an average of 25 kg/bunch. It was observed that Grand Nain averages 30 kg/bunch). GCTCV 219, on the other hand has relatively lower yield at an average of 18 kg/bunch but is sweeter and can be marketed as highland banana. But sadly, Grand Nain could not withstand Fusarium wilt.

Reports from the ground said that application of commercially-available microbial agents like Trichoderma harzianum enhances action against Foc TR4 in GCTCV 218, a moderately resistant somaclone, while GCTCV 219 which is very resistant to Fusarium wilt no longer requires microbial agents even in infested soil.

## DOST AND FRIENDS

In the midst of the epidemic, concerned government offices immediately sprung into action. On the part of the Department of Science and Technology, assistance came in the form of study on developing disease-resistant varieties that can help farmers go back on their feet.

The DOST's instantaneous response was the approval of the project "S&T Management Approaches against Fusarium Wilt [*Fusarium oxysporum f.sp. cubense* (Foc)] on Cavendish in Mindanao." It was a three-year research and development (R&D) program with one-year extension that was funded by DOST-Grants in Aid (GIA) and DOST-Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (PCAARRD) GIA.

The program was implemented in 2012 to address the alarming epidemic affecting the banana industry in Mindanao through the University of Southern Philippines, Bureau of Plant Industry – Davao National Crop Research, Development and Production Support Center (BPI-DNCRDC), Southern Mindanao Agriculture and Resources Research and Development Consortium,

Workers sharing their story about Fusarium wilt and how they bounced back

Southern Philippines Agri-Business and Marine and Aquatic School of Technology, and Institute of Plant Breeding - University of the Philippines Los Baños from April 2012 to March 2016.

It has three project components that assessed the adaptability of GCTCV somaclones from Taiwan against Fusarium wilt that determined the efficacy of commercially available biological control agents against Foc TR4 and developed strategies to effectively deliver these agents to the soil. Through the project, the distribution of Foc TR4 in Mindanao was also mapped to serve as basis for strict quarantine implementation in the future. The partner instituions have been combating Fusarium wilt through a wide array of possible biological controls.

Manang Bebeng shared that at the height of the Fusarium wilt infestation, when they were about to give up, the DOST came in and chose them as one of the farmer-cooperators. The DOST gave them about 1,800 seedlings of the two Fusarium-resistant varieties. They were happy that they were able to harvest again and maintain the workers who were fully dependent on the banana plantation. To date, they remain hopeful that more seedlings can be shared to them so that they may fill the big gap in the market as a result of the infestation. She said that a little over half of their farm is already planted to the resistant-varieties and harvest continues.

The benefits of the resistant varieties are deemed to have great impact to the lives of the farmers and the industry as well. Areas infested with Foc TR4 can be planted with GCTCV 218 and 219 to become productive again; while those with moderate infestation of Foc TR4 and can still grow.

## FROM THE EXPERTS' LENS

The three Fusarium research project leaders were Dr. Lorna Herradura, center chief of BPI-DNCRDC in Davao City; and Prof. Belly T. Dionio and Dr. Virgie P. Ugay of USeP.

Experts say that the fungus enters the plant through the roots and colonizes the xylem vessels, blocking the flow of water and nutrients. As the disease progresses, the leaves start to collapse at the petiole – the transition between the stem and the leaf blade. Then, there is the splitting of the pseudostem base resulting in the death of the plant eventually. On some varieties the stems split as well. Internally, brown, red and yellow rings appear in the stem, at first at the center and later, in cases of severe infection, spreading throughout the stem. Suckers may also show symptoms. Eventually, the plants die. Once established in a field, the fungus persists in soil for an indefinite period of time and cannot be managed using chemical pesticides. The solution best adapted to the continued production of bananas in infested soils is replacing susceptible cultivars by resistant ones.

Fusarium wilt is the first disease of bananas to have spread globally. But in the Philippines, we have already proven that we can fight this deadly banana disease through R&D. The earnest efforts of our scientists have helped our banana farmers regain their footing in the industry

# Antiqueño MSMEs receive DOST technical assistance

**By LIEZL M. LAMASAN**, *DOST-VI*


DOST Secretary Fortunato de la Peña (middle) leads the granting of technical assistance to MSMEs in Antique. Joining him are DOST VI Regional Director Rowen Gelonga (sixth from left) and DOST-Philippine Textile Research Institute Director Celia Elumba (leftmost). (LMLamasan)

**SAN JOSE,** Antique - The Department of Science and Technology (DOST VI) through the Antique Provincial Science and Technology Center granted six micro, small, and medium enterprises (MSMEs) with technical assistance under its Small Enterprise Technology Upgrading Program (SETUP).

