2017 DOST PERFORMANCE REPORT

science for the people

Department of Science and Technology

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Science For The People

Aligned with the national goals and plans, the DOST Strategic Plan for 2017-2022 bannering the call for "Science for the People" aims to use science, to enhance innovation and the creative capacity of the Filipinos towards the achievement of inclusive and sustainable development. The issuance of DOST Administrative Order No. 003 s., 2017 laid down the Science for the People 11-point agenda. This was a result of the Strategic Planning exercise in November 2017 and the subsequent meetings of DOST Planning Officers and consultations with the DOST Management Committee.

The DOST Strategic Plan revolves on the attainment of seven outcomes as follows:

1. ***Innovation stimulated***
2. ***Technology and adoption promoted and accelerated***
3. ***Critical mass of globally competitive STI human resources developed***
4. ***Productivity and efficiency of communities and the production sector, particularly MSMEs improved***
5. ***Resiliency to disaster risks and climate change ensured***
6. ***Inequality in STI capacities and opportunities reduced***
7. ***Effective STI governance achieved***

The strategies to attain these outcomes are embodied in the DOST Eleven Point Agenda as follows:

1. ***Pursue R&D to address pressing national problems.***
2. ***Conduct R&D to enhance productivity and improve management of resources.***
3. ***Engage in R&D to generate and apply new knowledge and technologies across sectors.***
4. ***Strengthen and utilize regional R&D capabilities.***
5. ***Maximize utilization of R&D results through technology transfer and commercialization.***
6. ***Develop STI human resources and build a strong STI culture.***
7. ***Upgrade STI facilities and capacities to advance R&D activities and expand S&T services.***
8. ***Expand STI assistance to communities and the production sector, particularly MSMEs.***
9. ***Provide STI-based solutions for disaster risks and climate change adaptation and mitigation.***
10. ***Strengthen industry-academe-government and international STI collaboration.***
11. ***Enhance effectiveness of STI governance.***

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Contents

MESSAGE FROM THE SECRETARY

In 2017, the Department heeded the call of the current administration to address the inequity in developments within and among countries. This, together with the other priorities of the Department constitute the Science for the People 11-point agenda. Great effort has been made to become more relevant to the conditions, needs and opportunities for contributing to regional development through STI, while keeping attuned with the trends and developments in the country and global community. The Department through its Regional Offices strived for more visibility in the regions, as well as played an active role in local and regional development committees. Although still faced with many challenges to hurdle, we have made big strides and will continue to move forward and become more responsive to regional and national needs.

The Harmonized National R&D Agenda (HNRDA) got the nod of the national government's planning agency in 2017. This strengthened the mandate of the Department to lead, direct, and monitor S&T activities in the country for the benefit of the Filipino people. With the HNRDA which defines the country's priorities and guides public investment in R&D, duplication will be minimized and complementation will be encouraged among government-funded R&D programs and projects, thereby resulting to effective allocation and efficient use of public investment in R&D. We will continue to develop better solutions to persistent problems and creative means to make life comfortable and more convenient to the Filipino people.

We would like to extend our deepest gratitude and appreciation to the science and business community for fostering a culture of innovation and for joining us in our quest to contribute to national development and progress. We would also like to thank the support received from our various partners for development. We will continue to become better stewards of science, technology and innovation and serve better with compassion, integrity, and excellence.

FORTUNATO T. DE LA PEÑA
Secretary

EXECUTIVE SUMMARY

Since the medium-term Philippine Development Plan (PDP) articulates that Science, Technology and Innovation (STI) is a key player in laying down the foundation for inclusive growth, a high-trust and resilient society, and a globally competitive knowledge economy, the Department of Science and Technology has taken strides in increasing potential growth by undertaking strategic research and development, providing necessary scientific and technological infrastructure and services, and expanding the base of S&T human resource.

The 2017 Performance Report, divided into 11 sections, encapsulates the accomplishments of the Department in terms of the implementation of strategies outlined in the Science for the People 11-Point Agenda. In a nutshell, the first four agenda outline major research and development initiatives, Agenda 5 on technology transfer efforts, Agenda 6 on S&T human resource development, Agenda 7 on S&T facilities, Agenda 8 on STI assistance to productive sectors, Agenda 9 on disaster risks and climate change adaptation and mitigation, Agenda 10 on collaborations, and Agenda 11 on STI governance.

Accomplishments under **Agenda 1** *(Pursue R&D to address pressing national problems)* highlight the latest advancements in research and development geared towards the shared goal of improved nutrition and health for all. Focused on health technology development, drug discovery and development remains to be the high-impact and big ticket program supported by the Department in the area of health. Central to this R&D program is the study of endemic resources, partnered with documentation of traditional knowledge and practices in health, that could eventually lead to decreased cost of medicines and health interventions for diseases that affect the quality of lives of many Filipinos. In 2017, about 3,000 terrestrial and marine species have been screened for several priority disease indications such as diabetes, hypertension, inflammation, gout, infection, and cancer. Furthermore, the Department has supported the development of affordable, safe and reliable hospital equipment and biomedical devices which can lead to improved health service delivery. To date, three prototypes of adult ventilator for respiration support and exoskeleton devise for rehabilitation of post-stroke patients have been developed. On the other hand, the Department started venturing into nutrigenomics to optimize nutrition-related interventions specifically for Filipinos to efficiently and effectively combat malnutrition. Acquisition of state-of-the-art equipment coupled with capacity building jumpstarted this endeavor. This is on top of the continuous implementation of the malnutrition reduction program among children five years and below and the R&D of various food products to address micronutrient deficiencies and undernutrition.

Of equal importance, **Agenda 2** *(Conduct R&D to enhance productivity and improve management of resources)* accomplishments present how R&D can be utilized to make key traditional industries steadfast and competitive through technological innovations that can address gaps in productivity and increase production yield. Enhancing the capacity of marginalized sub-sectors and people groups to use better and new technologies can expand their access to participate in economic activities and progress. The primary industries that will benefit from the featured major R&D programs include the agriculture, specifically coconut and rice production, non-wood forest products, i.e., bamboo processing and utilization, and

RESEARCH AND DEVELOPMENT

Harmonized National R&D Agenda (HNRDA), 2017-2022, approved by NEDA on August 30, 2017
R&D areas: health, agriculture, aquatic and natural resources, industry, energy, and emerging technology, disaster risk reduction, climate change adaptation, and basic research

1,154 R&D projects managed by DOST Sectoral Councils

147 R&D projects completed and disseminated by DOST R&D Institutes

Ongoing establishment of R&D Centers in the regions

natural textile among others. Major R&D programs featured are focused on addressing coconut scale insect infestation, using irradiated carrageenan as plant growth promoter for rice, optimizing operating conditions for bamboo charcoaling and pyroligneous liquors for industrial use, developing portable solar powered/heated dryer for wood and non-wood, developing multi-purpose hot press for engineered bamboo products, introducing protocols for rehabilitation of mine tailing areas, and optimizing processes for natural textile.

Agenda 3 *(Engage in R&D to generate and apply new knowledge and technologies across sectors)* accomplishments put the spotlight on R&D in emerging scientific and technological platforms which lay the inroads to the development of new products, services, and industries. Promising new technologies may potentially disrupt and change the way things are done. Recognizing this, the Department anticipates impact of new technologies in existing industries in the country by supporting local capability programs in the areas of artificial intelligence for new industry development and supporting research in nanotechnology for new materials development. On the other hand, the Department utilizes biotechnology to study the condition of the freshwater systems. The research results can provide policy inputs to ensure ecological integrity, clean and healthy environment.

Agenda 4 *(Strengthen and utilize regional R&D capabilities)* accomplishments show the headway made in strengthening institutional capacity to undertake research and development and contribute to regional development. Utilizing local researchers equalize opportunities in generating new knowledge and technologies suited for the specific need of the region. The Department partners with Higher Education Institutions in the regions in establishing niche R&D centers which may also serve as hubs for developing R&D capability of adjacent localities.

Agenda 5 *(Maximize utilization of R&D results through technology transfer and commercialization)* accomplishments feature mechanisms to encourage technology transfer and avenues where R&D results are promoted in the bid to maximize its utilization. The Department provided support in bringing R&D results to its final stage of development up to commercialization. Aside from supporting technologies generated by startups and research and development organizations, the Department also provided assistance in applying for intellectual property rights to encourage access of researchers and inventors to recognition, reward, and safety nets for their creativity. Of the total invention patent application provided with IP assistance, 89% were able to obtain patents and utility model. The Department took a step further by holding a focused Technology Transfer Day in regions. These resulted to 167 direct licensing terms sheets signed between researchers and entities that has an interest to commercialize the technology and subsequent issuance of 60 Fairness Opinion Reports which provides a statement as to the fairness of financial terms of licensing. Moreover, to intensify public awareness, promote learning, and adapting new technologies, the Department featured the latest advancements in R&D, as well as other S&T services, in a total of 46 S&T exhibits held in celebration of the 2017 National and Regional Science and Technology Week.

Stimulating innovation requires increasing investments for human resource development and infrastructure for developing an STI ecosystem, and fostering partnership among STI stakeholders. **Agenda 6** (*Develop STI human*

TECHNOLOGY TRANSFER AND COMMERCIALIZATION

12 TBIs and **2** Innovation Hubs supported
670 IP assistance completed
34 patents and utility model certificates obtained
5 Technology Transfer Days
167 Direct Licensing Term Sheets generated and evaluated
60 Fairness Opinion Reports (FOR) issued
12 TECHNICOM projects with PhP49M funding support

S&T HUMAN RESOURCE DEVELOPMENT

30,665
scholars supported
7,882 scholars in 16 Regional PSHS Campuses
19,058 BS scholars
2,832 MS scholars
893 PhD scholars

Implementation of Filipino Patriot Scholar Project in five regions to 1,258 undergraduate scholars

426 researchers/ scientists given awards and incentives

DOSTv
The Filipino Weather Channel

S&T PROMOTION

1,342 promotion services rendered
1,556,262 clients served
2,100 units of STARBOOKS deployed
240 episodes for online streaming via DOSTv.ph

resources and build a strong STI culture) accomplishments provide an indication of progress made in building a critical mass of competitive researchers, scientists, and engineers (RSEs) and promoting a culture of STI. Towards this goal, the Department continues to provide scholarship programs to scale up the number of RSEs. The Department supported a total of 22,703 scholars in higher education—broken down as follows: 19,058 undergraduate, 2,832 master's degree, and 893 doctoral degree, and 7,882 students in secondary level nationwide. To address brain drain and promote retention of RSEs, patriotism is fostered among new scholars and employment opportunities were provided to 53 graduates. The Department continues to promote a culture of innovation through the use of quad media. The year 2017 highlights the rebranding of "DOSTv: Science for the People," the official weather, science and technology television and online program of the Department.

S&T FACILITIES

16 FICs maintained
30,246 firms provided with lab testing services
PhP16M income generated by ADMATEL
1,256 testing jobs received by Auto-Parts Testing Lab
48 electro magnetic compatibility and other test services rendered through EPDC
3 Irradiation Facilities maintained

Agenda 7 *(Upgrade STI facilities and capacities to improve S&T services)* accomplishments feature various S&T facilities that offer technical services for carrying out research and development, as well as addressing the needs of the industry in terms of quality assurance, adherence to standards, product development, and innovation. The electronics, semi-conductor, automotive parts, gear assembly manufacturing, agriculture produce, and food manufacturing industries can benefit from the various S&T facilities and technical services. The Department also explores the use of nuclear techniques for environmental testing. Most of the S&T facilities offer less expensive testing services and shorter turnaround time for analysis compared to overseas testing. Providing access to the S&T facilities enable local manufacturing firms to meet product standards and compete globally.

Agenda 8 *(Expand STI assistance to communities and the productive sector, particularly MSMEs)* accomplishments focus on S&T assistance provided to upgrade the technological capabilities and improve the productivity and efficiency of Micro, Small and Medium Enterprises (MSMEs). The Department has continued to provide technological interventions such as process and system improvement, technical consultancy, packaging and labelling, training, testing and calibration, and product development to empower MSMEs to innovate, move up the technology scale and become more competitive. Moreover, the Department has made its services easier to access online through the use of OneExpert for consultancy services, OneStore for marketing products of assisted firms, and OneLab for testing services. For startup firms, the Department kicked-off a program to provide support for product R&D and market validation studies. On the other hand, the Department has extended its S&T interventions to economically disadvantaged communities in rural and urban through five entry points: 1) water and sanitation, 2) basic education and literacy, 3) livelihood and enterprise development, 4) health and nutrition, and 5) disaster risk reduction and climate change adaptation.

SUPPORT TO MSMEs

769 firms received innovation system support
5,600 technology interventions rendered
38,074 jobs created

SUPPORT TO COMMUNITIES

553 communities assisted through five entry points:
1) Water and sanitation
2) Basic Literacy and education
3) Livelihood enterprise development
4) Health and nutrition
5) Disaster risk reduction and climate change adaptation

SETUP
S & T innovations for MSMEs

DISASTER RISK REDUCTION AND CLIMATE CHANGE ADAPTATION

12 Doppler radars and **3** X-band radars
11,285 weather and flood warnings issued
94 km average forecast track error
98% of weather and flood warnings were issued within 5 minutes variance of scheduled time
391 disaster risk reduction activities conducted
Hazard and Risk Assessment, Warning and Risk Communication, Capability Building, R&D Projects on Disaster Risk Management and Climate Adaptation and Mitigation, Policies, Plans and Partnerships

Agenda 9 *(Provide STI-based solutions for disaster risks and climate change adaptation and mitigation)* accomplishments highlight the role of the Department in building a disaster-resilient community through the provision of accurate and timely information. Specifically, it presents the progress made in the establishing and upgrading observation and monitoring systems, efforts in hazard and risk assessment,

and researches for disaster risk management, as well as climate change adaptation and mitigation. To increase public awareness on disaster preparedness and climate-related events, capacity building and fora were held. The Department also participated in crafting the roadmap for an enhanced climate and disaster resilient communities and formulated the earthquake resiliency plan for the Greater Metro Manila area in partnership with other national government agencies.

Agenda 10 *(Strengthen industry-academe-government and international STI collaboration)* provides a glimpse of the linkages and networks being pursued by the Department in terms of S&T collaboration. In 2017, the Department took part in 24 bilateral engagements and participated in a number of activities which involved 14 international organizations.

Agenda 11 *(Enhance effectiveness of STI governance)* provides the policy framework that governs the implementation of the programs, projects and activities of the Department in contribution to national development and progress. Taking off from the National 0+10 Socioeconomic Agenda and Philippine Development Plan, the Department crafted the Science for the People 11-point Agenda, Harmonized R&D Agenda, and Regional Offices Strategy Map. The Department also helped in shepherding six bills that can shape the scientific and technological landscape in the country.

With all of the efforts and resources put in by the government, while there are still much to be done, the investments in STI are nonetheless worth banking on since STI has a multiplier effect in creating more possibilities for a brighter future for the nation and for every Filipino.

S&T POLICY

Inclusion of the STI Chapter "Vigorously Advancing Science, Technology and Innovation" in the Philippine Development Plan (PDP) (2017-2022)

Issued AO 003 s. 2017 for the DOST Strategic Plan "Science for the People" 2017-2022

Crafted the Regional Offices Strategy Map

Supported 6 proposed S&T legislations

AGENDA I

Pursue R&D To Address Pressing National Problems

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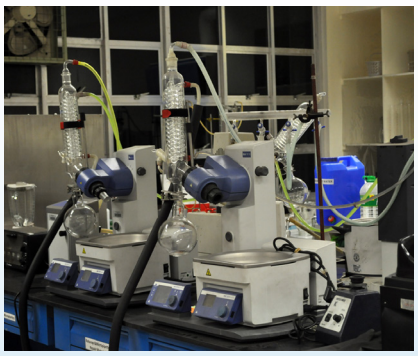


Tuklas Lunas Program Facilities

1. TLDC for Luzon
2. Xenopus Facility
3. Visayas State University TLDC
4. Bioactivity facility, UP Diliman

With the end goal of providing solutions to the pressing national problems and challenges that have direct and indirect adverse effects to the country's social, economic and environmental spheres of development, the DOST continues to undertake R&D programs and projects involving health, food and nutrition, hospital equipment and biomedical devices, among others.

Health

TUKLAS-LUNAS
(Drug Discovery and Development)

The *Tuklas-Lunas Program* of the DOST-Philippine Council for Health Research and Development (PCHRD) aims to produce safe and accessible herbal drugs that can serve as alternative treatments to local health conditions. The Program pursues a parallel track of drug discovery and development involving the production of standardized herbal drugs and the identification and characterization of high-value pure drug candidates for pre-clinical or clinical development.

In 2017, about 3,000 terrestrial (plants and fungi) and marine (microbial organisms, sponges, Conoideans) species have been screened for several priority disease indications such as diabetes, hypertension, inflammation, gout, infection and cancer. Under the herbal track, acute and sub-chronic toxicity studies of tawa-tawa, luya and banana for platelet enhancement related to dengue have been completed already. In addition, 28 plants are undergoing formulation and standardization studies for diabetes, gout, hypertension and inflammation. For drug track, major accomplishments were as follows: 1) isolated and purified 10 plants for the identification of active compound for diabetes, inflammation pain, gout, hypertension, cholesterol-lowering, infection and cancer (breast, lung, colon); 2) synthesized 205 compounds, of which 27 are active based on primary assays; 3) studied 10 pure peptides from Conus for anti-pain and anti-neurodegeneration; and 4) isolated 24 pure compounds from marine microorganisms (MMOs) and sponges, 18 assayed with 9 active for cancer and 4 active for infection, 12 with structure elucidated.

Also in 2017, setting up/upgrading of the following laboratories were completed:

- Satellite laboratories for medium throughput bioassay for cancer (UP Baguio, UP Manila and UP Mindanao), infectious diseases (UP Baguio, UP Manila);
- Laboratory for confirmatory and orthogonal assay testing for diabetes, hypercholesterolemia, obesity, inflammation, hypertension and cancer (UP Diliman-National Institute of Molecular Biology and Biotechnology);
- Liquid Chromatography-Tandem-Mass Spectrometry (LC-MS/MS) laboratory/facility in UP Diliman for dereplication work to determine whether compounds being studied are novel; and
- Various laboratories/equipment for drug discovery work from marine organisms (UP Diliman-Marine Science Institute):
    - High throughput Screening Facility

1

2

1. Adult Ventilator Prototype
2. Exoskeleton Device *(AGAPAY)*

Philippine Traditional Knowledge Digital Library on Health (TKDL) Interface

- Peptide Synthesis Laboratory
- Xenopus Facility
- Sterotaxic Surgery and Anesthesia System and Behavioral Analysis Systems

Hospital Equipment and Biomedical Devices R&D Program

The program involves the development of affordable safe and reliable hospital equipment and biomedical devices; skills and expertise in biomedical engineering and related areas; and systems towards a Philippine Biomedical devices/life sciences industry. In 2017, three (3) adult ventilator prototypes were developed, and are currently undergoing clinical testing in a small number of patients. The same number of prototypes were developed for the exoskeleton device for rehabilitation of post-stroke patients.

Potential Sources and Technology Applications of Antibiotics

The National Research Council of the Philippines (NRCP) pioneers various basic research breakthrough such as the discovery of potential sources of antibiotics. The soil microorganism *Actinomycetes* produce metabolites acting as antibiotics, anti-tumor agents, immunosuppressive agents and enzymes and act as the most efficient group of microbes that produce bioactive compounds that have valuable medical, veterinary and agricultural applications.

A research of Dr. Teofila Zulaybar and Irene Papa of University of the Philippines Los Baños resulted to the low-cost production of antibiotics from mangrove ecosystem which was found to be very effective against mastitis in dairy cows. It also sees possible technology applications such as a new line of drugs for veterinary medicine, antibiotics cream, ointments, an injectable for treatment of mastitis disease for dairy cows.

Another research on bioactive compounds from marine sediments has set its new potential as a source of antibiotics. The NRCP-funded project of Dr. Doralyn Dalisay explored the untapped marine sediments surrounding the Philippine archipelago for marine actinobacteria. These achievements align with Health Sufficiency – Fundamental Studies on Potential Sources of Natural Products under the National Integrated Basic Research Agenda (NIBRA)

Traditional Knowledge and Digital Library Program

The Philippine Traditional Knowledge Digital Library on Health (TKDL) is the national database on traditional knowledge and practices on health of indigenous people (IP) which aids in developing culture-sensitive health information, education, and communication (IEC) materials. The data gathered in its website supports creation of health policies and programs for

improving the health status and health services delivery of IP communities. In 2017, the program documented 17,000 medicinal plants, 1,207 traditional healing practices, and 509 traditional healers from the 43 ethnolinguistic groups in 24 research sites.

Food and Nutrition

Malnutrition Reduction Program (MRP)

In support to the reduction of the prevalence of underweight among 0 - 5 year old children, the MRP was continuously implemented as an expansion of the S&T intervention to address malnutrition in all regions of the country. With the need to focus programs addressing Mindanao, a MRP-DOST PINOY Training Workshop was conducted in Mamasapano, Maguindanao in January 25-26, 2017. This project monitored the extent of implementation of the program in 21 out of the 32 areas, where the program was already adopted. Feedback meetings were also conducted in Jaro, Leyte, Basey, Samar and Antique Province in the early part of 2017.

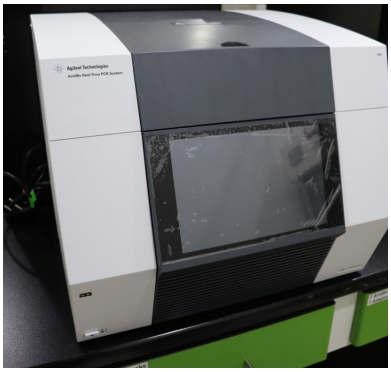
Food and Nutrition R&D

The DOST- Food and Nutrition Research Institute (FNRI) has developed various nutritional food products to address micronutrient deficiencies and undernutrition in the past years. For 2017, the micronutrient growth mix and Momsie (a complementary food for children ages 6 months to 3 years old) underwent efficacy trials to determine the extent it has improved the nutritional status of the intended population. These studies were conducted to extend the value of the products from the laboratory to the consumers. Application of new technologies for drying fruit mix and veggie packs using low temperature and low humidity were also undertaken under the R&D on Food Product Innovation.

R&D Program on Nutrigenomics

The DOST-FNRI acquired state-of-the-art equipment and conducted capacity building trainings to ensure a world-class and ISO-accredited Nutrigenomics Laboratory will be realized.

ISO/IEC 17025: Understanding the Requirement of Testing Laboratory UKM Medical Centre, Malaysia

1 

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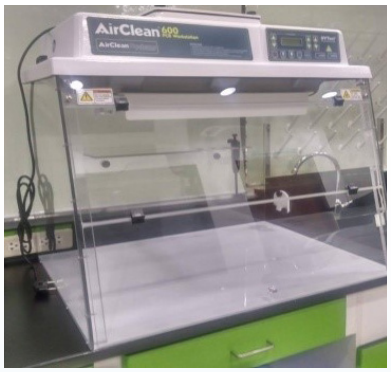
3 

Acquired state-of-the-art equipment

1. Real-time PCR Machine
2. Thermal Cycler
3. PCR Workstation

AGENDA II

Conduct R&D To Enhance Productivity and Improve Management of Resources

In the forefront of STI in the country, the DOST conducts R&D programs that aim to increase the industry competitiveness resulting into social and economic benefits to the Filipinos. This is realized through the conduct of programs and projects in agriculture and aquatic, forest products, and textile and other allied products, to name a few.

Laguna tall variety

Agriculture & Aquatic Researches

Coconut R&D Program

In 2017, DOST-Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development (PCAARRD) focused its Coconut R&D Program to address the problem of coconut scale insect infestation in CALABARZON, Basilan and Zamboanga. One study on coconut genomics was able to positively correlate high density of trichomes in coconut varieties to resistance against Coconut Scale Insect (CSI). In addition, the whole genome sequence and assembly of Catigan Dwarf and Laguna Tall varieties have been completed and ready for publishing in the National Center for Biotechnology Information (NCBI).

PNRI accepts the 2017 FNCA Excellent Research Team of the Year Award during the Forum for Nuclear Cooperation in Asia.

Plant Growth Promoter (PGP)

The award-winning Carrageenan Plant Growth Promoter (PGP) crowns the achievements in 2017 as the DOST-Philippine Nuclear Research Institute (PNRI) continues to spearhead the applications of nuclear science and technology in the country today. This product has now generated a total of three geographically exclusive Licensing Agreements equivalent to PhP 3 million worth of licensing fees. PNRI researchers earned the 2017 Forum for Nuclear Cooperation in Asia (FNCA) Excellent Research Team of the Year Award for the success in radiation technology applications during the Forum. In addition, the carrageenan PGP has been approved by the Fertilizer and Pesticide Authority for use on rice.

Agro-Industrial Machine Building

Agro Industrial Machine Building complements initiatives to provide technologies and support that address the high demands of localizing various agricultural and industrial equipment. Salient achievements include: successful passing the Agricultural Machinery Testing and Evaluation Center (AMTEC) testing of five (5) units of 12Hp Single Cylinder Engine prototype; deployment of Tikog Flattening Machine to lower preparation time, cost of labor and improved

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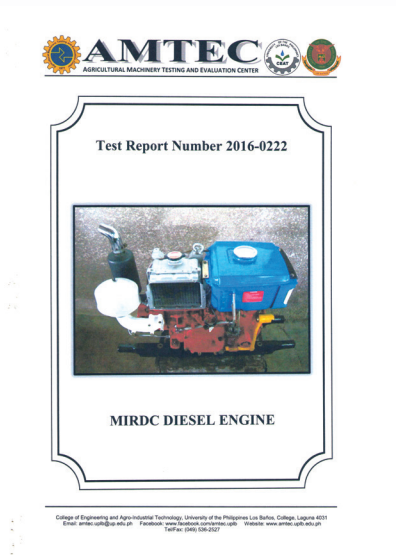


2

1. AMTEC test report on diesel engine
2. Secretary de la Peña inspects the 12Hp single cylinder engine prototype

3 

4 

3. Performance testing of sugarcane loader
4. Performance testing of sugarcane leaf-stripper

strands size and quality of 20 community-based tikog weaving organizations comprising more than 2,700 families as beneficiaries; completion of fields testing of sugarcane harvesting equipment; fabrication of various Food Innovation Centers (FICs) equipment and establishment of the Gear Making and Vacuum Carburizing Facilities.

Forest Products

Bamboo Processing and Utilization Development

The DOST-Forest Products Research and Development Institute (FPRDI) continued to undertake R&D on bamboo processing and utilization. It developed an upgraded (500 kg capacity) bamboo charcoaling and pyroligneous liquor for industrial uses. The optimization of operating conditions (carbonization temperature, time, charcoal, and PL yields) were adopted to produce high quality charcoal product that is comparable to activated carbon.

Portable solar powered/heated dryer for wood and non-wood

Design and Development of Portable Solar Powered/heated Dryer with Auxiliary Biomass Heater

The portable solar powered/heated dryer developed by the DOST-FPRDI has a loading capacity of 500 bdft. with eight pcs. solar panels of 300w. It utilizes eight pcs. 12V, 200AH solar batteries, two pcs. 5KVA solar inverter and two pcs. 60A solar charge controller. It also has two pcs digital temp. and humidity controller propeller fans of 300mm Θ, 2760 CFM, 0.5 Hp, 220V.

Multi-Purpose Double Acting Hot Press for Engineered Bamboo Products

The double acting hot press is designed and fabricated for pressing bamboo slats with a maximum area of 60 x 60 cm in less than 10 minutes of pressing time. It is more efficient than the traditional clamping system and is made of different components for ease in assembly. The screw attached to the machine

The improved bamboo charcoaling can produce more bamboo charcoal and pyroligenous liquor than old model.

Multi-purpose double acting hot press for engineered bamboo products

can deliver a vertical and horizontal pressure that add more rigidity during the binding process. This transportable machine has also a combustion chamber for generating heat by biomass (e.g. charcoal) in the absence of electricity. Estimated cost of fabrication of the machine is PhP 120,000, which is cheaper than the traditional electric hot press which has a market price of around PhP 500,000.

Protocols to Increase Farm Productivity

The NRCP-funded research of Dr. Nelly S. Aggangan on rescuing mined-out areas will give hope to communities in mined-out and tailing areas which, despite their condition, still have the flair to grow trees. A set of policy recommendations is generated, and published in the NRCP Policy brief 'A Special Series on Sustainable Communities' Issue No. 1 Q4 (2017).

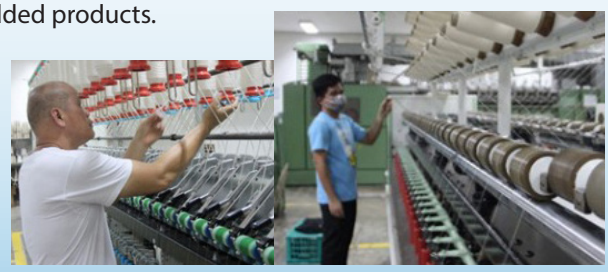
Another valuable contribution to farm productivity is a research by Dr. Gina V. Pangga on biochars as a soil amendment. Together with the Bataan Peninsula State University, Dr. Pangga designed a prototype stove for regular households to make their own biochars using agricultural and plant waste materials. This effort is an inexpensive means of turning junks into biochars and offer agriculture and waste management possibilities.

Cost competitive fiber pretreatment process

Textiles and Allied Products

Textiles Empower Lives Anew (TELA) and Innovation Center for Yarns and Textiles (ICYT)

The year 2017 for DOST-Philippine Textile Research Institute (PTRI) was all about TELA and how textiles can empower lives anew through inclusive innovations. With particular focus on the development of enabling technologies for new materials, yarn products, and cost-competitive pretreatment and functionalization processes, the Institute aims to address the requirements of micro, small and medium-scale textile and garment enterprises, of weaving communities and social entrepreneurs, in particular. To support the textile industry, the PTRI's ICYT has helped increase utilization and promotion of higher blend ratios of natural textile fiber (NTF) yarns in combination with Philippine cotton, from 5% up to 35%. Where once the NTF yarns could only be used for the filling or weft yarns, today it can also be used for the warp, thereby increasing the local NTF content. This means higher local content for better value-added products.



Utilization and promotion of higher blend ratios of natural textile fiber (NTF) yarns in combination with Philippine cotton through the ICYT facilities

AGENDA III

Engage in R&D to generate and apply new knowledge and technologies across sectors

The Department undertakes collaborative efforts among the government agencies, private sector and the academe to contribute in STI knowledge-building initiatives and enable safe, effective and efficient application of such knowledge across the major sectors of the society. DOST focuses its effort to develop CAPACITY AND APPLICATIONS USING emerging scientific and technological platforms FOR industry, agriculture and environment as well.

New Industry Development

52 Participants attended the 1st batch of AI training titled as DOST Summer School on Artificial Intelligence on June 3-9, 2017 at Microtel by Wyndham, UP Technohub

Artificial Intelligence Program

The DOST-Philippine Council for Industry, Energy and Emerging Technology Research and Development (PCIEERD) committed to foster innovation and develop science and technology-based solutions by jumpstarting Artificial Intelligence (AI) development in the country. In 2017, several experts from the academe, government and industry were invited to develop a research and development (R&D) program for AI. The AI Program focuses in areas such as transportation, service robots, healthcare, education, low-resource communities, public safety and security, employment and workplace, and entertainment where AI is foreseen to have greatest impact. The conduct of a Summer School with 52 participants was also initiated to train college professors, students and government IT practitioners on the theory and applications of machine learning methodologies. A follow-up training entitled, "DOST Deep Learning using TensorFlow and Machine Learning Training" was also conducted with 35 participants trained in fundamental education on the current state of AI tools, touching on machine learning, and spending most of the time on artificial neural networks, convolutional neural networks, and recurrent neural networks.

Biotechnology

Pollution Biomarkers in the Lakes

As a fresh start to restore the integrity of the Philippine lakes, the NRCP funded-research project by Dr. Michelle Grace V. Paraso and Vachel Gay V. Paller identified the biomarkers of pollutants affecting Philippine freshwater systems. A biomarker is a measureable substance in an organism whose presence is indicative of some phenomenon such as disease, infection, or environmental exposure.

The results from Laguna de Bay revealed highly detectable levels of estrogenic pollutants at the east and west sides. The result shows the applicability and sensitivity of biomarkers in assessing estrogen contamination of local freshwater resources. Dr. Paraso used common Carp *(Cyprinus carpio)* as biomarker of estrogenic pollutant. In the same manner, Dr. Paller used Tilapia parasite (*Aanthogyrus sp*., commonly called *Puting Bulate*) as a biomarker of heavy metal pollutants in the seven lakes of San Pablo City.

These projects are undertaken as part of the – SAKLAW Program or Saklolo sa Lawa R&D Program under the National Integrated Basic Research Agenda (NIBRA).

Nanotechnology

E-Bike Roof using VART Molding of Abaca Fiber-Reinforced Composite

The DOST-Industrial Technology Development Institute (ITDI) developed the e-bike roof using vacuum assisted resin transfer through the fabrication of abaca-fiber reinforced composite. The e-bike using abaca fibers (which are abundant and environment-friendly) is made up of lightweight material, has low heat conductivity and fuel efficient. The e-bike provides protection to passengers and drivers from the sun's heat.

Airframe for a Medium-Range, Short take-Off and Landing Unmanned Aerial Vehicle (UAV)

Through the collaborative undertaking with FEATI University and the Philippine Fiber Development Authority (FIDA), the DOST- ITDI has designed and fabricated an airframe for a medium-range, short take-off and landing UAV using thermoplastic abaca composite for the belly part. Prototypes of flat sheets for the belly part are now for further tests. The Institute is set to release two (2) prototypes of the UAV in April 2018. The UAV, popularly called "drone", is an aircraft without a human pilot aboard used for commercial, agricultural, scientific, and recreational applications.

AGENDA IV

STRENGTHEN AND UTILIZE REGIONAL R&D CAPABILITIES

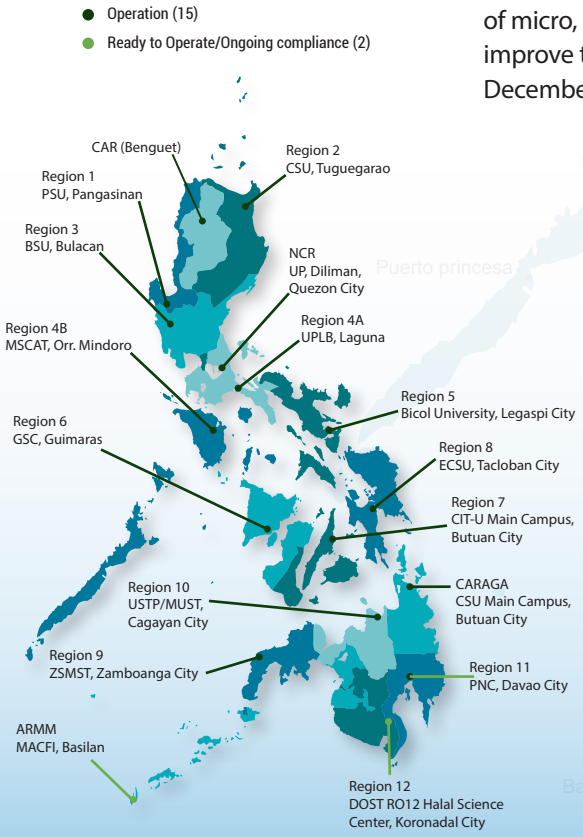
A critical step towards bringing science to the people and stimulating regional development is engaging stakeholders in the countryside in the conduct of STI activities, primarily R&D. The Department recognizes the need to strengthen and utilize regional capabilities on R&D, hence, partnerships with higher educational Institutions and other institutions are undertaken to further develop their capability to conduct R&D.

To set the stage, the DOST Regional Offices have already formulated their Regional R&D Agenda, while the DOST Sectoral Councils continued to support R&D of Regional Consortia. On the other hand, the Department laid down R&D capability building programs such as Niche Centers in the Regions for R&D (NICER) and R&D Leadership (RDLead) to mobilize the academic institutions and industries towards greater participation in the country's R&D.