Among of the beneficiaries include CMYK Test Print Advertising and Supply, Process Foundation Panay, Inc., MEEMM-JON Malunggay Products, Jomil 21 Peking Duck Poultry Farm, Servano Bakeshop, and Middle East Furniture Manufacturer.

SETUP, one of DOST's banner programs, seeks to address technological constraints through technical assistance for the upgrading of production facilities, technology trainings, and consultancy services.

This package of S&T interventions is geared towards improving product quality, production efficiency, good manufacturing practices, and generating employment.

Under this program, the beneficiaries repay the total cost of the financial assistance to the government for three years without interest.

SETUP boosts its efforts on food processing, furniture, gift, decors and handicrafts, aquatic and marine, horticulture/ agriculture, metals and engineering, information and communications technology/Electronics (ICT), and health products and services.

For 2017, some 25 MSMEs in the region will be granted with technology upgrading assistance amounting to PhP38,200,000.00. These MSMEs are bound to intensify the country's labor force, generate innovative products and services that cater to global and domestic market, and likewise serve as key players in stepping up the value chain of the business sector.

The granting of the financial assistancewhich gathered some local government units (LGUs), technical experts, national government agencies (NGAs), and students, was conducted during the Technology Forum held in line with the conduct of the 2017 Technology Caravan.

# DOST develops Tuburan coffee packaging


**IF THERE** is anything brewing in Department of Science and Technology (DOST) Cebu nowadays, it is on how to make Tuburan ground coffee hot. This is not about temperature but about packaging coffee grounds to make it more competitive in the local and global market.

"We designed the label and developed the appropriate packaging for the Tuburan Coffee," DOST Cebu Provincial Director Engr. Tristan Abando revealed.

From transparent stand-up pouch plastic packaging, Tuburan coffee now sports a more elegant black opaque, matte-finish, stand-up, zip-locked, aluminum composite plastic, Dir. Abando said.

DOST-Cebu has been shouldering the cost of the packaging materials since the initial coffee production as part of the Accelerated and Sustainable Anti-Poverty Program (ASAPP) team.

"The DOST team is continuously studying on how can we further improve the coffee packaging to extend its shelf life and to make the product world-class," Engr. Abando added.

Engr. Abando said that improving the Tuburan Coffee packaging for the world market is one of DOST's initial assistance that would benefit the coffee farming communities in Tuburan. ASAPP is spearheaded by the National Economic and Development Authority which convened government agencies & stakeholders to help improve and develop the local Tuburan coffee as a poverty reduction program.

DOST 7 Regional Director Edilberto Paradela pointed out that the Tuburan Coffee project is a showcase of the maximum impact of the convergence of different government agencies through ASAPP to improve an industry. Engr. Paradela cited that the significant contributions of the different government agencies and other stakeholders are very critical in making the Tuburan Coffee program successful.

DOST is currently allocating funds for the technology upgrading of the current coffee production and for further packaging improvement through its ASAPP's counterpart program, the Community Empowerment through Science and Technology.

"Currently, the coffee production in Tuburan is still small-scale. We are now studying on how to boost its production capacity through equipment and skills upgrading," Engr. Paradela added.

Engr. Paradela also commends the Municipality of Tuburan through Mayor Democrito Diamante, Jr. for its efforts and commitment in making this breakthrough of developing a Cebu homegrown coffee product. From a mere 500 hectares in nine barangays in Tuburan, Cebu, the industry now spread to 2,850 hectares in 16 barangays of the town. About 1,000 farmers in Tuburan, Cebu, are now enjoying the fruits of the government-assisted coffee plantation. (By S&T Media Service, DOST-VII)

## Making technology work in the biz

# A stitch in time

By **LIEZL M. LAMASAN**, *DOST-VI*

**This clothing company is now able to thread more products into its line up thru technology upgrade.**

**FOOD. SHELTER.** Clothing. These three are known as the basic needs in quest of survival. Of the three, clothing weaves unique patterns such as designs that endure the test of time.