NICER provides institutional grant for Higher Education Institutions in the regions to improve their S&T infrastructure and support them to undertake quality research that will promote regional development. Nationwide call for proposals and evaluation were held this year. The first set of capacity building projects will be implemented by national and state universities in the Visayas regions and will focus R&D capability building on environmental informatics, flora and fauna assessment, and mollusk species.

RDLead complements the establishment of R&D Centers through the NICER Program. RDLead provides the mechanism to bring in experts and highly skilled professionals to the regions. The RDLead and NICER Programs will capacitate HEIs to help improve and hasten the use of research results that will contribute to the socio-economic development of the country and help address pressing challenges.

Food Innovation Center (FIC)



Food Innovation Center (FIC) aims to enhance the innovative capacities of micro, small and medium enterprises (MSMEs) in the food industry to improve the quality of their existing products and/or develop new ones. As of December 2017, the following are the 16 FICs in the regions:

1. Benguet State University, CAR (Benguet)
2. Pangasinan State University, Region I (Pangasinan)
3. Cagayan State University, Region II (Tuguegarao)
4. Bulacan State University, Region III (Bulacan)
5. UP Diliman-College of Home Economics, NCR (Quezon City)
6. DOST-ITDI, NCR (Taguig City)
7. UP Los Baños, CALABARZON (Los Baños)
8. Mindoro State College of Agriculture and Technology, MIMAROPA (Oriental Mindoro)
9. Bicol University, Region V (Albay)
10. Guimaras State College, Region VI (Iloilo)
11. Cebu Institute of Technology, Region VII (Cebu City)
12. Eastern Visayas State University, Region VIII (Tacloban City)
13. Zamboanga State College of Marine Science and Technology, Region IX (Zamboanga City)
14. Mindanao University of Science and Technology, Region X (Cagayan de Oro)
15. Philippine Women's College in Region XI (Davao City)
16. CARAGA State University, Region XIII (Butuan City)

AGENDA V

Maximize utilization of R&D results through technology transfer and commercialization

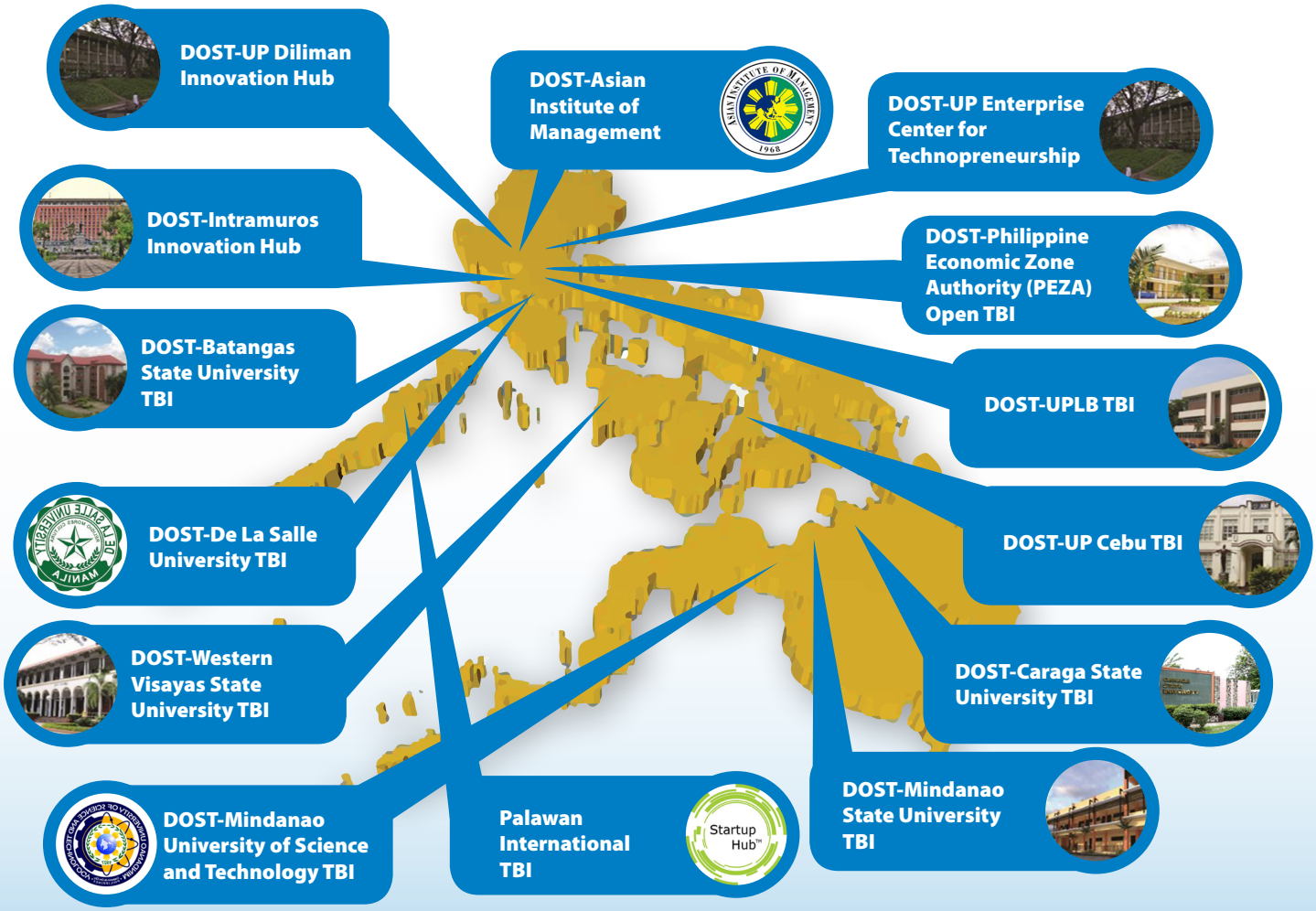



Technology transfer and commercialization is an integral part of ascertaining whether R&D have achieved positive results. Thus, the DOST has stepped up in formulating and updating existing policies and activities to fast track the dissemination, transfer, commercialization, and utilization of R&D results.

Technology Business Incubation (TBI) Program

Technology Business Incubation (TBI) is a facility designed to nurture and accelerate the establishment and growth of technology-based startups through the provision of business and mentoring support, offered both in the incubator and through its network of key players in the industry.

Since 2009, the PCIEERD has supported the establishment of 12 TBIs and two Innovation Hubs. These are:



Technology Promotion

The DOST-Technology Application and Promotion Institute (TAPI) is a strategic partner in advancing national socio-economic growth by advocating a culture of innovation and promoting globally-competitive and useful technologies.

The Institute has financed 46 science and technology exhibitions all over the country including the Technology Transfer Days and the celebration of the Regional and National Science and Technology Fairs and Exhibits.

The "Technology Transfer Day" project served as an excellent venue for the technology generators and potential adaptors to forge collaboration resulting to successful technology licensing agreements. The event features the ready technologies from the DOST – Research and Development Institutes (RDIs) for commercialization.

For 2017, there were five technology transfer days conducted in 5 regions namely: Regions II, III, VI, VII and X. The event had generated 167 signed term sheets and from these, 60 Fairness Opinion Reports (FORs) were issued and signed by the DOST Secretary. Out of the 60 FORs, 18 Technology Licensing Agreements (TLA) were already signed while the rest were in various stages of compliance.

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1. Awarding Ceremony during Technology Transfer Day, Cagayan De Oro City, Region X, September 8, 2017
2. Participants rushing to see exhibits during Technology Transfer Day, Cebu City, Region VII, June 20, 2017
3. Keynote speech by Sec. Fortunato T. de la Peña during Technology Transfer Day, Pampanga City, Region III, December 11, 2017

Intellectual Property Protection

As of December 31, 2017, a total of 670 Intellectual Property (IP) assistance was completed, 34 of which had successfully obtained patents and utility model certificates.

Some of the Utility Model (UM) / Industrial Design (ID) Registrations granted by the IP Philippines

DOST Staged "Science For The People" On S&T Week

The Department of Science and Technology (DOST) led the celebration of the 2017 National Science and Technology Week (NSTW) last July 11 to 15. All forums were held at Philippine Trade and Training Center while the exhibit areas were located at the World Trade Center. Carrying the theme "Science For The People", the 2017 NSTW highlighted S&T services, products, and research outputs that help improve the life of every Filipino.

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1. Some of the visitors experienced the Interactive Simulator of PAGASA

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2. DOST Secretary de la Peña delivered his opening message
3. Ribbon cutting ceremonies of DOST-IVA Regional Science and Tecnology Week (RSTW)

The exhibit was highlighted with the latest innovation technologies, products and research outputs from the sectors of health, biodiversity, food, transport and services, advanced technologies, and disaster risk reduction. Apart from the exhibits, there were activities conducted such as technology fora, technology demonstrations, interactive activities, career talks, film showing, journalism workshop, disaster summit, and other special events. The week-long event attracted a total of 56,209 visitors who experienced the wonders of science and technology.

Besides the national celebration, a series of Regional S&T Fairs including the Regional Invention Contest and Exhibits (RICE) were conducted in every region. The Regional S&T Fairs attracted at least 90,000 visitors from the academe (faculty and students), private & business organizations, entrepreneurs, and other government institutions. A total of PhP 2.6 million sales was generated from the S&T Bazaars based on the submitted reports from the DOST Regional Offices. Among the DOST's top technologies and services showcased in the Regional S&T Fair were the Small Enterprise Technology Upgrading Program (SETUP), One Expert, and One Store.

Awarding of Plaques to the winners of NSTW awards during the Opening Ceremony last July 11, 2017 at World Trade Center, Pasay City.

National Science and Technology Week (NSTW) Awards

The Department of Science and Technology, through the National Academy of Science and Technology, Philippines (NAST PHL), gave three major awards during the National Science and Technology Week Opening Ceremony last July 11, 2017 at World Trade Center, Pasay City. The awards aim to provide national recognition to exemplary S&T workers as a means of promoting S&T in the country. Each of the awardees received a cash prize, medal, and a plaque from NAST PHL.

The following are the annual awards, the 2017 awardees and their recognized contribution on their respective fields:

1. Recipients of the 2017 Outstanding Technology Commercialization Award (Gregorio Y. Zara Medal)
   - Mr. Jude L. Sasing, Dr. Ilustre I. Guloy Jr., and Dr. Ramon B. Gustilo of Orthopaedic International, Inc.
     - Commercialization of the Axis Knee Replacement System

2. Recipients of the 2017 Outstanding Research and Development Award for Basic Research (Eduardo A. Quisumbing Medal) and for Applied Research (Julian A. Banzon Medal)

   Basic Research (Eduardo A. Quisumbing Medal)
   - Dr. Nathaniel P. Hermosa II (UP Diliman)
     - Pioneering research on "Subluminal Group Velocity and Dispersion of Laguerre Gauss (LG) Beams in Free Space"

   Applied Research (Julian A. Banzon Medal)
   - Dr. Lucille P. Abad (Philippine Nuclear Research Institute)
     - Research on "Radiation Modified Carrageenan as Plant Food Supplement (CPFS)"
   - Dr. Maria Patricia V. Azanza (UP Diliman and Industrial Technology Development Institute)
     - Scientific research on the application of laboratory-developed food technology to real-life situation titled "Technology for a Social Cause: Formulated Emergency Relief Foods for Super Typhoon Yolanda (Haiyan) Survivors"

3. Recipient of the 2017 Outstanding Science Administrator Award (Dioscoro L. Umali Medal)
   - Dr. Raymond Girard R. Tan (De La Salle University)
     - Accomplishments as Vice Chancellor for Research and Innovation of De La Salle University

2017 Outstanding Young Scientist (OYS) Awards

This year, the eight Outstanding Young Scientists (OYS) who successfully met the high standards of excellence and have earned themselves worthy of their achievements and accomplishments were also presented during the NSTW.

Awarding of Trophies to the winners of 2017 Outstanding Young Scientist Awards during the NSTW Opening Ceremony last July 11, 2017 at World Trade Center, Pasay City.

The winners of 2017 Outstanding Young Scientist Awards and their field of specializations are:

1. Mr. Phillip A. Alviola, University of the Philippines Los Baños (Wildlife Studies)
2. Dr. Aletta Concepcion T. Yñiguez, University of the Philippines Diliman (Marine Biology and Fisheries)
3. Dr. Lanndon A. Ocampo, University of San Carlos (Industrial Engineering)
4. Dr. Mario Antonio L. Jiz II, Research Institute for Tropical Medicine – DOH (Medical Science)
5. Dr. Nathaniel P. Hermosa II, University of the Philippines Diliman (Physics)
6. Mr. Jeffrey S. Perez, Philippine Institute for Volcanology and Seismology – DOST (Civil and Environmental Engineering)
7. Dr. Jayeel S. Cornelio, Ateneo de Manila University (Sociology)
8. Dr. Krista Danielle S. Yu, De La Salle University (Economics)

Delegates of the International Conference on Green Technologies for Achieving SDG on November 28, 2017 at the Park Terraces, Makati City

Asian and Pacific Centre for Technology Transfer (APCTT)

In 2017, DOST-TAPI as the recognized focal agency of the Asian and Pacific Centre for Technology Transfer (APCTT) of the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) in the Philippines hosted the 13th Session of its Governing Council (GC) on November 28-30, 2017 in Manila, Philippines. Thirteen (13) representatives from member States comprising of Bangladesh, China, Fiji, India, Indonesia, Islamic Republic of Iran, Malaysia, Pakistan, The Philippines, Republic of Korea, Sri Lanka, Thailand and its new member, Kazakhstan attended the Governing Council and gave advises and recommendations on the formulation and implementation of the program of work for CY 2018 and, reviewed the administration and financial status of the Centre.

Highlighted during the event was the election of a chairperson and vice chairperson for the GC, wherein Director Edgar I. Garcia was once again re-elected as the chairperson for the second term for the period 2017-2020 and the conduct of the International Conference on Green Technologies for Achieving Sustainable Development Goals attended by 77 participants from countries across Asia and the Pacific constituted the high-level substantive segment of the 13th session. The conference deliberated how governments can promote the transfer and adoption of green technologies for sustainable future.

Technology Innovation for Commercialization (TECHNICOM)

The TECHNICOM is a support program implemented by DOST-TAPI to bring R&D results to their final stage of development up to commercialization. In 2017, the TECHNICOM Program funded 12 projects from various State Universities and Colleges (SUCs), private Higher Education Institutions (HEIs), RDIs and start-up companies. Post-completion activities were also conducted to assess the impact of the technologies. An investment of almost PhP 49 million was allocated for the following technologies, i.e., Village-Type Cacao By-products Processing Enterprise, Mosquito-Repellent Patch, Portable

Potable Water Equipment for Disasters and Emergencies (PWEDE), Electronic Procurement System (ePS) for Government Agencies, Foam Shredding Machine, eHATID, Universal Sensing Meter for Instruction and Laboratory Experiments (U-Smile), Mechanical Carrot Washer Cum Sorter, R-TAP (an advance pressure management system for water utilities), Abaca Fiber-Reinforced Composite for Boat Application, Mechanical Cacao Shellter, and Single Bed Potato Digger.

The TECHNICOM Program also provided trainings to its stakeholders to further strengthen their entrepreneurial capabilities. Trainings on strategic business, planning and marketing strategies were conducted in partnership with expert partners in the field.

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The TECHNICOM funded technologies have garnered nominations and awards from prestigious governing bodies including the 2017 Alfredo M. Yao (AMY) IP Awards, Civil Service Commission's Pagasa Award, and the Benita and Catalino Yap Foundation (BCYF) Innovation Awards.

1. TECHNICOM-sponsored Training on Strategic Planning with SAS Management conducted on November 21-22, 2017
2. TECHNICOM-sponsored Training on Marketing Stategies with Trust Management Center conducted on November 23-24, 2017

Launching of Collaborative R&D to Leverage Philippine Economy (CRADLE) and Business Innovation through S&T (BIST)

The Collaborative R&D to Leverage Philippine Economy (CRADLE) and Business Innovation through S&T (BIST) had been launched by DOST-Office of the Undersecretary for Research and Development as mechanisms to boost the productive and innovative capacities of S&T institutions and firms, particularly in the regions. The CRADLE Program aims to bridge the academe and the industry to create a seamless flow of research outputs to practical applications and stimulate collaboration to meet the needs of both academe and industry. On the other hand, the BIST Program paves the way for the acquisition and adoption by Filipino companies of emerging and strategic technologies to stimulate wealth creation and enhance the global competitiveness of industry-specific Filipino companies.

AGENDA VI

Develop STI human resources and build a strong STI culture

Human resources is an integral part in the economic growth and development of a country. Thus, the DOST provides scholarship and training programs to develop and achieve higher standard of STI human resources; produce critical mass of globally competitive scientists, researchers, and engineers; and build a strong STI culture.

Grade 12 student Hillary Diane Andales from the Philippine Science High School- Eastern Visayas Campus in Palo, Leyte bagged the grand prize of the 3rd Breakthrough Junior Challenge on December 3, 2017 (December 4 in Manila) at the NASA Ames Research Center in Silicon Valley, California, USA.

Provision of Specialized Secondary Education

The DOST-Philippine Science High School (PSHS) System continues to uphold excellence in all its endeavors. With its mandate to provide a free scholarship basis for secondary education with special emphasis on the sciences, PSHS scholars have proven in this year's achievements that they are ready for a science career. In 2017, the PSHS system has supported a total of 7,882 scholars from the 16 regional campuses.

This year, a number of campuses have already taken the Scholastic Aptitude Test (SAT), a standardized test widely used for college admission in the world's best universities. Campuses who took the 2017 SAT scored 1238, on the average, which is above the minimum mean of the total score of those who took the exam.

One major achievement in 2017 was the remarkable award given to Hillary Diane Andales from the PSHS – Eastern Visayas Campus on December 13, 2017 when she took home the Breakthrough Junior Challenge (BJC) Prize during the awarding ceremony held at National Aeronautics and Space Administration (NASA) in California. The grade 12 student triumphed over 11,000 students from 178 countries across the globe who joined the BJC global science video competition, with the video she made about Relativity and Equivalence of Reference Frames. The video became remarkable with its efforts to make complex concepts in Physics understandable to the layman. Andales went home with her USD 250,000 post-secondary scholarship, USD 50,000 prize for her coach Xavier de los Santos, and USD 100,000

Breakthrough Science Laboratory for PSHS. Overall, PSHS scholars from all campuses have participated in international events, wherein, about 469 awards and recognitions were received for individual and group categories at international and national levels.