One firm that mastered the nitty-gritty of clothing apparel is Cefekur Garments Industry. From designing to lay outing, sewing, stitching and so on, the success of this Oton, Iloilo-based company is largely due to passion, determination and innovation married with technology.

Mrs. Feliciana Valencia, the proud owner of Cefekur, recalled how the business kicked off in 1991.

"We started as sub-contractor with five sewers using an ordinary machine to cope with the embroideries. We also used some borrowed sewing machines to produce school uniforms, T-shirts, and lab gowns."

While her husband formed intricate designs, Feliciana worked closely with the staff ensuring that the products are of utmost quality.

In 1995, they bought edging machine and sewing machines. Five years later, Feliciana resigned from her work and helped her husband in managing the business. They began to specialize in sportswear which they supply during congressional district meets.

The company's products and services include printing, stitching, and embroidering garments. Today, Cefekur's star product is sportswear which includes jerseys and shorts.

"We chose garments because my husband has a tailoring shop from the family and he has the skills when it comes to design. When Cefekur grew, our customers demanded T-shirts and sportswears until some local government units (LGUs) from the first district and other towns required us to make sports uniform for the Congressional District Sports Association Meet."

Cefekur also went through tough times which spell opportunity loss. These range from electricity and machine failure, and poor maintenance. It also experienced difficulty to cope with the volume demand and distribution delay.

But it was fortunate that, through word of mouth, the company learned of the various assistances provided by the Department of Science and Technology through the Small Enterprise Technology Upgrading Program (SETUP).

Cefekur readily prepared a request which DOST approved within a month. Under the project entitled "Product and Process Improvement of a Gift and Décor Production Facility for Cefekur Garments Industry", the firm was able to enhance and upgrade its production process.

The services became possible through DOST's technical assistance on equipment upgrading such as the purchase of computer embroidery and industrial sewing machine.

"With regard to the quality that we have, we can already compete in the national level. In terms of embroidery, we're proud to say that ours is computerized and same goes with our industrial machine."

By tapping S&T experts and industry practitioners, Cefekeur was able to avail of technical consultancy programs on Energy Audit and Cleaner Production. These consultancy programs are excellent platforms in advancing scientific solutions that translate to positive socio-economic and industrial impacts.

With the help of these innovations, Cefekur now ensures product quality and efficiency, as well as increased sales and volume production, and job generation.

This development encouraged the owners to expand their product line to include personalized gifts and souvenirs. They also have caps, mugs, and other customized products.

Although there have been numerous businesses in Iloilo, Cefekur Garments Industry still stands as one of the most steadfast in the industry. No doubt, a huge appreciation goes to science and technology for making the business work.

# Food talk reveals opportunities for MIMAROPA entreps

by **PATRICIA O. CALORA**, *DOST-MIMAROPA*


Stakeholders of the food industry gather in the ADMATEL Lecture Room to learn about the technologies and potential products of the Food Innovation Center.

**BICUTAN, TAGUIG** CITY—Various stakeholders from the food industry came together at the Food Innovation Dialogue held at the Advanced Device and Materials Testing Laboratory (ADMATEL) Lecture Room on February 28, 2017.

During the event, the Food Innovation Center (FIC) was introduced, along with its technologies and products, to researchers, microenterprises, and possible investors from the business sector. Attendees totalled 97, with 39% from DOST agencies and regional offices. Thirty-one percent (31%) were entrepreneurs or business owners, 16% came from the academe, and 11% were from the business sector. A few came from local government units and other government agencies.

The FIC is a prime example of "Science for the People" initiative, supporting equitable economic development in the country.It is in line with President Rodrigo R. Duterte's 10-point socioeconomic agenda, which includes the enhancement of "innovation and creative capacity towards self-sustaining, inclusive development" by promoting science, technology, and the creative arts; and matching "skills and training to meet the demand of businesses and the private sector." Through this initiative, the country's microenterprises can acquire new capabilities, produce innovative products, and become more competitive in the market, be it local or international.