PSHS Infrastructure Development

As the PSHS Campuses expand with new campuses and the implementation of the Specialization Years Program (SYP), development of infrastructure projects of the campuses is one of the priorities. As of December 2017, there were 87 infrastructure projects awarded in the PSHS System, including ones under Medium-term Information and Communication Technology Harmonization Initiative (MITHI).

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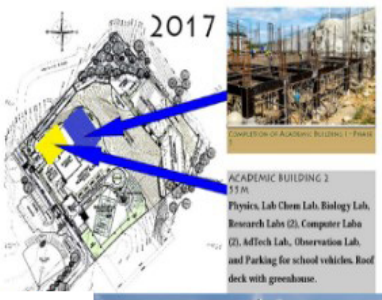

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1. Campus layout
2. Academic building
3. Administration building
4. Science lab and tech building
5. Canteen

Undergraduate and Graduate Scholarship Programs

The DOST-Science Education Institute (SEI) continues to implement various scholarship programs both in the undergraduate and graduate levels in collaboration with the DOST Regional Offices, Consortium-Universities (CUs) and other partner institutions. The S&T Undergraduate Scholarship Program includes the R.A. 2067 (The Science Act of 1958) or DOST-SEI Merit Scholarship Program, the R.A. No. 7687 (Science and Technology Scholarship Act of 1994), and the R.A. 10612 (Fast-Tracked Science and Technology Scholarship Act of 2013).In addition, the Junior Level Science Scholarship (JLSS) which is implemented to support the overall goal of increasing the number of scientists and engineers that will help boost knowledge creation and economic productivity in the country. There was an increase in the number of municipalities and congressional districts served, from 1,573 in 2016 to 1,587 in 2017 for the Undergraduate S&T Scholarship Program. The program supported 19,058 scholars in 2017.

The Institute is also supporting 2,832 scholars at the master's degree programs and 893 scholars at the doctoral degree programs in response to the need to develop high-level human resource to steer technology-based research capability. The Graduate S&T Scholarship Program includes the "Capacity Building Program in Science and Mathematics Education" that was implemented since 1994, the "Accelerated S&T Human Resource Development (ASTHRD) Program" that was developed in 2007, and the "Engineering Research and Development for Technology (ERDT) Program" that was established in 2008.

There was an 85% increase in the number of new slots offered which led to the 11% (from 20,618 in 2016 to 22,783 in 2017) increment in the total number of scholars supported for Undergraduate and Graduate S&T Scholarship Programs. Partnerships with the following consortium-universities were also strengthened:

- Ateneo de Manila University
- Bicol University
- De La Salle University
- Philippine Normal University
- University of Santo Tomas
- Mapua Institute of Technology
- Mariano Marcos State University
- Visayas State University
- Central Luzon State University
- University of the Philippines-College of Education
- University of San Carlos
- University of the Philippines-Diliman
- West Visayas State University
- University of the Philippines-Manila
- University of the Philippines-Los Baños
- Mindanao State University-IIT
- West Mindanao State University
- University of the Philippines-Visayas
- Mindanao State University - Marawi
- University of the Philippines – Open University

Moreover, employment opportunities for scholars were also given through the implementation of the "DOST Graduate Career Incentive Program (CIP)", which created job opportunities for 1,257 scholars. Furthermore, the agency also implemented the Filipino Patriot Scholar Project which benefitted1,258 scholars to foster patriotism among them; utilized 205 Patriot Scholars Corps (PASSCorps) for developing projects for Marawi and conceptualized Bangon Marawi Science and Technology Human Resources Development (STHRD) Program.

The CD/DVD Copies of Grades 1-6 Interactive Courseware in Mathematics and Grades 7-8 Interactive Courseware in Science and Mathematics.

DOST-SEI 21st Century Model Classroom

Innovative Approaches in Science Education

The DOST-SEI was able to maximize the use of information and communication technology (ICT) by exposing 2,536 students and teachers to advanced technology in the classroom that allows teacher to experiment more in pedagogy; promoting exciting ways to educate students by having more interactive experience in the classroom; and providing instant access to information that can supplement 12,313 teacher's teaching and student's learning experience through creating an online education resources.

Training of trainors on "Innovative Approaches for Teaching Science and Mathematics"

Teacher-Training Programs

Science Teacher Academy for the Regions (STAR), is a pool of capacity building efforts aimed to enhance the teaching and learning of science. This initiative is very timely with the transition of the country to the K to 12 basic education program. In response to this challenge, the DOST-SEI established linkages with 16 partner-universities to provide innovative trainings in Science, Technology, Engineering and Mathematics (STEM).

Young Innovators Program (YIP)

Signing of Memorandum of Agreement with the grantees of Young Innovators Program held on August 9, 2017

The DOST-PCIEERD launched the YIP in 2017 to provide funding to promising scientists and engineers and up-and-coming researchers with innovative research direction to pursue pioneering work leading to quality thesis/dissertation, publication or product/ invention. The program aids in ushering young high school students, to independent research and encourage new, innovative research areas. It is open to young talented researchers who wish to gain research experience by engaging in a research activity under a mentor. Five teams and two individuals were recognized as YIP grantees during the 7th anniversary of PCIEERD on June 29, 2017 out of the 97 applications.

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1. Pilot testing of elementary module with Upper Bicutan Elementary School, Bicutan, Taguig City held on November 29, 2017
2. Trainor's training for Elementary Module held on August 7-8, 2017 at DOST Compound, Taguig City

Invent School Program (ISP)

The DOST-TAPI's Invent School Program (ISP) broke new ground in 2017 by opening its doors to Elementary pupilsin creating awareness on IP rights, creativity and invention development. A module for elementary level was developed and training for the would-be trainers was completed on August 8, 2017. Also, a set of pilot testing for the developed module was also implemented.The full implementation deploys early 2018.

The Program serves as a platform in developing ones' creative knowledge which is needed in invention and prototype development as a crucial starting ground for young Filipino inventors, and has already trained 5,585 students from College and High School levels.

In addition, collaborative works with private and public schools in cooperation with Local Government Units (LGUs) and Non-Government Organizations (NGOs) and the DOST regionals arms were forged to implement the program.

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1. Students tried using STARBOOKS.
2. 52nd Anvil Awards held on March 10, 2017

Science and Technology Academic and Research-Based Openly Operated Kiosk Stations (STARBOOKS)

STARBOOKS is the first digital science and technology library in the Philippines. It has proven its merit as a stand-alone information and learning resource in schools and communities with limited or no access to libraries or Internet connectivity. In the process, the DOST, through Science and Technology Information Institute (STII) and STARBOOKS, was able to carry out its mandate to provide S&T information to stakeholders, as well as stimulate public interest in science and technology.

In March 2017, STARBOOKS was recognized by the Anvil Awards, the most prestigious award-giving body in public and corporate relations. The 52nd Anvil *Gabi ng Parangal* saw STARBOOKS win the Gold Anvil for Public Relations Program and Silver Anvil for Public Relations Tool in Multimedia/ Digital. In a field of over 400, it landed in the third spot toward the Grand Anvil.

STARBOOKS also became a finalist in the 2017 Government Best Practice Recognition, a nationwide search conducted by the Development Academy of the Philippines (DAP) to identify best practices in government and cultivate the culture of business excellence in the public sector.

A total of 860 new sites have become STARBOOKS recipients in 2017, raising the grand total of STARBOOKS sites to 2,103 throughout the country. STARBOOKS has also partnered with a growing number of companies and organizations, among which include the United Nations (UN) World Food Programme (WFP), Front Learners, and the Coastal and Marine Resources Management in the Coral Triangle Program of the Asian Development Bank.

DOSTv: Science For The People

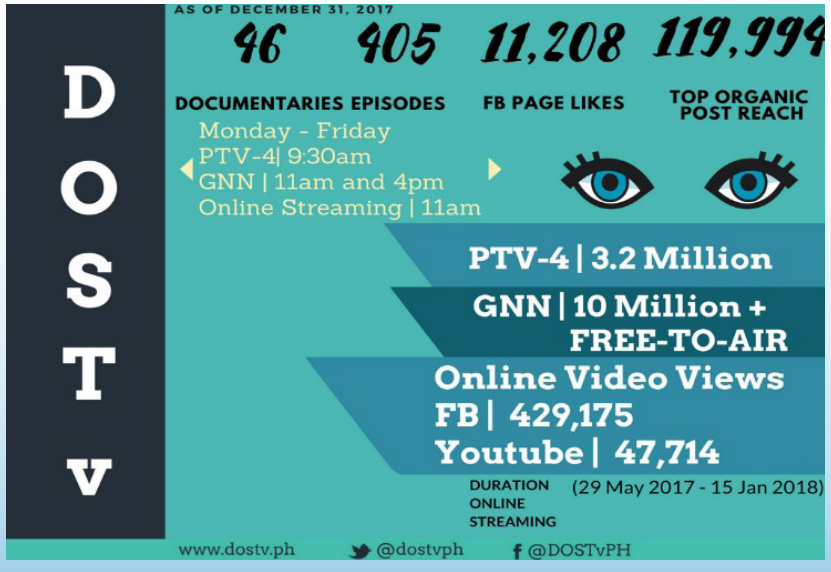
DOSTv: Science For The People is the official weather, science and technology television and online program produced by the DOST Science and Technology Information Institute (DOST – STII). On February 27, 2017, DOSTv was officially launched, coinciding with the 30th Anniversary of the DOST – STII. The programs also made a rebrand into "DOSTv: Science For The People", with new graphics, broadcast design and additional segments.

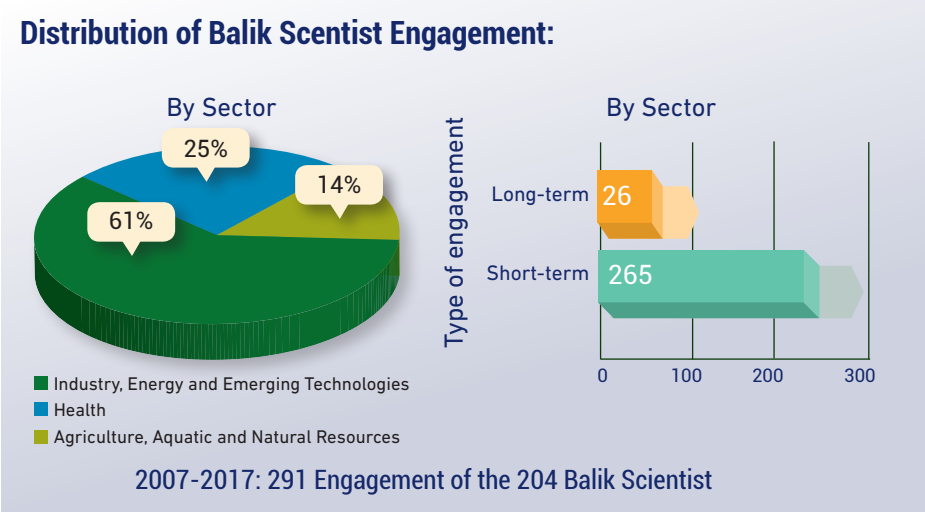
DOSTv: Science for the People is currently being broadcast nationwide on free television via state-owned People's Television Network Channel 4 (PTV4) from Monday to Friday at 9:30 a.m. and on cable and satellite TV thru Global News Network (GNN) from Monday to Friday at 11:00 a.m. and 4:00p.m. It also airs on its website www.dostv.ph, and on the new DOSTv mobile app. The streaming of the daily broadcast can also be accessed via www.facebook.com/DOSTvPH and www.dostv.ph/youtube.

Data from Kantar Media, a market research firm specializing in broadcast media audience analytics, showed a 700% increase in average viewership per minute of DOSTv based on the comparative rating of DOSTv in PTV-4 from May to June and the July to September 2017 rating.

In addition, on December 18, 2017, the DOSTv: Science For The People TV program received from the Rotary Club of Pasay *Sinagtala* and Eurotel the "*Dangal ng Bayan, Gawad Pilipino* Award' as the Media People's Choice Award for the Most Trusted Science TV Program," while its host Ms. Gel Miranda earned the "Most Outstanding Science TV host of the Year." In-house monitoring of the shows is regularly being done particularly for social media sites like Facebook and YouTube as well.

DOSTv Analytics, Airtime, and Viewership as of December 31, 2017



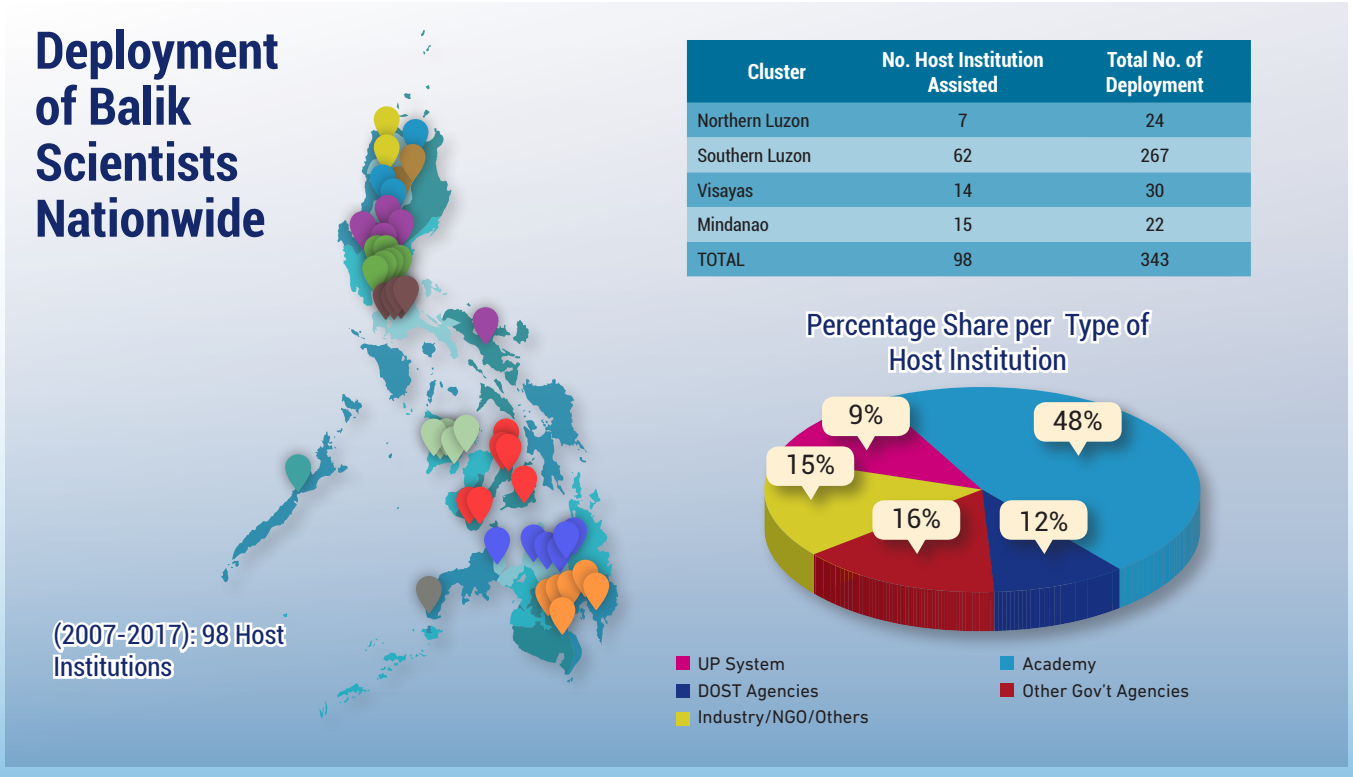


Balik Scientist Program (BSP)

The DOST, through its Councils continues to encourage Filipino Scientists or Scientists of Filipino descent to return to the Philippines to share their expertise to strengthen the scientific and technical human resources of the academe, the public and private institutions including the industry to accelerate the flow of new and strategically important technologies that are vital to national development.

As of December 2017, 492 Balik Scientists were encouraged to return to the Philippines to share their expertise. These 492 Balik Scientists were able to participate in 598 engagements servicing the requirements of the academe, public/government agencies, and the industry.

For the period 2007-2017, 204 Balik Scientists from 5 continents were convinced to return to the Philippines to deliver 343 engagements benefiting 98 host institutions nationwide. Out of the 204, 30 have been repatriated.



AGENDA VII

Upgrade STI facilities and capacities to advance R&D activities and expand S&T services




The DOST provides access to S&T facilities and technical services to assist researchers and firms in carrying out innovation activities, improving production efficiency and product quality, and keeping them abreast of the latest technological developments. Technical services have been provided to DOST clients in the form of testing and calibration services, packaging and labelLing assistance, and technical consultancy services.

Advanced Device and Materials Testing Laboratory (ADMATEL)

ADMATEL is the country's first national testing facility for the electronics and semiconductor industry. It was established to reinforce and upgrade the Failure Analysis (FA) and Advanced Materials Characterization (AMC) capability of our local industry, provide shorter turn-around time for analysis and offer less expensive testing services. In 2017, the laboratory serviced 138 customers, generating PhP 15.694 million in income.

ADMATEL Building in the DOST Compound, Bicutan, Taguig City

Electronics Product Development Center (EPDC)

The Electronics Product Development Center (EPDC) has served the electronics industry, the academe as well as some government agencies offering its Electromagnetic Compatibility (EMC) Test Services as well as its Electronic Product Prototyping (EPP) Services where 48 EMC and other Test Services have been rendered and 498 PCBs are fabricated and assembled combined in 2017. It is slowly gaining clients from the local electronics industry including small and medium enterprises as well as students from the academe and projects from the government. Different entities have also expressed great interest in collaborations and tie-ups to utilize the facilities of EPDC.

The EPDC has been graced with a visit by Mr. Olivier Midiere, MEDEF Ambassador for Digital Economy on May 31, 2017. He was accompanied by Ms. Rapunzel Acop from the Philippine Embassy in Paris and Mr. Froilan Pamintuan from the DTI based in Paris. MEDEF is the largest federation of French entrepreneurs with over 750,000 member companies and Mr. Midiere's mission is to create a program for these companies in order to educate and accompany them in their companies' digital transformation.