During her keynote message, Undersecretary for Research and Development Dr. Rowena Cristina L. Guevara traced the beginnings of the FIC, which started as an idea to help farmers and food processers earn more from their produce. She recognized the capabilities of Filipinos to produce world-class food products, especially with the help of the FIC technologies.

"We have the ability to produce new kinds of food, but we just need to be enabled," she said.

With the ASEAN economic integration, industry partnerships with academic institutions, research and development institutions, and especially the business sector, are integral to the success and further development of the country's food industry, added Dr. Guevara.

The ASEAN Economic Community

Dr. Guevara emphasizes the importance of commercializing newly developed products to take advantage of the opportunities presented by the AEC.

(AEC) presents a unique opportunity for the Philippine Food Industry's growth. The free flow of goods and services among ASEAN nations has expanded the available market for local enterprises,encouraging product innovation and development.

The FIC will provide efficient and reliable technologies in the field of food processing and manufacturing. Such will greatly assist MIMAROPA-based food producers, processors, marketers, and entrepreneurs in developing concepts, prototypes, and market samples at par with the products and services being offered by other countries.

During the Food Innovation Dialogue, DOST-Industrial Technology Development Institute (DOST-ITDI) Director Dr. Maria Patricia V. Azanza thoroughly explained the components and strategies of the implementation of the FIC product development programs. Aside from four technologies – spray dryer, vacuum fryer, freeze dryer, and water retort – the FIC also offers expertise in the form of food technologists, machine operators, and university researchers who are experts in business, food safety, engineering, and intellectual property rights.

She gladly shared her expertise with the participants, also detailing what local food processors can gain from the use of different S&T interventions offered by DOST. This includes higher quality and prolonged shelf-life of goods even without the use of preservatives, which can translate into higher sales. Currently, there are 10 FICs in the country, and Dr. Azanza hopes to establish six more by the end of 2017 to achieve the goal of having one FIC in each region.

After Dr. Azanza's presentation, representatives from the business sector gave insights on the current and emerging trends in the food industry. According to them, there is a real potential for FIC-developed products to occupy a niche in both the local and international markets.

Dr. Azanza thoroughly discusses the FIC product development programs.


Ms. Ngan Tian shares her experience in introducing new products to the market

Ngan Tian, president of PCCI-Las Piñas and Midwest Food Corporation, stated thatthe food industry is the most competitive industry nowadays as it meets multiple challenges in sustainability, competition, and profitability, especially in the face of globalization. She noted that for local businesses to survive, innovation and extensive market research is key. They must also take advantage of emerging trends such as e-commerce, health and wellness products, and organic food. Of the halal industry, she says that although it is difficult and expensive to get into, the huge market for it is worthwhile.

Mr. Bien Delgado looks forward to the possible collaboration between DOST and the members of PHILFOODEX

Bien Delgado, executive director of PHILFOODEX, concurs with Ngan Tian. As part of an organization of over 156 micro, small, and medium food enterprises engaged in exporting, he says that it is important to be aware of the global food and drink trends. He adds that there is an increasing demand for vegetarian, vegan, or other plant-focused formulations, convenience food/food on the go, and superfoods such as moringa, seeds, nuts, fermented food, coconut products, and exotic fruits. There is also an opportunity for modernized traditional food, as the number of Filipinos abroad continue to increase. Further, a report from Bloomberg lists Filipino cuisine among the top 11 food trends of 2017.

DOST-MIMAROPA Regional Director Dr. Ma. Josefina P. Abilay discusses the framework for the upscaled FIC.


Dr. Carl E. Balita moderates the discussion as Dr. Azanza explains how better packaging and labeling can prolong the shelf-life of products.

In line with the Food Innovation Dialogue's goal to commercialize FIC-developed products, FIC managers and personnel from the academe presented their most innovative products. These were the Cagayan State University, UP Diliman, Mindoro State College of Agriculture and Technology, Eastern Visayas State University, and Philippine Women's College.

These products included Water Retorted Turmeric Blend Tea Tums, Spray Dried Nipa Vinegar, Spray Dried Calamansi, Vacuum Fried Mayahini (shellfish), Water Retorted Moron (sticky rice pudding), Freeze Dried Durian Twinks, Vacuum Fried Monggo Sprouts, Water Retorted Monggo Filling, Vacuum Fried Sweet Potato, Vacuum Fried Mixxed Veggies, Freeze Dried Gracilaria Seaweeds, and Vacuum Fried Mixed Beans.

After the product presentation, DOST-MIMAROPA Regional Director Dr. Ma. Josefina P. Abilay presented the framework for an

upscaled FIC where FIC technologies will be commercialized by bringing them directly to interested firms/partners, promoting innovation and technopreneurship at the same time.

"The main goal is to develop new products while maximizing the economic benefits for farmers," said Dr. Abilay. Through the upscaled FIC, MSMEs can be empowered to create or adopt new food products at par with foreign goods, and able to compete in the global market.

The dialogue engaged different stakeholders – from potential investors to prospective adoptors – in a conversation about the market viability of FIC-developed products and FIC technologies. It aimed to bridge the gap between research and practice by effectively communicating how the food industry can benefit from the FIC. To further promote understanding, microenterprises, potential investors, and other stakeholders exchanged questions and ideas during an open forum facilitated by Dr. Carl E. Balita, host of Radyo Negosyo and notable technopreneur.

As one of DOST's Science Ambassadors, he encouraged the participants to grab different business opportunities presented by the event. He also took the time to commend DOST for the agency's technology transfer initiatives, sharing his belief that innovation without commercialization is only invention.

For attendees to have more idea on how products are developed and prepared in the FIC, they visited the ITDI-FIC. Rommel M. Belandrez of ITDI's Food Processing Division explained the science behind the FIC technologies and mentioned what kind of products can be developed while a technical staff demonstrated how the equipment are operated. Afterwards, guests sampled the vacuum-fried products (kamote and mayahini), and water retorted tea tums (lemongrass-calamansi blend infused with turmeric and ginger).

Proprietors of small businesses or those who wished to start a food business found the event helpful, and hoped to attend similar events. Even representatives from the business sector were excited by the possibility of adopting the technologies, or partnering with DOST to adopt the already developed products.

The event was organized by DOST-MIMAROPA in partnership with the DOST-ITDI and DOST regional offices II, NCR, VIII, and XI.

Mr. Rommel M. Belandrez shows samples of products that can be developed using FIC technologies.

A technology demonstration was held while the science behind the FIC developed products was explained.

# New tech, innovation drive biz growth, NegOr entreps say

**By SEAN ADRIAN T. GUARDIANO**, *DOST Negros Oriental*

**DUMAGUETE CITY** – The need for technology trainings, modern equipment acquisition, and good management systems are among the top needs identified by over 20 participants from micro, small and medium enterprises (MSMEs) from various areas of Negros Oriental. This was revealed during a two-day workshopon visioning and strategic planning for the potential innovation advocates onMarch 15-16, 2017at Perpetual Help Community Cooperative Inc. (PHCCI) in Dumaguete City, Negros Oriental.

Organized by the Department of Science and Technology-Negros Oriental Provincial S&T Center (DOST NegOr PSTC), the workshop aims to develop the MSMEs' vision, mission and key performance indicators (KPIs), and action plan for the participants which will eventually become the basis for linking with the programs and services of DOST and other government agencies.

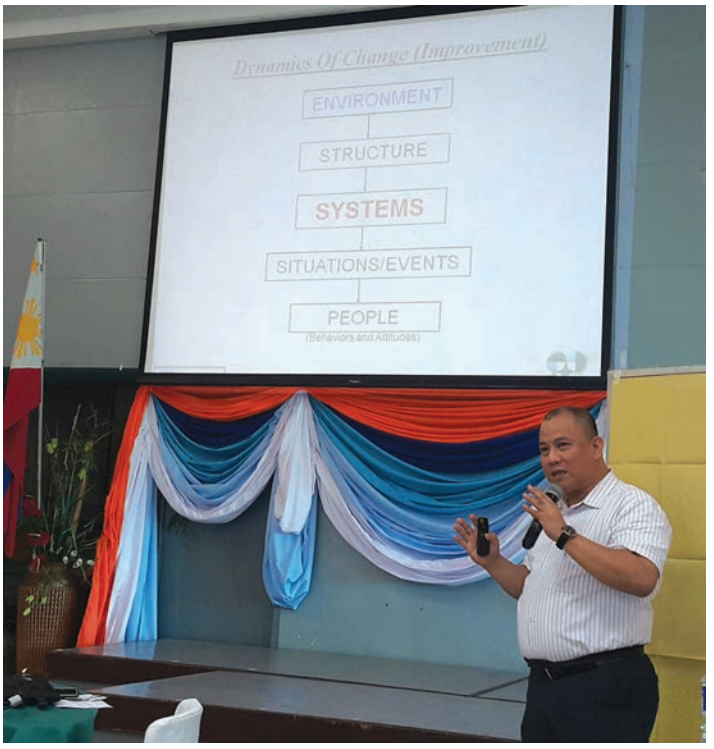
Through the workshop, participants were able to determine the evaluation of indicators, core issues to be addressed, and key programs to meet the targets for 2017 onwards.