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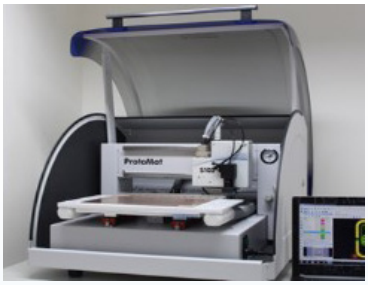

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1. PCB Prototyping equipment
2. Printed Circuit Board (PCB) fabricated in EPDC
3. MEDEF Ambassador with Representatives from DTI and Philippine Embassy in Paris along with EPDC Engineers

Mr. Diosdado "Dado" Banatao also visited EPDC on June 8, 2017 accompanied by DOST Undersecretary Rowena Cristina L. Guevara, DOST-PCIEERD Executive Director Carlos Primo C. David, and DOST-ASTI Director Joel Joseph S. Marciano, Jr. During his visit, he shared his insights and ideas on possible future collaborations with EPDC.

Auto-Parts Testing Laboratory (ATL)

The DOST-Metals and Industry Research and Development (MIRDC) developed the Auto Parts Testing Facility (ATF), now known as ATL, to provide testing facility for local parts manufacturers to improve product quality and at the same time minimize expenses otherwise used for overseas testing. It has a range of equipment for testing services such as hardness measurement of metallic material and rubber, thickness measurement for base metal, simulated crash analysis, tire endurance testing, and accelerated corrosion tests.

Partnerships with Philippine Parts Maker Association (PPMA) and Motorcycle Development Program Participants Association (MDPPA) were developed for the establishment of a comprehensive testing facility for active safety systemv of vehicle (i.e. safety belt, anchorage, car seat, head rest, airbags) using the Sled System.

Gear Making and Assembly Facility

The facility is one of the projects under the *Makinarya at Teknolohiya Para sa Bayan (MAKABAYAN)* Initiative. The facility brings together innovative measures to boost local capabilities in gear design and prototype production for the development of gear assembly manufacturing industry. It focuses not only on transport but also on metalworking and agro industrial applications.

In 2017, nine major equipment including gear design and CAM softwares were delivered and successfully installed, such as gear measuring equipment, dynamic balancer (CIMAT-1500 H2P), CNC 5-axis vertical

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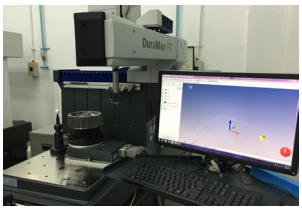
1. CNC 5 -Axl Vertical Machining






2. Vacuum Carburizing Machine
3. Dynamic Balancer
4. Gear Measuring Equipment
5. CNC Gear Shaping Machine
6. CNC Shaving Machine
7. CNC Gear Hobbing Machine

machining center (Okuma MU-6300V), CNC gear hobbing machine (GE25A), vacuum carburizing machine, CNC gear shaping machine (ST25CNC) and CNC gear shaving machine (FE30A).

National Furniture Testing Center

Plastic school tablet armchair for DepEd procurement bidding and upright chair for export undergoing performance and stability testing respectively

In 2017, the FPRDI Furniture Testing Center (FFTC) has served 50 customers from Metro Manila, Batangas, Bulacan, Pampanga, Pangasinan, Cebu, Lanao del Norte and Davao del Sur with a total of 218 test samples and a total revenue of PhP 2.5 million. All the samples were evaluated on their strength and durability following PNS ISO 7173: 2006 (Chairs and stools-Determination of strength and durability) and PNS 1478:1998 (Furniture-Monobloc chair, monobloc stool and plastic table) test standards. Majority of the samples tested were school tablet armchair for DepEd bidding requirements and Monobloc chair and stool for PS and ICC mark issuance of the Bureau of Philippine Standards. Other samples that were tested are furniture for export.

Radiation Processing Facilities

Multipurpose Irradiation Facility

Whether by gamma rays or electron beams, PNRI's irradiation facilities have once again proven useful to the industrial, medical, government and academic sectors engaging in radiation processing and in advanced research applications. These services are provided using PNRI's three irradiation facilities namely: Multipurpose Irradiation Facility, Gamma Cell 220 and Electron Beam Irradiation Facility.

Multipurpose Irradiation Facility (MIF)

The PNRI operates a multipurpose gamma irradiation facility which can be used for the following applications: 1) Reduction of microbial load or decontamination of spices, herbal products, dehydrated vegetables, and cosmetic raw materials and accessories; 2) Sterilization of single-use, disposable medical devices; 3) Sprout inhibition of onions, garlic, and potatoes; 4) Quarantine treatment of fruits and vegetables; and, 5) Elimination of disease-causing microorganisms in food.

The facility was upgraded to a semi-commercial scale to improve the performance of the irradiator, resulting in a higher throughput of the facility. In 2017, 33,795 bags/boxes from 91 clients (47 from industry, 36 from academe, 3 from research institutes and 5 from PNRI) were irradiated at the MIF.

Preparation of products for irradiation

Gammacell - 220 Facility

The Gammacell-220 is a self-shielded irradiator used for irradiation of small volume of samples, making it more suitable to provide special services for academic and research clients. It is also used for calibration of dosimeters. This year, 307 samples from 28 clients (1 from industry, 1 from research institute, 23 from academe and 3 from PNRI) were irradiated at the GC-220.

Gammacell - 220

Electron Beam Irradiation Facility (EBIF)

As the next step in PNRI's use of irradiation technologies, the 2.5 MeV electron beam (EB) irradiation facility is the first of its kind in the country intended for full-scale research and development and semi-commercial EB services.

The newly established EB irradiation facility opens more applications of radiation such as improving the quality of semiconductors, automobile parts/tires, O-rings, wires and cables and production of nanomaterials, among others. This can also be used in radiation sterilization of medical devices, food irradiation, radiation crosslinking, degradation or grafting of polymers and for surface curing.

Electron Beam Irradiation Facility

Isotope Ratio Mass Spectrometry (IRMS) Facility

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The Isotope Ratio Mass Spectrometry Laboratory (IRMS Lab) is part of the facilities under the Environmental Isotope Center of PNRI. The IRMS lab was established initially for the Isotope Hydrology studies, but later on IRMS was found practical for food authenticity testing, sediment nutrient origin tracing, and other applications employing the applications. The IRMS facility houses the IRMS and peripherals for solid and water analyses, and a laser-based stable isotope analyzer for fresh water samples.

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1. The isotope ratio mass spectrometer (IRMS) of PNRI
2. The Laser-based water isotope analyzer of PNRI

Metrology building in the DOST Compound, Bicutan, Taguig City

Metrology Facilities & Services

The DOST-ITDI introduced new calibration services involving short gauge blocks by mechanical comparison, high-accuracy hydrometers, determination of solid and liquid density and lux meters. New receiving and releasing system was also introduced to improve delivery of services to its clients.

In the five-year framework of modernizing the National Metrology Laboratory to cover relevant measurement fields needed by the country, enhancement of metrology facilities and services including augmentation of personnel commenced in 2017. Six measurement areas were prioritized: mass, density, volume, length, temperature and humidity. A total of 81 equipment and standards have been delivered in September 2017. The NML is now supported with additional six Science Research Specialists designated and trained in their respective laboratories and are now conducting calibration services for clients.

AGENDA VIII

Expand STI assistance to communities and the production sector, particularly MSMEs




This Agenda encompasses all programs, projects and activities which are related to provision of STI services to enhance the productivity and efficiency of the target customers, particularly the MSMEs.

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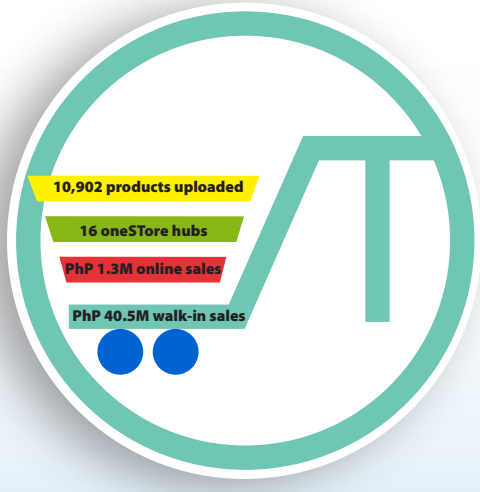
1. Equipment acquisition leads to faster production and increased sales.
2. Labelling and packaging of herbal tea product.

Small Enterprise Technology Upgrade Program (SETUP)

Technology transfer and commercialization by MSMEs are made possible through the continued implementation of the Department's flagship programs – Small Enterprise Technology Upgrade Program (SETUP) implemented by the DOST Regional Offices. Through SETUP, MSMEs are provided with technology intervention packages in the form of innovative and cost-effective facility, human resource development, and technical consultancy services, among others. This program is aimed at empowering MSMEs so they may apply innovation in their firms, move up the technology scale, and become more competitive thereby improving productivity, substantially generating value-added and employment to increase the country's overall manufacturing growth. Said program has also created a high level of awareness among firms that technology has a very critical impact on their operations and pave the way for better profitability, improved productivity and better products and processes as well as the development of new products for the market, among many others. In 2017, a total of 769 MSMEs received innovation system support fund and adopted technological interventions for enhanced productivity and competitiveness. Furthermore, a total of 5,600 technology interventions such as process and system improvement, training, technical consultancy services, product development, testing and calibration, and packaging and labelling assistance were provided during the year. SETUP has already benefitted thousands of MSMEs, resulting in more competitive MSMEs in the country.



One Store

To help MSMEs expand their customer reach, increase brand awareness, save up on operational costs for opening up new physical stores, and overcome geographical limitations, DOST established the oneSTore.ph program, which promotes both "e" and "m"-commerce. MSMEs who are beneficiaries of SETUP are able to use the platform to sell their products for free. In 2017, the onestore.ph online and mobile shopping platform has uploaded a total of 10,902 products and recorded a total transaction amounting to PhP1.3 million. Visit to OneSTore website has reached 10 million hits. Data analytics showed that the top visitors of the portal are from the United States, South Korea, and China. There are also site visitors from Russia.

1. Sec. Fortunato T. de la Peña of DOST places an order on onestore.ph during the MOA signing with the Filipino Inventors Society Producer Cooperative (FISPC).
2. oneSTore was a finalist in the Benita and Catalino Yap Foundation (BCYF) Awards 2017.

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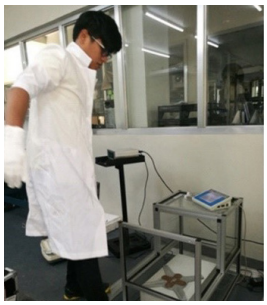
OneLab: One Stop Laboratory Services for Global Competitiveness

Firms, researchers and students can now easily access laboratory testing services at a single touch point through https://web.onelab.ph/

The One-stop Laboratory Services for Global Competitiveness (OneLab) project is an IT-based solution, envisioned to broaden public access to testing services of all the member-laboratories in the network at a single touch point. OneLab integrates participating laboratories from across the country through an IT-based Referral System. This allows for seamless handling of samples from receiving, referral, transport, analysis to the prompt delivery of calibration and testing reports wherever the customers are. The customers need not shuttle from one laboratory to another to have access to all their testing and calibration needs. The customers are also provided with accurate and complete instructions regarding their testing requirements as well as on-line access to track the status of their test requests. In 2017, two laboratories in the Association of South East Asian Nations (ASEAN) joined the network and new tests/services were being offered such as arsenic in water, lead, water activity, fatty acid, pencil hardness test, push-pull test, pork DNA detection, crude protein, calibration of liquid-in-glass and thermometers, calibration of enclosures (ovens and climatic chambers), and calibration of bimetallic thermometers (Analog).

1 

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1. Calibration Laboratory - Calibration of Mass Standard
2. Microbiology Laboratory - Quality Control of Culture Media
3. Furniture Testing Laboratory - Lag Test
4. Chemistry Laboratory - Testing for protein

Consultancy Services/ One Expert

To improve the overall performance of MSMEs, government-subsidized consultancy services are provided to MSMEs to help them improve their operations and intelligently exploit their resources to make them even more competitive. Among the consultancy services provided are:

1. Manufacturing Productivity Extension (MPEX) Program, which involves the deployment of industry experts, productivity specialists and other technical experts to assist MSMEs in the manufacturing sector to provide recommendations for the improvement of the firms' overall operations to achieve higher productivity;
2. Food Safety (FS) Program, which involves the deployment of food safety experts to assist food processors in complying with statutory requirements;
3. Energy Audit (EA) Program, which involves the systematic analysis of an energy consuming facility within a defined energy audit scope by examining existing practices on energy utilization and identifying strategies and alternatives to reduce energy costs and improve energy efficiency;
4. Cleaner Production (CP) Program, which involves the deployment of industry experts, productivity specialists, and other technical experts to assist MSMEs by determining and recommending integrated preventive environmental strategy to processes to increase efficiency, reduce waste in their production process, and reduce risks to humans and the environment;
5. Consultancy for Agricultural Productivity Enhancement (CAPE) Program, which aims to institutionalize effective farm management strategies, including transfer and commercialization of appropriate technologies, to

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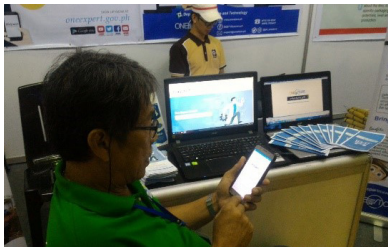
1. Energy Audit

To improve access to experts and technologies particularly by people living outside of the major urban centers, an interactive web-based nationwide pool of S&T experts was created.



2. Access to expert advice is made more easy through OneExpert mobile app

improve agricultural and aquaculture productivity; and

6. Consultancy for Agricultural and Manufacturing Productivity Improvement (CAMPI) Level-Up Program, which provides consultancy services to Small and Medium Enterprises (SMEs) to attain higher productivity through the identification and installation of productivity improvement strategies in the agriculture and manufacturing sectors throughout the country.

To improve access to experts and technologies particularly by people living outside of the major urban centers, an interactive web-based nationwide pool of S&T experts was created. The program, dubbed as One Expert, brings the services of accredited expert located anywhere in the Philippines to clients that need S&T assistance. To date, there are 530 registered S&T experts from DOST Regional Offices and other DOST agencies. In 2017, a total of 3,012 S&T services were provided by our S&T experts to over 5,000 firms and other clients from all over the country. The project portal recorded a total of more than 600,000 website visits for the period.

Community Empowerment through Science and Technology (CEST)

Community Empowerment through Science and Technology (CEST) is a package of S&T interventions which aims to build progressive and empowered rural communities. Its target beneficiaries are the economically disadvantaged communities in the country. As of 2017, the program has assisted a total of 553 communities and provided S&T interventions through the five CEST entry points: (1) water and sanitation; (2) basic education and literacy; (3) livelihood enterprise development; (4) health and nutrition; and disaster risk reduction (DRR) and climate change adaptation (CCA).

Series of trainings about DOST PINOY Modules were conducted to Barangay Nutrition Scholars, Barangay Health Workers, and parents on proper meal management, preparations of complementary foods and other strategy to curb malnutrition in their community.

Assisted **553** Communities

Distrubuted **5,963** Ceramic Water filter

Deployed **283** Starbooks Units

Granted **299** scholarships

Installed **50** Water Level Monitoring Devices (WLMS); **104** Automatic Rain Gauge (ARG); and **11** Tandem (WLMS + ARG)

Benefited **8,288** children under the feeding program

Implemented **223** technology-based projects

Water filters with waterine solutions were distributed to residents to ensure potability of water supply especially during the rainy season. These devices are then monitored for efficacy after a year of use.

Farmers updated their knowledge in coffee production and processing as they participate the training on "Quality Production of Coffee from Seed to Cup."

AGENDA IX

PROVIDE STI-BASED SOLUTIONS FOR DISASTER RISKS AND CLIMATE CHANGE ADAPTATION AND MITIGATION



Committed to provide science-based climate and disaster risks information and services with associated impact assessments, the DOST continues to develop appropriate mitigation strategies for a disaster and climate change resilient Philippines.

The accomplishments under this Agenda are divided according to the following namely, 1) observation and monitoring systems, 2) hazard and risk assessment, 3) warning and risk communication, 4) disaster risk management, 5) climate change adaptation and mitigation, 6) capacity building and 7) policies, plans, and partnerships.

Observation and Monitoring Systems

1. Zamboanga Station
2. Guian Station

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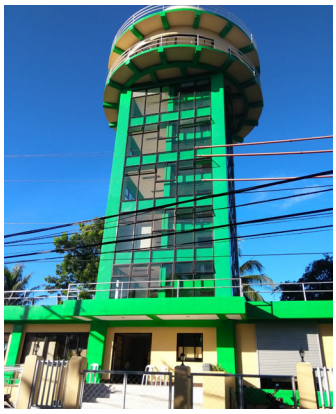

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Doppler Radars

The establishment of Doppler Radars in strategic locations nationwide has significantly contributed to the agency's forecasting capability. In 2017, there were 22 Tropical Cyclones that entered the PAR and these typhoons were tirelessly monitored by the agency for the issuance of advance and accurate warnings to all stakeholders and to the general public.

To date, there are 12 Doppler Radars and three mobile X-Band Radars. The 12 operational Doppler Radars are located in Subic,Tagaytay, Mactan, Hinatuan, Iloilo, Tampakan, Quezon in Palawan, Zamboanga, Aparri and Virac, while the three mobile X-Band Radars were deployed in Mindanao, Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) Central Office and in Baler.

Establishment of Flood Forecasting and Warning System (FFWS)

A Flood Forecasting and Warning System (FFWS) consist of a building and hydro-meteorological monitoring facilities. This system is designed to cater directly to the needs of the communities directly affected by floods through the forecasts and warnings provided by the local river centers. In short, it is a form of downscaling the flood warning service from a national to municipal scale, therefore bringing PAGASA's services closer to the people.

In addition to the existing and operational Flood Forecasting and Warning System located in Pampanga, Agno, Bicol, Cagayan, Pasig-Marikina, two more established and operational FFWS were added in 2017 located in Tagum-Libuganon and in Cagayan de Oro. To date, PAGASA is establishing more FFWS in major river basins in particular nationwide.