The workshop output affirmed the potential innovation advocates' need to improve their business in different levels, from product improvements, to process improvements, stakeholder management, leadership system and managing the innovation process.

"If you really want to improve or make some changes to your business, there has to be a system. An effective system needs to be established and everything should be centered around it. The people and process will just follow," Engr. Renato B. Solis, workshop facilitator, said.

Solis is managing consultant of Measure Up Enterprise Consulting.

Engr. Solis also discussed strategy development, identification and validation of core issues, and identification of strategies and programs for MSMEs.




Engr. Renato B. Solis lectures on the vision-mission, its key performance indicators and long term direction plans to MSME participants.

One of the participants agreed on the effectiveness of having a system in every business during the workshop.

Dr. Roslyn D. Tambago, officer-in-charge of DOST NegOr PSTC, also conducted a half-day orientation on DOST's programs and services to the participants as well as the survey on organizational innovation. Tambago pointed out that it is important that acknowledging the need for the application of science, technology, and innovation as a key to business improvement should emanate from the entreprenuers themselves to facilitate increase of absorptive capacity for relevant government programs.

Engr. Solis is a Cebu-based management coach with more than 20 years of experience in management. He developed the unique strategic planning process which was adopted by San Miguel Corporation's business units. This strategy approach has since been applied to MSMEs and corporate clients in his role as strategy management adviser and has benefited businesses, service and civic organizations, as well as government units and agencies.

# Cake lady bags award as outstanding woman entrepreneur

**By CINDY BELIVESTRE**, *DOST- Surigao del Sur*

Sarah Guarte of Sarah Guarte Cakes and Party Needs poses with Caressa Leanne V. Lim, provincial S & T director of DOST Surigao del Sur.


Sarah Guarte with the other awardees of Successful Women Entrepreneurs in Caraga Region

**A LADY** cake maker who was able to prosper her business through the help of the Department of Science and Technology (DOST) was recently named as one of the Successful Women Entrepreneurs in Caraga.

Sarah Guarte, a beneficiary of DOST's Small Enterprise Technology Upgrading Program (SETUP), received the award during the celebration of the International Women's Day on March 8, 2017 at the Balanghai Hotel in Butuan City. The awards were given to outstanding women who thrived in the business sector in Caraga.

Sarah, owner of the Sarah's Cakes and Pastries, was one of the seven women entrepreneurs recognized by the Regional Development Council – Gender and Development Coordinating Committee as part of the campaign on empowering women through entrepreneurship.

A long-time client of SETUP, Sarah has proven to successfully apply the different technologies, trainings, and other capacity development opportunities provided by DOSTin operating her business firm.

## Road to entrepreneurial success

Like any other accomplished entrepreneur, Sarah's business journey began in small and humble beginnings. Before she discovered baking, Sarah started her entrepreneurial journey in cooking and selling native delicacies. Her mother's interest in baking led her to explore the world of cake-making. She revealed that she had many attempts of baking cakes perfectly in her own kitchen.

Receiving favorable reactions and comments, it encouraged her to put an edge on her skills. After years of carefully crafting her skills in baking, Sarah was able to establish a cake production facility in 2004. Sarah's enduring dedication and commitment to her business made her as one of the 20 Outstanding Caraga Women Entrepreneurs in 2010 by the Department of Trade and Industry – Caraga.