Online live streaming monitor

Improvement of Volcano Monitoring Systems

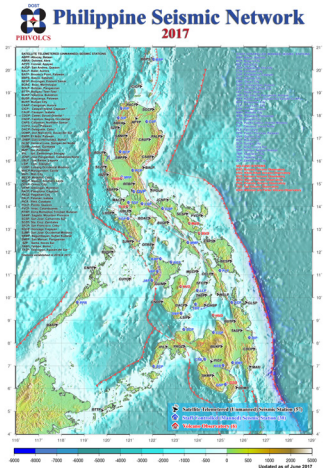
The Philippine Institute of Volcanology and Seismology (PHIVOLCS) has emplaced integrated multi-parameter and real-time monitoring technologies in eight monitored volcanoes. Cameras were also installed in

four volcanoes for online live streaming and real time visual monitoring. In line with a fully operational real-time broadband seismic upgrade for PHIVOLCS' volcano monitoring networks, five (5) volcano networks were upgraded with 24/7 operational real-time broadband seismic arrays, namely: Bulusan Volcano, Pinatubo Volcano, Taal Volcano, Parker-Matutum Volcanoes, and Kanlaon Volcano. Volcano networks in Kanlaon, Pinatubo, and Parker-Matutum Volcanoes were also upgraded with 24/7 operational near real-time and web-accessible visual monitoring systems using IP cameras. These enhancements would improve the capability of PHIVOLCS volcanologists in the local observatory and in the main office in Quezon City to monitor closely and in real-time any volcanic activities.

Earthquake and Sea-level Data Receiving Center

Improvement of Earthquake Monitoring Systems

PHIVOLCS has commissioned four new seismic stations into operationalization in 2017 namely: Pikit, Cotabato; Bacolod, Lanao del Norte; Guihulngan City, Negros Oriental; and Cadiz City, Negros Occidental. Thus, PHIVOLCS currently operates a 96-station Philippine Seismic Network capable of monitoring earthquakes and providing accurate and timely information. It has also commissioned three strong motion stations into operationalization namely in: Palo, Leyte; Kidapawan City; and Dipolog City.



Map of the Philippine seismic network, 2017

PHIVOLCS has commissioned four tsunami monitoring stations as well in: Kalamansig, Sultan Kudarat; Zamboanga City; Ivana, Batanes and Lawaan, Eastern Samar, further enhancing its capability in detecting local and distant tsunamis. PHIVOLCS' tsunami monitoring stations was able to detect the tsunami generated by the April 29, 2017 magnitude 7.2 Sarangani earthquake, and disseminate accurate and timely information to the stakeholders.

PHIVOLCS installed two intensity meters in Doña Remedios, Bulacan and San Francisco, Cebu bringing the total to 92 intensity meters now being operated by PHIVOLCS.

DEWS Project Team during 3rd Quarterly Meeting 2017, Dumaguete City

Deployment of Early Warning Systems in Disaster-Prone Areas (DEWS)

The DEWS Project is a collaborative effort of ASTI, PAGASA and DOST Regional Offices aimed at deploying hydrometeorological devices (hydromets) and warning stations for disaster preparedness and mitigation. To complement the system of hydromets, early warning systems consisting of sirens and beacons were deployed in flood-prone communities. As of 2017, nine Information and Educational Campaigns (IECs) were conducted. Also, 500 hydromet devices and 500 warning stations were deployed nationwide. Likewise, a new monitoring website was created and can be accessed through http://philsensors.asti.dost.gov.ph.

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1. Installation of radiation monitoring equipment and training at Cebu PAGASA Complex Station

Real-Time Radiation Monitoring System

The Real-Time Environmental Radiation Monitoring System is a DOST-PNRI project which aims to establish a country-wide network of detectors for real-

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2. Installation of radiation monitoring equipment and training at Davao PAGASA Station

time monitoring and immediate detection of radiation emergencies. In 2017, additional two radiation monitoring stations were installed to expand the coverage of the system to central and southern Philippines. The radiation monitoring stations were installed in Lapu-Lapu City, Cebu and in Davao City on June and August 2017 respectively.

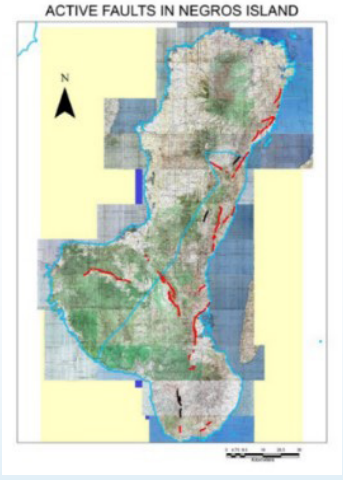
The Central Data Station was installed in September 2017. This includes the licensed software of the radiation monitoring system and server for collection, storage, and analysis of data from radiation monitoring stations. This provides the PNRI the full control on the operation of radiation monitoring stations and the handling of the data gathered.

e-ASIA Joint Research Program: Development of Information Gathering and Utilization Systems Using Small Unmanned Airborne Vehicles (UAVs) for Disaster Risk Assessment, Monitoring, and Response

Capacity building of PHIVOLCS staff on the application of UAV technology

The e-ASIA Joint Research Program aims to mainstream the application of UAV technology into the different aspect of disaster preparedness and risk mitigation program of PHIVOLCS by capacitating its technical staff with the expertise in the assembly, configuration and operation of UAVs. In 2017, 11 PHIVOLCS technical staff were trained in the assembly, operation and maintenance of UAVs for disaster risk mitigation and response. They were able to already apply such expertise in the mapping and documentation of the impacts of the magnitude 6.7 earthquake in Surigao del Norte on February 10, 2017, and the magnitude 6.5 earthquake in Leyte on July 6, 2017.

Hazard and Risk Assessment



Map of active faults in Negros Island

Earthquake and Volcanic Hazard Mapping

Hazard maps are used for local development and contingency planning and in the designs of buildings and infrastructure. Various hazards mapping, and research and development activities were conducted by PHIVOLCS in 2017. By virtue of their mapping and research activities, PHIVOLCS generated and updated several hazard maps in 2017. These were: the earthquake-induced landslide and tsunami hazard maps for Cebu, Bohol, and Davao City; ground shaking, ground rupture, liquefaction, earthquake-induced landslide, and tsunami hazard maps for Negros Occidental and Negros Oriental; and ground rupture, liquefaction, and earthquake-induced landslide hazard maps for various provinces throughout Luzon and Visayas such as Marinduque, Romblon, Samar, Apayao, Kalinga, Mountain Province, Ifugao, Quirino, La Union, Pangasinan, Tarlac, Nueva Ecija, etc.

Specific Earthquake Ground-Motion to Help Enhance the Seismic Resiliency of Residential and Medium-to High Rise Buildings

This PHIVOLCS project commenced in 2013 for residential and medium-to-high rise buildings in Metro Manila. The objective of this project was to

provide a seismic microzoning map in Metro Manila specific for long-period waves, which could be used to compare with the period of the high-rise buildings, needed by structural designers/engineers. Upon completion of the project, the Specific Earthquake project was then renewed in 2017 to cover residential and medium-to-high rise buildings in Metro Cebu and Metro Davao. Thus, in 2017, initial activities were completed such as a shear wave velocity profile, and short period and VS30 maps.

Improved Hydro-Meteorological Modules for REDAS, Hazard and Risk Assessment Tool for Mainstreaming DRR in Local Development Planning

The newly-developed REDAS Severe Wind Risk Module and REDAS Flood Risk Module was developed under the PHIVOLCS project entitled "Enhancing Greater Metro Manila's Institutional Capacities for Effective Disaster/Climate Risk Management towards Sustainable Development (READY for GMMA Project)", in collaboration with various agencies such as OCD, MGB, National Mapping and Resource Information Authority (NAMRIA)and PAGASA. These modules simulate the conditions of a typhoon causing severe wind and flooding, and physical and economic loss that will be caused by such typhoon. The data gathered from the results of the simulation will aid planners, engineers and other related persons to the development of a plan of action before, during and after such event in order to minimize the potential losses that will be caused by such event. A workshop on the use of these two modules was conducted on March 29-30, 2017 in Quezon City. A total number of 40 participants from PHIVOLCS, MGB, and PAGASA attended the workshop.

Phil-LiDAR Program

The PHIL-LIDAR Program composed of 39 projects implemented by 16 State Universities and Colleges and Higher Education Institutions (SUCs/HEIs) concluded on December 31, 2017 with one project to end in March 31, 2018. The program completed the mapping of 257 river basins nationwide and turned-over its flood hazard maps to 684 municipalities and provided LIDAR derived datasets to 821 LGU requesters. Moreover, various resource maps were produced including 485 for agriculture, 395 for coastal, 501 for forest and 183 for hydrological and renewable energy resources. Said maps were likewise turned-over to concerned LGUs, national and regional government agencies through its LiDAR Portal for Archiving and Distribution (LiPAD) which can be accessed through lipad.dream.upd.edu.ph.

Phil-LiDAR Program

Warning and Risk Communication

Hazard and Risk Information Through Web Applications

PHIVOLCS developed the PHIVOLCS-LAVA, a web-based database of multi-parameter monitoring data acquired through the years by instrumental and visual observation of the Philippines' eight most active volcanoes. These web-based applications are useful for land-use planning, risk assessment, disaster risk reduction plan, and awareness.

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Hydro-Met Information, Risk Assessment, and Inter-Linkages of Advisories (HIRAIA)

The objective of the project is to absorb, integrate and operate the NOAH Web-GIS visualization and risk assessment system. The project will also develop the methodology for Multi-Hazard Impact Based Forecasting and Warning and Hydro-Meteorological Hazards Exposure Database as it aims to provide risk information for impending extreme weather events to NDRRMC and its clusters and to potentially affected LGUs.

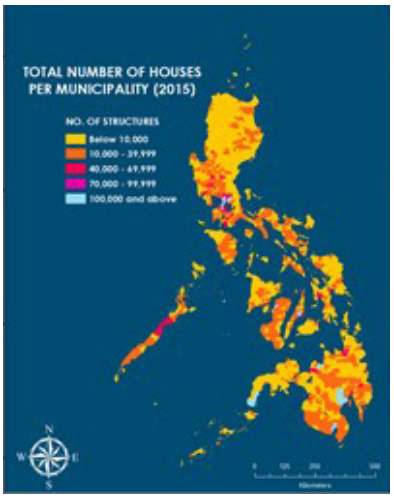
In 2017, the project integrated the 1623 ASTI Hydro-met Sensors, NOAH Hazard Maps such as Flood, Landslide, and Storm Surge to PAGASA's Met-hydro Decision Support Infosys (MDSI) for visualization. And all data from the network of sensors from ASTI are uploaded to PAGASA's Unified Meteorological Information System (PUMIS).

An additional output of the project is the development of new PAGASA Website. That introduces new features like ClimateX (four-hour rain forecast), Meteogram using WRF Model, NOAH Hazard Maps, Active Warnings and Impact Based Forecasting and Warning for Tropical Cyclone. The new website is undergoing continuous development to display all available products of PAGASA and additional features will be added like Metra Weather (weather visualization) and ENcast(pinpoint accurate forecasts). The address of the new website is bagong.pagasa.dost.gov.ph.

PAGASA Unified Meteorological Information System (PUMIS)

PUMIS is a local area network base application which is accessible only within PAGASA network. It featured data consolidation of climate, hydrology, radar, satellite, models, etc. It also has data archive, manual data entry, offline manual data entry, statistical analysis, report generation, instrument inventory (metadata) and maintenance logs, map visualization tools and disaster recovery site co-located in Cebu City. PUMIS Disaster Recovery (DR) Project located at Globe Data Center in Cebu City is 100% completed.

The delivery, installation and testing of additional hardware for the primary site in Central Office and in Cebu City which is the secondary site was accomplished. The system is now running backups for the system database and storage from the primary site to the DR site.

3 

1. New PAGASA Website Soft Launching with the DOST Family and CSCAND Members at Cocoon Boutique Hotel
2. New PAGASA Website (bagong.pagasa.dost.gov.ph)
3. Map of Exposure Database

Development of Web-based Southeast Asia Climate Diagnostics and Monitoring

In November 2016, PAGASA was identified by the World Meteorological Organization (WMO) to perform the mandatory functions as Lead-Centre for Climate Monitoring and as consortium member on Long-Range Forecasting in the Southeast Asian sub-region of Regional Association V (RA-V SEA RCC-Network). The Southeast Asia Climate Diagnostics and Monitoring System is an application built on top of a Python-based web stack. It is an in-house, web based system for processing and analysis of climate data in aid of monitoring and forecasting.

This system will be utilized for issuance of Climate Watch/ Bulletins for NMHS and its stakeholders in Southeast Asia. The provision of a Climate Watch/Bulletins in response to climatic extremes by NMHS in Southeast Asia is an important component of the climate monitoring function while the provision of Tropical Cyclone for Long Range Forecast (TCLRF) is a compulsory forecast product of PAGASA as consortium member for Long Range Forecasting.

Ultimately, the web-based system has been developed to ensure better access to climate information and optimize relevance of climate information and services to all end-users, specifically the ASEAN community.

Disaster Risk Management

S&T Action Frontline for Emergencies and Hazards (SAFE) Program

SAFE Program is a quick response program of PCAARRD to provide science and technology-based interventions to act on climate- and environment-related emergencies and hazards in the Agriculture, Aquatic and Natural Resources (AANR) sector.

Dr. Jose Bacusmo led the review as Dr. Melvin B. Carlos assessed the updates of the Typhoon Yolanda projects under the SAFE Program

The SAFE program has seven components: 1) SAFE IWAS (for S&T preventive measures/initiatives against hazards), 2) SAFE LIGTAS (for S&T restoration/ rehabilitation and reinforcement against disasters), 3) RESCUE against Pests and Diseases, 4) SAFE Organization & Policy; 5) SAFE Capacity Building, 6) SAFE IEC Development, Promotion and Awareness, and 7) SAFE ICT and ICT Build Up.

The nation is divided into five regional clusters, namely: 1) Northern Luzon Cluster (Ilocos, Cordillera, Cagayan Valley and Central Luzon regions) led by Dr. Armando Ganal, Ilocos Regional Director and DOST focal person to the SAFE Program, 2) Southern Luzon Cluster (NCR, CALABARZON, MIMAROPA and Bicol regions) led by BCAARRD Consortium Director, Dr. Marissa N. Estrella, 3) Visayas Cluster (the entire Visayan region), led by

VICAARP Consortium Director, Dr. Othello B. Capuno, 4) Mindanao Cluster One (Northern Mindanao, Davao and Caraga Regions) led by NOMCAARRD Consortium Director, Dr. Maria Estela B. Detalla, and 5) Mindanao Cluster Two (ARMM, SOCCKSARGEN and Western Mindanao regions) led by WESMAARRDEC Consortium Director, Dr. Teresita A. Narvaez. The current National Coordinator of SAFE Program is Dr. Melvin B. Carlos, Director of the PCAARRD-Technology Transfer and Promotion Division (TTPD).

Preparedness to Respond to Disasters

The program aims to develop innovative technologies that address basic needs of Filipinos like food and clean water in disaster-stricken areas.

To address the availability of clean water, ITDI developed rainwater collection system that can store up to 1 cubic meter for non-potable domestic use. Twenty-one rainwater collection systems were deployed and installed through the Research & Development Center (RDC), Army Support Command, Philippine Army at several infantry divisions and brigades in Marawi City (9 units), Indanan, Sulu (3 units), Patikul, Sulu (3 units) and Surigao del Sur (6 units). The ceramic water filters (10 units) were also distributed by RDC at infantry divisions in Indanan, Sulu, Jolo, Sulu, Malagutay, Zamboanga City and Isabela Basilan.

Ready-to-eat (RTE) disaster relief food in retort pouches are developed for consumption in disaster-stricken areas with limited water, electricity, gas, and necessary utensils to open packaged materials. These RTE relief foods are as follows: Chicken Arroz Caldo (1st stage), Smoked Fish Rice Meal (2nd stage), Pandesal with 3 months shelf life (3rd stage), and Sweet Potato (4th stage). A total of 2,000 pouches of RTE chicken arroz caldo were deployed to evacuees during the Marawi siege while 3,320 pouches of RTE smoked fish rice meal were given to fire victims in Cebu City.

Philippine Earth Data Resource Observation (PEDRO) Center

The Philippine Earth Data Resource and Observation (PEDRO) Center is a facility that securely receives, processes and distributes space-borne imagery from supported remote sensing satellites for various applications such as post-disaster assessment, environmental monitoring, emergency response management, among many others. In 2017, more than 600 satellite images were downloaded, archived and distributed to various end-users including, but not limited to, the National Security Council (NSC), the National Disaster Risk Reduction and Management Council (NDRRMC), DOST-PHIVOLCS and DOST-PAGASA.

Data from the PEDRO Center were then used to develop applications in response to critical events, for example, the 2017 Magnitude 6.5 Leyte Earthquake, Marawi Rehabilitation and Typhoons Nina, Urduja and Vinta.

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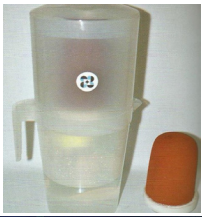

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1. Rainwater Collection System
2. Rainwater collection system installed at Kampo Ramao, Marawi City
3. Rainwater collection system installed in Surigao del Sur
4. Portable Water Filter
5. Deployed and installed 10 units of ceramic water filters through the Research and Development Center (RDC), Army Support Command, Philippine Army at several infantry divisions and brigades in Marawi City
6. Ready-to-eat disaster relief food

Moving forward, the DOST-ASTI is looking to expand its constellation of supported earth observation satellites as well as establish another ground receiving station with the country's largest satellite tracking antenna (7.3m) in Davao City.

1. 3.7m Transceiver Antenna
2. DOST-ASTI Ground Receiving Station

Climate Change Adaptation and Mitigation

Monitoring and Detection of Ecosystems Changes for Enhancing Resilience and Adaptation in the Philippines (MODECERA)

The MODECERA is a DOST-PCAARRD funded program aims to set up long-term monitoring system in eight selected ecosystems to enhance resilience and adaptation of agriculture, marine, and natural resources sector through promotion of science and technology based management and policy decisions. It envisions to develop an ecosystem observation network across the country and establish a long-term watershed and ecosystem database to promote resiliency and sustainability.

MODECERA established eight Permanent Biodiversity Monitoring Areas (PBMAs) and 37 transects across the eight watersheds covered by the Program which generated several volumes of local-specific datasets and information which can be used for assessing the resiliency of communities, ecosystems and watersheds.