Her application in the SETUP Program of DOST has also aided Sarah's business in establishing four branch stores of her firm in Surigao del Sur. She was able to increase her sales from P400,000 to P1,000,000. Just recently, Sarah was able to build a new cake production facility based on the recommendation of DOST's Manufacturing Productivity Extension Program consultants.

## SETUP empowers women

Women's participation in the workforce greatly enhances productivity and fosters economic growth. Women represent a substantial force for sustainable development. The crucial part is getting resources for the working women, allowing them to thrive in their economic environments so that they may, in turn, foster the success of local communities.

DOST, though SETUP, encourages and assists MSMEs to adopt technology innovations to improve their operations, productivity, and competitiveness. The program enables firms to address their technical problems through technology transfer and technology interventions.

The new cake production facility of Sarah Guarte Cakes and Party Needs in Tandag City.

# Science For The People

In this very first issue for 2017, we introduce a new section called "Science for the People" or #ScienceForThePeople to show in photos some of the various activities of Secretary Fortunato T. de la Peña for the quarter. As DOST's top man, Sec. de la Peña is also the Department's lead science and technology ambassador whose main job is to promote in various ways that science is for the people.

(Photos by STII-AV unit)

DOST Secretary Fortunato de la Peña received from the UP Diliman a 20-karat (1.658gms) gold bead as the first product of the UP-DOST Project "Field-Testing of the Integrated Gold-Copper Mineral Processing Pilot Plant" at Sitio Besil, Bgy. Gumatdang, Itogon, Benguet. The inauguration and turnover ceremonies were held 09 March 2017. The gold is produced using non-cyanide and non-mercury clean processing.


Sec. de la Peña awards to the Mamalicious group the P10,000 prize for winning first place in the Lutong Nanay Challenge: A Pinggang Pinoy Cooking Contest fof Moms by the DOST-Food and Nutrition Research Institute headed by Dr. Mario V. Capanzana (rightmost).

Sec. de la Peña warms up before his speech during the DOST- National Research Council of the Philippines (NRCP)'s annual Scientific Conference and 84th General Membership Assembly on March 22, 2017 at the Philippine International Convention Center, Pasay City. Sec. de la Peña served as the NRCP president and chair of NRCP Division of Engineering and Industrial Research from 2002 – 2007 or five consecutive terms, the longest term ever served by an NRCP President. With him is NRCP Executive Director Marieta B. Sumagaysay (right).

In an educational trip at the Philippine Science Centrum (PSC), Riverbanks Center, Marikina City, Sec. de la Peña shows Grade 3 students of Jose Fabella Memorial School of Mandaluyong the feel of the smoke-like vapor from dry ice. The activity is part of a community extension program of the Rizal Technological University - College of Education represented by teacher Franklin M. Garvida (background). The kids' fun experience at the interactive exhibits was sponsored by Sec.de la Peña, as part of his advocacy to promote science and technology to the young, in partnership with the PSC headed by Executive Director May M. Pagsinohin.

# 3C Arangkada sa Tatlong Dekada

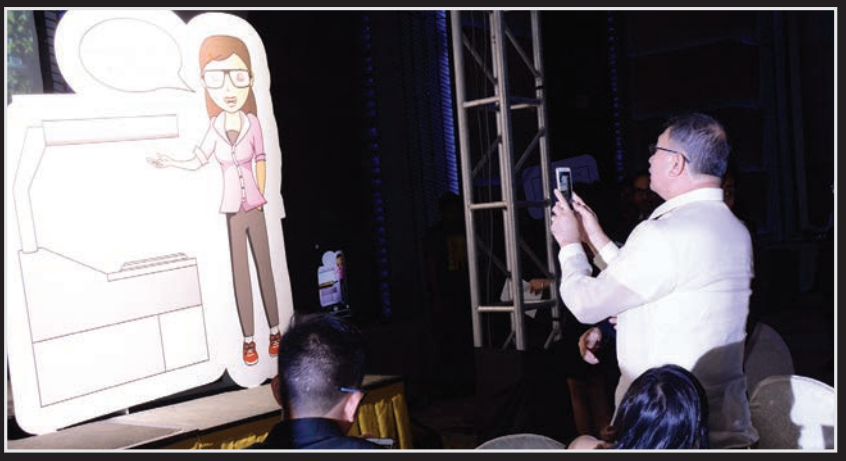
*DOST-STII's 30th Anniversary which we called "Arangkada sa Tatlong Dekada" (Full speed at three decades) was a night pregnant with surprises for our stakeholders.*

*STII Director Richard P. Burgos shall welcomed all participants which included DOST officials, former STII Director Raymund E. Liboro, friends and partners from DOST and other agencies, the media, and others. DOST Secretary Fortunato de la Peña set the tempo for the night through his very candid message which warmed up everyone.*

*We also launched STII's new products and services that will take STII to full speed in 2017, such as DOSTv, a compendium of R&D projects called Bridge, STII Library's Augmented Reality, Juan Time, and, after a ceremonial toast, the DOST-STII institutional audio-visual presentation.*

*We also did the catwalk to give everyone a share of the limelight, especially for those who work hard yet stay behind the scenes. We likewise conveyed our appreciation to our people who stayed with us for three decades and more.*

*Entertainers gave us good music as guests made a headway to the banquet table to celebrate with us our three decades of bountiful service. As our final surprise, we performed a mob dance with Dir. Burgos at the lead. It was indeed a meaningful and productive night, just as what we envision our next 30 years to be.*



Sec. de la Peña is the first to try the S&T Augmented Reality Library, the latest innovation in our library experience.

Dir. Richard P. Burgos (second from left) leads the division chiefs (L-R) Dr. Aristotle P. Carandang, Alan C. Taule, and Arlene E. Centeno in greeting the audience.

We launch "Bridge", the compendium of DOST-supported R&D from 2010 to 2015.


We launch the new set (left), logo (center), and segments (right) of DOSTv.

DOST officials led by Sec. de la Peña and Dir. Burgos join us in our festivity (L-R): Dr. Landrico U. Dalida (PAGASA), Usec. Cristina L. Guevara (R&D), Dr. Mario V. Capanzana (FNRI), Engr. Roberto O. Dizon (MIRDC), and Dir. Celia B. Elumba (PTRI).


1000th SITE

starbooks

DOST Scholars from all over CALABARZON raised their questions and concerns in a breakfast dialogue with DOST Secretary Fortunato T. de la Peña. The Secretary also informed the students that the Department has loosened some of its policies and has expanded the courses accepted in the program. Nevertheless, DOST will continue to uphold the academic excellence of its scholars. The DOST Scholars Breakfast with the Secretary was part of the Science For The People: Roadshow, SETUP MSMEs and CEST Convention of DOST CALABARZON held at Bay, Laguna on February 20, 2017. **(By Rodolfo P. de Guzman, DOST-STII)**

**The "Fault Finder"** now handles disasters and climate change. Branding himself as a "Fault Finder" being a renowned geologist who studies the different fault systems in the country, Dr. Renato U. Solidum Jr. (right) was sworn in by Department of Science and Technology Secretary Fortunato T. de la Peña (left) as Undersecretary for Disaster Risk Reduction and Climate Change Adaptation effective 27 February 2017. Dr. Solidum will continue to head the Philippine Institute of Volcanology and Seismology or PHIVOLCS as Officer-In-Charge. Dr. Solidum Jr. brings with him years of experience in disaster risk reduction and management particularly in the field of geological hazards like earthquakes and tsunamis. As PHIVOLCS director, Dr. Solidum Jr. initiated several projects that include the following: improved volcano monitoring system, tsunami warning system, earthquake monitoring system and the Rapid Earthquake Damage Assessment System, a software that can produce seismic hazard and risk maps before and immediately after an earthquake. **(Photo courtesy of DOST/Text by Rodolfo P. de Guzman, DOST-STII)**

Reyson's Food Processing Project Visit. Dr. Aristotle P. Carandang, chief of Communication Resources and Production Division of DOST- Science and Technology Information Institute, along with other DOST personnel toured the facilities of the Reysons Food Processing in Calauan, Laguna. The company is a beneficiary of DOST's Small Enterprise Technology Upgrading Program (SETUP). Under SETUP, the company was able to upgrade its procedures in preparing sweet preserves like nata de coco and kaong. Project visit to DOST assisted enterprises is part of the DOST's Science Nation Tour project activities. The said event is a partnership of DOST-CALABARZON with DOST-STII. **(Text and Photos by Karl Raven A. Ramon, DOST-STII)**