Integrating Agriculture Sector into National Adaptation Plan in partnership with UN-FAO-Philippines

The project aims to identify and integrate climate adaptation measures in the agriculture sectors into relevant national planning and budgeting. Specifically, this engagement will seek to build technical capacities to forecast solar radiation and wave height, improve capacities in conducting sub-seasonal forecast at municipal level of the identified pilot municipalities, and developing the capacities of regional and provincial agricultural technicians to use forecast products for farm and fisheries advisories.

Provision of Climate Change Projection in the Philippines

In line with the provision of climate change information, the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) has updated the 2011 report on climate change in the Philippines. It has recently produced a new set of national projections using regional climate models (RCMs) to downscale global climate models (GCMs) from the CMIP5; assuming moderate emission (RCP4.5) and high emission (RCP8.5) scenarios. This new climate projection provides more spatial detail to inform local adaptation to climate change.

Streamflow and water quality assessment within Aborlan watershed, Aborlan, Palawan (1) width and profile measurement, (2) water quality measurement, and (3) stream velocity determination.

A policy brief summarizing the observed climate trends and projected climate change in the Philippines has been released. Such policy brief contains basic information aimed to help decision-makers understand current climate-related hazards, and integrate future climate risks in formulating adaptation plans such as in the local government units' Local Climate Change Action Plans (LCCAP), Comprehensive Land Use Plans (CLUP), and Local Disaster Risk Reduction Management plans, among others.

Sharing the climate information to various end users

Capacity Building

Information Sharing and Capacity Building

In 2017, PHIVOLCS conducted the following trainings such as "How to use REDAS for mainstreaming DRR", seminar workshop for LGUs on "Earthquake and Tsunami Awareness and Preparedness", and Training for Teachers on "Communicating Earthquake and Tsunami Hazards".

Training on REDAS

Trainings on how to use REDAS for mainstreaming DRR

With aim of ensuring the mainstreaming of disaster risk reduction into the local development process of LGUs, agencies and organizations, PHIVOLCS conducted 12 batches of training on the use of the PHIVOLCS-developed Rapid Earthquake Damage Assessment System (REDAS). The participants of REDAS trainings were representatives from provincial offices, from each towns and cities and from various NGAs, and planners and engineers from the private companies. Over a 5-day period, the participants underwent lectures and hands-on exercises on seismic hazard assessment risk exposure database. With LGUs trained on the use of REDAS, mainstreaming of DRR in local development planning is enhanced. A total of 462 participants attended the trainings and 386 REDAS licenses were issued.

Seminar workshop for LGUs on Earthquake and Tsunami Awareness and Preparedness

PHIVOLCS conducted three seminar-workshops in earthquake awareness and preparedness for LGUs. The seminar-workshops for the provinces of Leyte, Davao Oriental, and Cebu were conducted on May 24, at the Sabin Hotel, Ormoc City, on May 30-June 1 at the Honey's Hotel, Mati City, and on July 26-27 at the Sarrosa International Hotel, Cebu City, respectively.

A total of 285 participants coming from various disaster agencies such as Local Disaster Risk Reduction and Management Office (LDRRMO), Provincial Disaster Risk Reduction and Management Office (PDRRMO), and Office of Civil Defense (OCD) attended the seminar-workshops. By conducting disaster awareness and preparedness capacity-building activities for the LGUs, PHIVOLCS empowers stakeholders to lead in disaster awareness and preparedness.

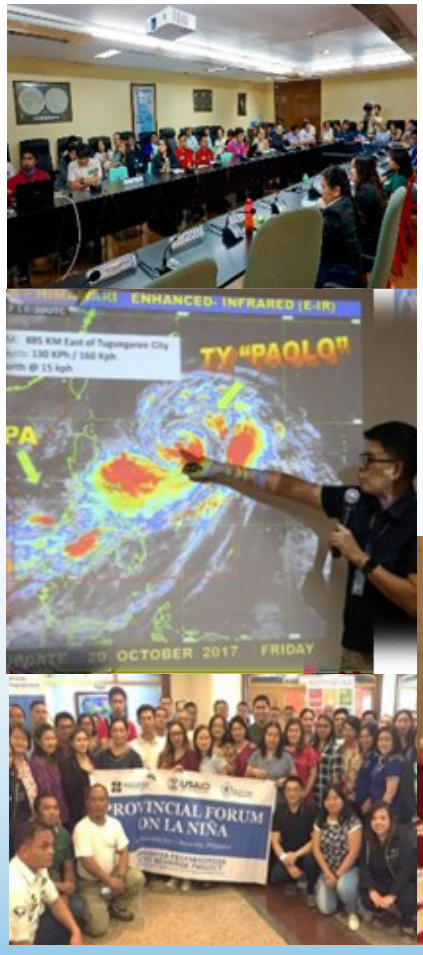
Training for Teachers on Communicating Earthquake and Tsunami hazards

Training for Teachers on Communicating Earthquake and Tsunami Hazards

PHIVOLCS conducted trainings for teachers on communicating earthquake and tsunami hazards for the school division for DepEd Zambales. With the training, the teachers were able to learn how to impart correct information about earthquakes and tsunami, how to understand the various earthquake and tsunami information materials provided by PHIVOLCS, and how to disseminate the materials to their respective schools.

Capacity Building Trainings in a Fora of Climate Outlook and La Niña

The conduct of National Climate Outlook Forum (NCOF), Provincial Climate Outlook Forum (PCOF), and La Nina Forum are intended to make participants primarily understand climate variability and extreme events and its consequences. The forum includes discussion on PAGASA's current forecast such as increasing chances of extreme events such as La Niña, as well as its consequences and recognizes the need for precise La Niña mitigation strategies and interventions. It also aims at communicating climate information and useful forecast to diverse users and decision-makers. These efforts lead to capacity building of professionals at national and local level to better use climate information in decision-making related to agriculture, water resource management, and public health and disaster management. The target audience of the forum includes provincial and local government officials, members of the disaster coordinating councils (DCCs), tri-media, interested private companies, LGUs, and other interested weather/climate information users, i.e., farmers, fisher folks, etc. There were 11 NCOFs,10 provincial COFs and two La Niña Fora held in 2017.



Conduct of Climate Outlook/La Niña forum in several provinces

Policies, Plans, and Partnership

Draft Climate Change Adaptation and Mitigation-Disaster Risk Reduction (CCAM-DRR) Roadmap (2018-2021)

A draft CCAM-DRR Roadmap (2018-2021) was developed for submission to the Office of the President. The desired result of the roadmap would be "Enhanced Climate-and Disaster-resilient communities in 21 vulnerable provinces, 882 coastal municipalities, and Major Urban Centers in Metro Manila, Cebu, Iloilo, and Davao." DOST agencies such as PHIVOLCS and PAGASA participated in developing the roadmap.

Earthquake Resiliency Plan for the Greater Metro Manila Area

The Earthquake Resiliency Plan for the Greater Metro Manila Area which was ordered by the President in his State of the Nation Address (SONA) has been formulated and approved. It involves developing the resiliency of government and businesses, a resilient community in Metro Manila, and infrastructure and financial resiliency.

The highlights of the Earthquake Resiliency Plan approved by the President such as dispersion of population of Metro Manila by dispersing business and economic activities outside of Manila, development of an alternative government center to be developed in the new city that will be situated in the New Clark area, north of main Clark Zone.

Partnerships with other NGAs

The partnership aims to provide science-based information and research and development (R&D) support for the planning and design, development and operation of critical infrastructure with due consideration to climate change trends and disaster risk reduction principles and using the most detailed and updated datasets available. This partnership will support and upgrade the operation and activities of the agencies involved in the joint cooperation program through science and technology-based research & development (R&D) projects/programs.

In collaboration with PCIEERD, the following programs were developed:

1. Climate Resilient Infrastructure Initiative (CRII) Program in collaboration with Department of Public Works and Highways (DPWH), National Water Resource Board (NWRB), and National Irrigation Authority (NIA)
2. Climate and Disasters Resilient Communities Program: R&D Support for Philippine Civil Defense (OCD)
3. Mindanao Development Corridors – Disaster and Climate Adaptive Development Initiative (MinDC-DCADI)
4. Integrated Assessment and Modelling of Blue Carbon Ecosystems for Conservation and Adaptive Management (IAMBlueCECAM) Program co-funded by the Department of Environment and Natural Resources – Biodiversity Management Bureau (DENR-BMB)
5. Harmonization of Flood Hazard Maps and transfer of technology to DENR-Mines and Geosciences Bureau (MGB)
6. Capacity building of the DPWH personnel nationwide in the use of LiDAR for infrastructure planning and development
7. Capacity building of the Department of Interior and Local Government (DILG) personnel nationwide in the use of LiDAR for the development of Local Climate Change Adaptation Plans (LCCAP) and Comprehensive Land-Use Plans (CLUPs)
8. Use of space technology applications and data science in the monitoring and evaluation and geotagging of major government-funded programs/projects including infrastructure projects for disaster management and rehabilitation of typhoon-affected areas, among others with the Department of Budget and Management (DBM)

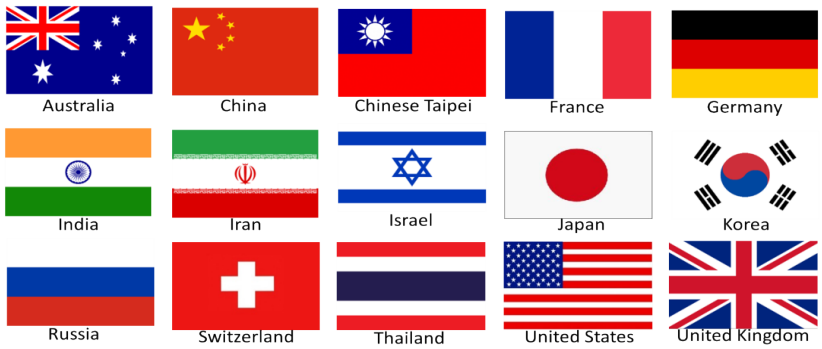
AGENDA X

Strengthen industry-academe-government and international STI collaboration

The Department of Science and Technology (DOST) and its agencies continually explores and strengthens linkages with industry-academe-government and international counterparts to promote extensive Science, Technology and Innovation (STI) collaboration.

With the new administration's theme "Change is coming," the year 2017 appeared to be a ray of hope that science will finally take the limelight in the policy agenda. A number of bilateral and multi-lateral engagements have ensued in which the Philippines took part through the DOST and its agencies' participation.

To date, there are 15 priorities bilateral cooperation which involve countries such as:



Priority areas for collaboration and cooperation had also been identified during these bilateral engagements.

The **Australian government** through its largest research agency, Commonwealth Scientific and Industrial Research Organization (CSIRO), came to DOST to introduce their research agenda and seek opportunities for partnership. It was recognized that it can be hoped from both nations that technology transfer is a possible area of cooperation.

The **People's Republic of China,** on the other hand, is not far behind in manifesting their intent to be our partner. As the Asian giant is forging a strong friendship bond with our President, Chinese officials made discussion with the DOST delegation about the revitalization of the S&T cooperation between the two countries. During the 14th PH-China Joint Commission Meeting on Science and Technology (JCMST) which is hosted by DOST, the two states agreed to cooperate in the areas of renewable energy, agriculture, health, remote sensing satellite data sharing and application, technology transfer, and aquaculture & marine science. It is projected by many that this partnership will shake things up in the science and technology (S&T) sector in the Philippines.

Another Asian neighbour **Chinese Taipei** is standing firm in being our partner in advancing the interest of S&T. DOST hosted the Manila Economic and Cultural Office-Taipei Economic Cultural Office (MECO-TECO) Pre-Joint Science and Technology Committee (JSTC) and was successful in securing the acceptance of 10 Sandwich Scholarship Program applicants and approval of four projects in Health, Agriculture, and Training (HAT) Program, five Joint Research Projects, and updating of the three ongoing Volcano, Ocean, Typhoon, and Earthquake (VOTE) projects.

DOST Undersecretary for Research and Development Rowena Guevara (seated on left) and MOST-China Vice Minister Huang Wei (seated on right) signed the 14th Protocol of the Joint Commission Meeting on Science and Technology (JCMST), identifying six areas of collaboration. This momentous event was witnessed by DOST Secretary Fortunato T. de la Peña and Philippine Ambassador to China Jose Santiago Sta. Romana in Tagaytay, Philippines on November 10, 2017.

The areas of nuclear application on health, biological sciences, and health and medical research are priorities for **France** in their desire to collaborate. The French embassy proposed a scholarship program in which the DOST welcomed with the proposition of a Joint Research Program. Partnership discussions with **Germany, India, and Iran** are currently in the works and are expected to come into a more comprehensive action plan this 2018.

DOST Secretary Fortunato T. de la Peña signs the MoU between DOST and State Atomic Energy Corporation "ROSATOM" in Moscow, Russia on May 25, 2017.

As regards the Philippine-**Israel** relations, the 1958 Treaty of Friendship is very much alive and the arena of S&T is of no exception. No less than His Excellency Ambassador Effie Ben Matityau extended his interest by visiting DOST to discuss and explore possible cooperation between the two countries in the field of S&T. The proposed agreement is now transmitted by the Philippine embassy in Tel Aviv to the Jewish government, its priority areas are innovative ecosystem, intensive agriculture, biomedical engineering and drug discovery, robotics animation, and artificial intelligence.

DOST Secretary Fortunato T. de la Peña and MOST-Thailand Minister Atchaka Sibunruang discussing the way forward after identifying the areas of collaboration between the Philippines and Thailand in Bangkok, Thailand on August 24, 2017.

Resumption of Joint Research Project was the highlight of Philippine relations with **Japan**. One project proposed by PUP and PCAARRD was funded for implementation for 2017-2019, and six more projects are expected to be implemented in 2018. The DOST also showed consistent support to the Science and Technology in Society (STS) Forum through its participation on September 30 – October 2, 2017 in Kyoto, Japan, and commitment to host the 5th STS Forum ASEAN-Japan Workshop in Cebu in 2018.

The revival of PH-ROK Basic Agreement on S&T is also underway to move partnership with **Korea** to greater heights.

As one of the administration's closest allies, a breakthrough cooperation with **Russia** was seen through the signing of the Memorandum of Understanding (MOU) on Cooperation on the use of nuclear energy for peaceful processes between the State Atomic Energy Corporation, "ROSATOM" and the DOST. The MOU aims to promote the peaceful use of nuclear energy to reap benefits in agriculture, health and medicine, industry, and environment.

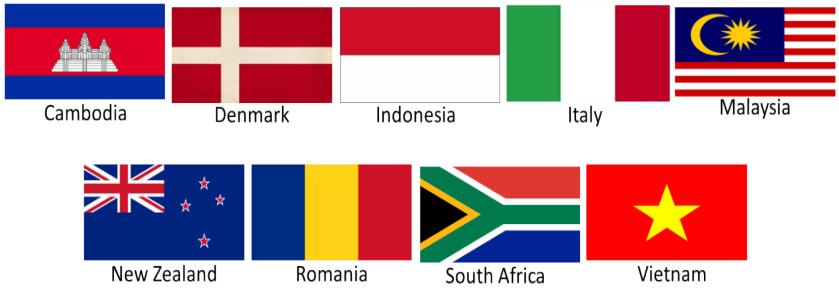
Kick-off activities in the areas of high-energy physics, nanotechnology for agri-aqua application, marine science and environmental science, health, innovation and entrepreneurship are the priorities for PH- **Switzerland** relations.

This year was also a breakthrough for PH-**Thailand** relations as the two S&T Ministers signed the S&T Agreement in March, and was witnessed by no less than the two heads of state, Philippine President Rodrigo R. Duterte and Thailand Prime Minister Prayut Chan-o-cha. Among the priorities identified in the agreement are medical science, food processing, innovative agriculture, electronics and computer, nanotechnology, space technology and application, innovative start-up and metrology.

For PH-**UK**,10 scholarships under Newton Agham program were approved since 2015, and four on-going projects under UK-PH Joint Health Research. The meeting of DOST Secretary de la Peña and British Ambassador Pruce also led to identification of space technology, startups, exchange of young scientists and health as priorities for the ensuing S&T Agreement.

A stronger relations with **United States** is the focus of the on-going negotiations for a new PH-US S&T Agreement spanning a 10-year duration. Meanwhile, the DOST facilitated the signing of the MOU between Manila Observatory and NASA on the Cloud Aerosol Monsoonal Processes Project Philippine Experiment (CAMP2Ex) which will be launched in 2018.

Apart from the above priorities, S&T collaborations have also been initiated with other bilateral partners such as:

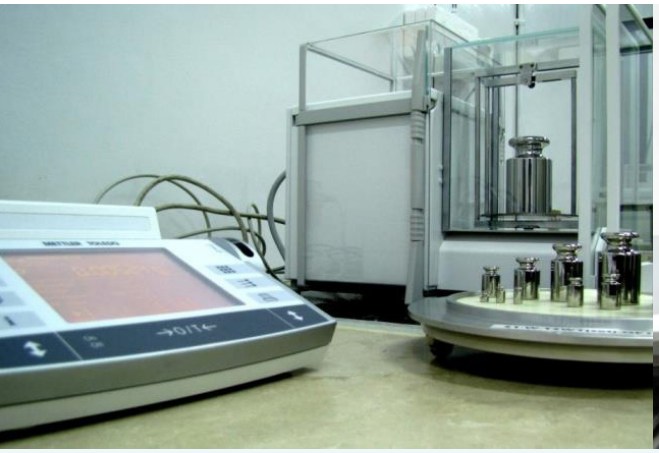


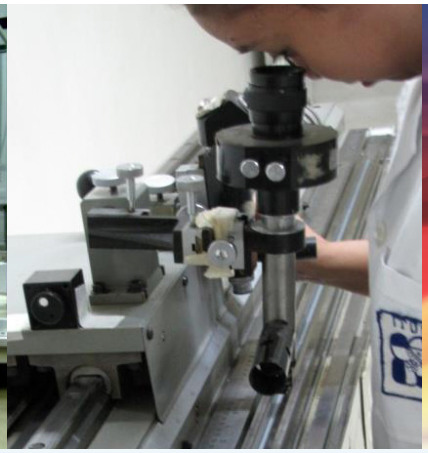
In terms of multi-lateral engagements, 2017 was a great opportunity for the Philippines to show leadership as the host country for the 50TH **ASEAN** Summit. The ASEAN Declaration on Innovation-- a document symbolizing the commitment of member states towards strengthening the impact of science, technology, and innovation towards people empowerment, inclusive growth, and strengthening of the ASEAN Community—was adopted by the ASEAN Leaders through the leadership of the DOST. In October, the Philippines pledged USD 1 million during the 9th Informal ASEAN Ministerial Meeting on S&T (IAMMMST-9) to support Philippine initiatives on scholarships, non-degree training programs, and capacity building activities for all ASEAN Researchers with special assistance extended to researchers from Cambodia, Lao PDR and Myanmar (CLM).

The Philippines also fulfilled its international S&T commitments through active involvement in international bodies such as:

AGENDA XI

Enhance effectiveness of STI governance





Science, technology and innovation is considered as the prime mover for national development and progress. When utilized properly and in the most efficient way, STI promotes inclusive and sustainable development. It creates a force multiplier effect that can dramatically increase gains for the Filipino people. The creation of a policy environment, development of internal capacities and personnel empowerment in all of the agencies is necessary to support the delivery of intended benefits of science, technology and innovation. Agenda 11 includes development of all internal policies, operations, procedures and HRD-related initiatives of DOST.

Vigorously Advancing Science, Technology and Innovation

DOST charted the goals and strategies of the S&T sector in Chapter 14 of the Philippine Development Plan (PDP) which maps out the nationwide strategies for developing and implementing development plans and programs. PDP Chapter 14 entitled "Vigorously Advancing Science, Technology and Innovation," was spearheaded in close coordination with the National Economic Development Authority (NEDA) and the Planning Committee composed of other government agencies such as Department of Agriculture (DA), Department of Trade and Industry (DTI), Philippine Statistics Authority (PSA), Intellectual Property Philippines (IPOPHL) and Commission on Higher Education (CHED). The Chapter emphasizes the importance of science, technology and innovation as key driver for economic growth and social progress. It defines the priority strategies and outcomes needed to build the foundation for inclusive growth, high trust society and a globally competitive knowledge economy. The PDP 2017-2022 was launched in June 2017. The accompanying Results Matrix for Chapter 14 was likewise prepared by the Department in consultation with DOST agencies and partner institutions such as PSA, IPOPHIL and DTI. The Results Matrix will be released as a separate publication by NEDA.

The DOST also took part in the preparation of the 2017 Socioeconomic Report (SER). This is the first annual assessment of the PDP and the Public Investment Plan for the period 2017-2022. The document contains the whole of government's performance in terms of achieving its major outputs and intermediate outcomes for 2017 and set the priorities for 2018 and 2019. In addition, the report will provide inputs in drafting the Budget Priorities Framework for 2019.

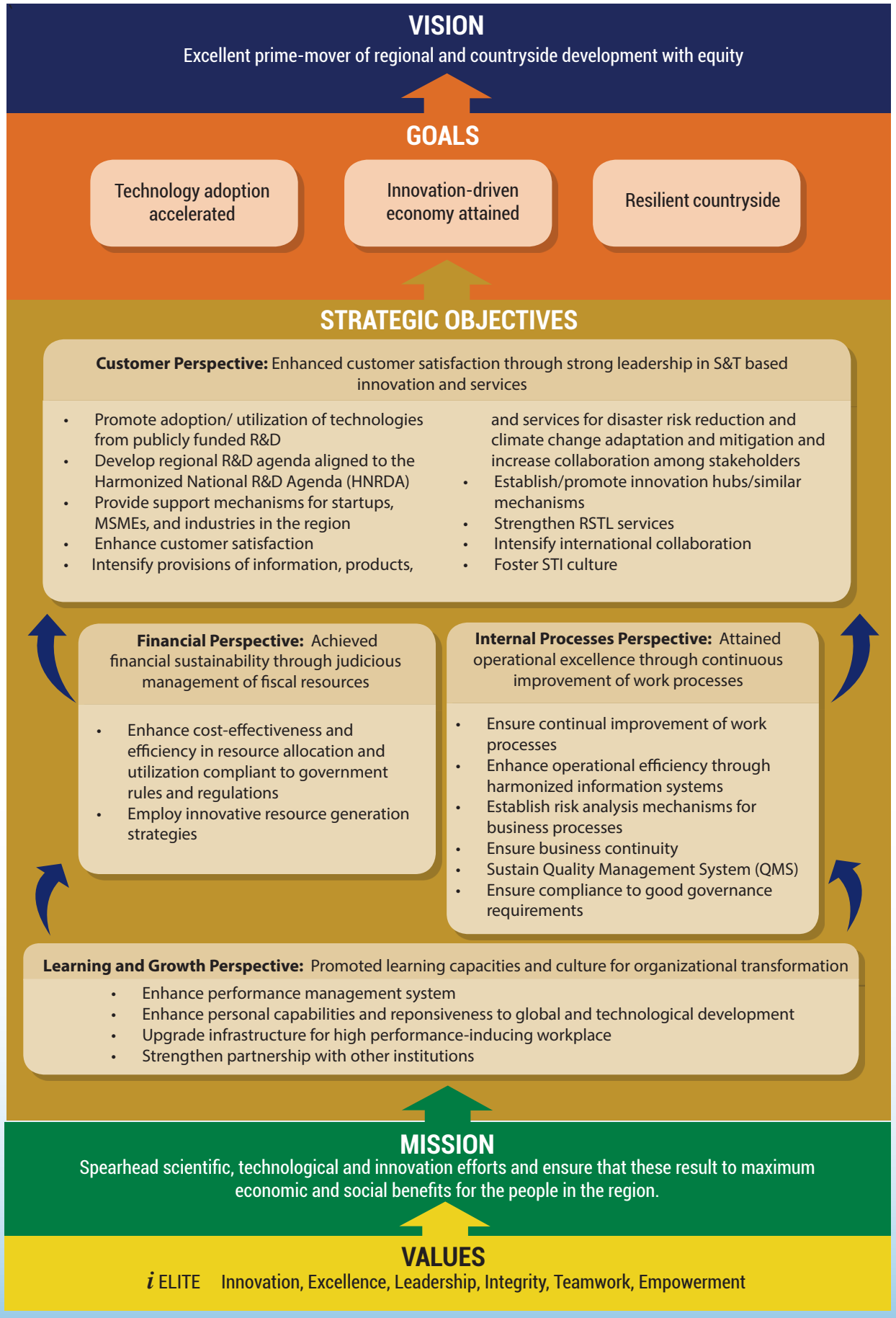
Taking off from the 0+10 Socio-Economic Agenda and Philippine Development Plan, the DOST Strategic Plan for 2017-2022 was crafted, laying down the Science for the People 11-Point Agenda. It fleshes out the development strategies to bring science, technology and innovation closer to the people.

Harmonized National R&D Agenda

The DOST spearheads the adoption of the Harmonized National Research and Development Agenda (HNRDA) which defines the country's priorities, guides public investment in R&D and ensure these result in maximum economic and social benefits for Filipinos. By minimizing duplication and promoting complementation among government-funded R&D programs and projects, effective allocation and efficient use of public investment in R&D can be achieved. These R&D programs and projects are in the areas of 1) Agriculture, Aquatic and Natural Resources, 2) Health, 3) Industry, Energy and Emerging Technology, 4) Disaster Risk Reduction and Climate Change, and 5) Basic Research. HNRDA was approved by the National Economic Development Authority on August 30, 2017.

Regional Offices Strategy Map

In support to the 2022 vision of the DOST to be "a leading ASEAN Science, Technology, and Innovation Hub by 2022," the DOST regional offices conducted a strategic planning in the early part of 2017 and came up with a strategy map.


VISION
Excellent prime-mover of regional and countryside development with equity
GOALS
Technology adoption accelerated
Innovation-driven economy attained
Resilient countryside
STRATEGIC OBJECTIVES
Customer Perspective: Enhanced customer satisfaction through strong leadership in S&T based innovation and services
Promote adoption/ utilization of technologies from publicly funded R&D
Develop regional R&D agenda aligned to the Harmonized National R&D Agenda (HNRDA)
Provide support mechanisms for startups, MSMEs, and industries in the region
Enhance customer satisfaction
Intensify provisions of information, products, and services for disaster risk reduction and climate change adaptation and mitigation and increase collaboration among stakeholders
Establish/promote innovation hubs/similar mechanisms
Strengthen RSTL services
Intensify international collaboration
Foster STI culture
Financial Perspective: Achieved financial sustainability through judicious management of fiscal resources
Enhance cost-effectiveness and efficiency in resource allocation and utilization compliant to government rules and regulations
Employ innovative resource generation strategies
Internal Processes Perspective: Attained operational excellence through continuous improvement of work processes
Ensure continual improvement of work processes
Enhance operational efficiency through harmonized information systems
Establish risk analysis mechanisms for business processes
Ensure business continuity
Sustain Quality Management System (QMS)
Ensure compliance to good governance requirements
Learning and Growth Perspective: Promoted learning capacities and culture for organizational transformation
Enhance performance management system
Enhance personal capabilities and reponsiveness to global and technological development
Upgrade infrastructure for high performance-inducing workplace
Strengthen partnership with other institutions
MISSION
Spearhead scientific, technological and innovation efforts and ensure that these result to maximum economic and social benefits for the people in the region.
VALUES
iELITE Innovation, Excellence, Leadership, Integrity, Teamwork, Empowerment

The DOST Regional Offices now employ the Balanced Scorecard as an effective tool to measure and review performance of all the Regional Offices vis-à-vis its plan. The tool looks into the performance and strategies of the regional offices in four perspectives: the learning and growth, internal processes, financial and customer perspectives. By virtue of OUSec-RO Resolution No. 2007-001, the DOST Regional Offices' Strategy Map and Harmonized performance indicators were adopted effective March 23, 2017. The Operational Definitions of the Key Performance Indicators were finalized and approved on November 3, 2017.

S&T Legislative Agenda

As the 1987 Philippine Constitution upholds the importance of science and technology in nation development and progress, the Department continued to lobby for policies that shape the scientific and technological landscape in the country. In 2017, it has put forward 30 position papers for house and senate bills, and participated in 25 committee hearings and various policy-related meetings. Moreover, it has actively engaged in the discussions of six proposed legislations, as follows:

Balik Scientist Act, An Act Institutionalizing the Balik Scientist Program and Appropriating Funds Therefor. This aims to strengthen the scientific and technological human resources of the academe, public institutions and domestic corporations in order to promote knowledge sharing and accelerate the flow of new technologies into the country. Towards this end, DOST shall award short, medium, and long term engagements to Balik Scientists, and ensure their participation in the mentorship activities, training, lecture, and other similar activities in any institution, subject to the agreement between the Balik Scientist, the host institution, as approved by the DOST.

Comprehensive Nuclear Regulation Act, An Act Providing for a Comprehensive Nuclear Regulation, Creating for the Purpose, the Philippine Nuclear Regulatory Commission, and Appropriating Funds Therefor. This aims to provide a legal framework that adequately protects public health and safety and the environment against the harmful effects of ionizing radiation, and for the safety and security of radiation sources.

An Act Strengthening the National Measurement Infrastructure System (NMIS) Amending R.A. No. 9236, also known as the National Metrology Act of 2003 and for other Purposes. This builds on Republic Act No. 9236 also known as the "National Metrology Act of 2003." This aims to establish the National Metrology Institute and provide capacity building programs to strengthen metrology authorities at the local level.

Provincial Science and Technology Directors Act, An Act Upgrading the Position of the Provincial Science and Technology Officer into the Provincial Science Director in the Department of Science and Technology Amending Republic Act No. 6959, Appropriating Funds Therefore, and for Other Purposes. The bill seeks the improvement of the provincial centers of Science and Technology, which are responsible for the development and transfer of technologies to agriculturists, local businesses, and educators in rural areas.

Philippine Space Act, An Act Establishing the Philippine Space Development and Utilization Policy and Creating the Philippine Space Agency (PSA) and Define the Purpose and Scope of its Activities. This serves as the Philippines primary strategic roadmap for space development that will embody the goal of the country to become a space-capable and space-faring nation. It will also be responsible for addressing space-related issues, advance space science and technology research, coordinate all national space activities, and provide a framework for harmonious cooperation ensuring that the country's space development goals are realized.

An Act Establishing the Science for Change Program (S4CP). This bill aims to strategically leverage the use of science and technology to contribute to the development of the economy and society by upgrading the standard of science and technology at par or above with other countries.

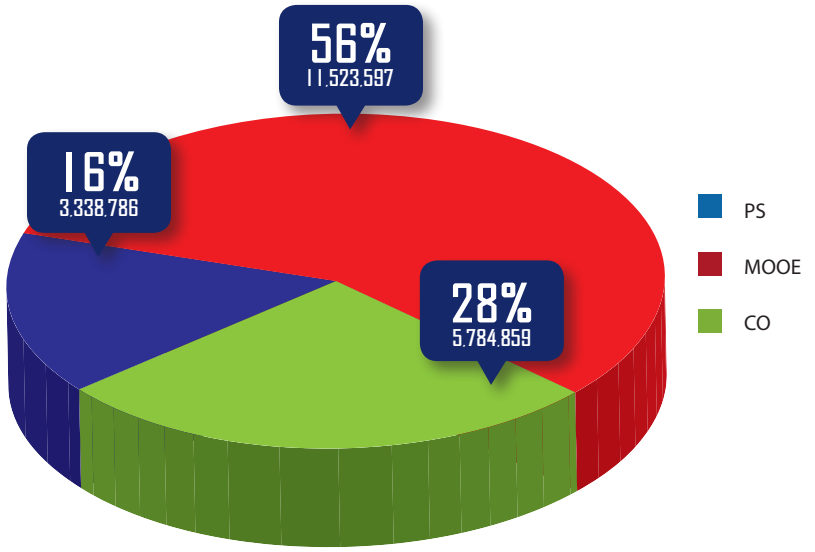
DOST RESOURCES

Financial Profile

PERCENTAGE DISTRIBUTION OF DOST SYSTEM 2017 EXPENDITURE BY EXPENSE CLASSIFICATION (P'000)

TOTAL EXPENDITURE

20.647 BILLION

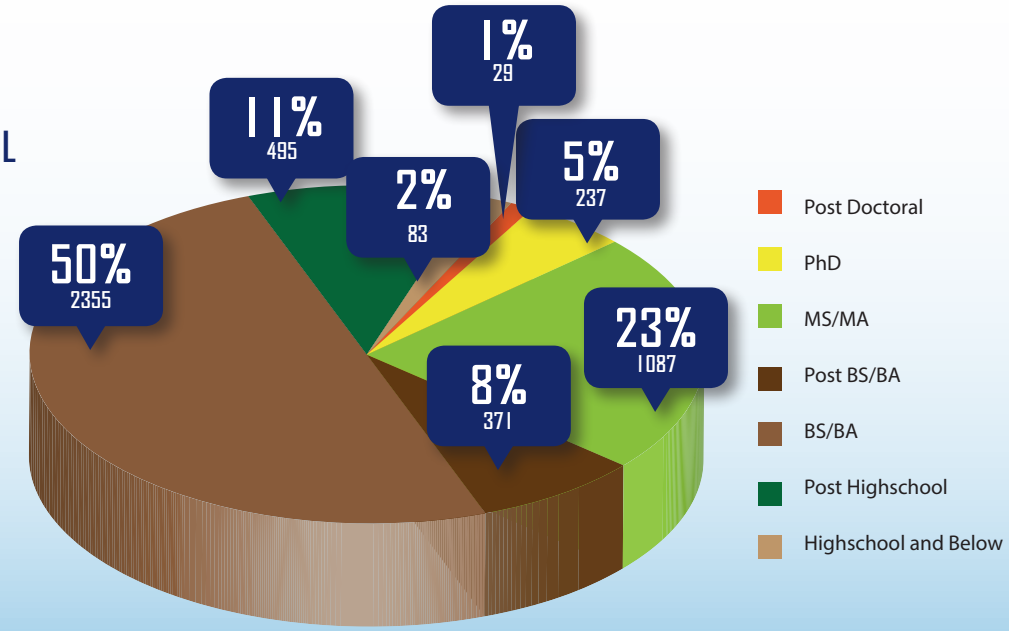


S & T Personnel Profile

PERCENTAGE DISTRIBUTION OF DOST SYSTEM 2017 PERSONNEL BY EDUCATIONAL ATTAINMENT

TOTAL NUMBER OF PERSONNEL

4,657



DOST Organizational Structure

SECRETARY

- Undersecretary for Scientific and Technical Services
- Undersecretary for Research and Development
- Undersecretary for Regional Operations
- Undersecretary for Disaster Risk Reduction and Climate Change
- Assistant Secretary for Finance and Legal Affairs
- Assistant Secretary for International Cooperation
- Assistant Secretary for Administration
- Administrative and Legal Service
- Finance and Management Service
- Internal Audit Service
- Planning and Evaluation Service

SECTORAL PLANNING COUNCILS (3)

- **PCAARRD** — Philippine Council for Agriculture, Aquatic and Natural Resources Research and Development
- **PCHRD** — Philippine Council for Health Research and Development
- **PCIEERD** — Philippine Council for Industry, Energy and Emerging Technology Research and Development

COLLEGIAL AND SCIENTIFIC BODIES

- **NAST** — National Academy of Science and Technology
- **NRCP** — National Research Council of the Philippines

S&T SERVICES (6)

- **PAGASA** — Philippine Atmospheric, Geophysical and Astronomical Services Administration
- **PHIVOLCS** — Philippine Institute of Volcanology and Seismology
- **PSHSS** — Philippine Science High School System
- **SEI** — Science Education Institute
- **STII** — Science and Technology Information Institute
- **TAPI** — Technology Application and Promotion Institute

R&D INSTITUTES (7)

- **ASTI** — Advanced Science and Technology Institute
- **FNRI** — Food and Nutrition Research Institute
- **FPRDI** — Forest Products Research and Development Institute
- **ITDI** — Industrial Technology Development Institute
- **MIRDC** — Metals Industry Research and Development Center
- **PNRI** — Philippine Nuclear Research Institute
- **PTRI** — Philippine Textile Research Institute

REGIONAL OFFICES (16)

Provincial Science and Technology Centers (80)

DOST EXECUTIVE OFFICIALS

SECRETARY

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Secretary

UNDERSECRETARIES

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