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DOST funded tech enables real-time dam monitoring

By Kristelle Nicole G. Chavez, DOST-PCIEERD
Photos from DOST-PCIEERD



This is the Sensor Node System that houses the main circuit box, GPS module, and battery level monitoring module. It collects information from the disdrometer, soil moisture sensor, and anemometer and transmit these information to the web portal "Arms4dams."

Actual setup of the disdrometer (measures rainfall) and anemometer (measures wind speed).

Amidst the water scarcity hitting the Philippines, a technology funded by the Department of Science and Technology-Philippine Council for Industry, Energy and Emerging Technology Research and Development (DOST-PCIEERD) and the National Water Resources Boards (NWRB) may yet be the key in averting a water crisis.

The Automated Real-time Monitoring System (ARMS) for dams and reservoir, a technology developed by the Mapua University, uses wireless sensors to provide the NWRB access to real time data on water levels and a decision support tool for the daily management of the reservoirs.

The NWRB is the regulating agency for all water resources development and management activities in the country.

At Mapua in cooperation with the National Power Corporation, deployed the ARMS system in the cascading Ambuklao, Binga, and San Roque dams along the Agno River.

The cost-effective ARMS provides the NWRB with real-time data on water level, rainfall, humidity, temperature, atmospheric pressure, soil moisture, and wind speed—all hydrological parameters necessary for monitoring water availability and managing the reservoirs.

DOST-PCIEERD Executive Director Dr. Enrico C. Paringit is confident that this technology can help the government in mitigating risks in watersheds like drought and floods as it provides real-time data on the conditions of the dams.

"We can outsmart water scarcity by employing smart technologies and using real data to create science-based decisions and policies to ensure ample water supply," he said. "ARMS is locally developed, making it a cost-effective tool for our water companies."

ARMS project leader Francis Aldrine A. Uy said all of the data coming from the deployed sensors are received in real-time at the office of the NWRB.

"These data help the NWRB and dam operators in making smart decisions regarding dam operation specifically in the utilization of water," he said.

Uy said that for data storage and archiving, the web portal "Arms4Dams" was also developed for information viewing at different

DOST honors Pinay scientists in Women's Month celeb

Text and photo by Allan Mauro V. Marfal, DOST-STII

In the celebration of the International Women's Month, the Department of Science and Technology (DOST) gave the spotlight to eight Filipina scientists who made significant impact in improving the products and services of different sectors in the country.

During the department's celebration of Women's Month held 19 March 2019 at the Hotel Jen in Pasay City, the DOST recognized the efforts and contributions of Dr. Lucille V. Abad, Dr. Annabelle M. Briones, Dr. Maria Leonila P. Bautista, Dr. Josette T. Biyo, Dr. Esperanza O. Cayanán, and Dr. Lilia T. Habacon.

Dr. Abad is currently the chief of Atomic Research Division of the DOST-Philippine Nuclear Research Institute. Among her major projects were on carrageenan as plant growth promoter that could help in increasing the yield of rice and other crops, and hydrogel wound dressing for burns, wounds, and bedsores.

Meanwhile, Dr. Briones is the newly-appointed director of the DOST-Industrial Technology and Development Institute (ITDI). She spearheaded the development of various innovative technologies focusing on the use of carrageenan from Philippine *Eucheuma* species for pharmaceutical, medical, and industrial applications, development of the DOST Mosquito Ovi/Larvicidal Trap System (OL Trap), studies on adrenergic drug and dietary fiber from calamansi wastes, biofuels and alternative energy, and on cloning and sequence analysis



Secretary de la Peña (middle) and other DOST officials with the awardees (L-R):) Dr. Anabelle M. Briones (DOST-ITDI), Dr. Maria Leonila P. Bautista (DOST- PHIVOLCS), Dr. Lucille V. Abad (DOST-PNRI), DOST Administrative and Legal Services Director Elizabeth T. Fontanilla, DOST Undersecretary Carol M. Yorobe, Executive Dr. Lilia T. Habacon (DOST-PSHSS,) Dr. Josette T. Biyo (DOST-SEI), and Dr. Esperanza O. Cayanán (DOST-PAGASA).

of cDNAs encoding precursors of starfish asterosaps.

The other awardee is Dr. Bautista, chief science research specialist from the DOST-Philippine Institute of Volcanology and Seismology (PHIVOLCS), who led the collaborative disaster risk management projects and the conduct of PHIVOLCS-developed software training called Rapid Earthquake Damage Assessment System.

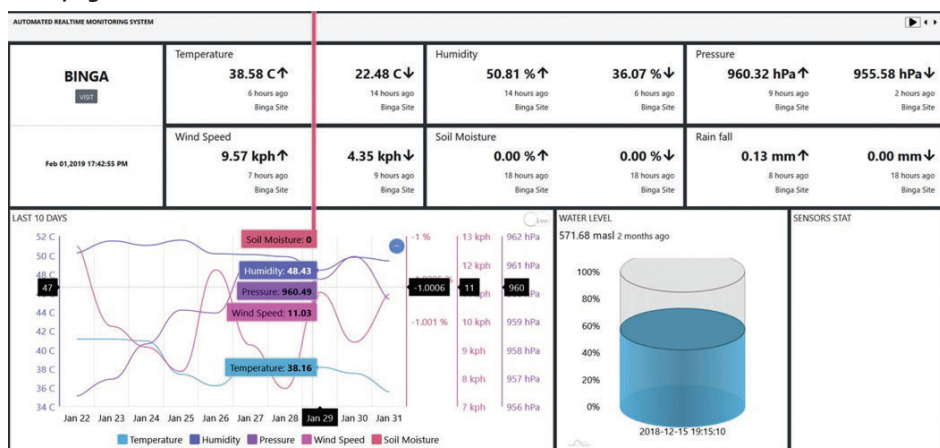
Dr. Cayanán, chief of Weather Services Division of the DOST-Philippine Atmospheric, Geophysical and Astronomical Services

Administration, is also among the awardees. Some of her studies were the study of heavy rainfall events during the southwest monsoon season in the Philippines, seasonal march patterns of the summer-rainy season in the Philippines, abrupt climate shift in the mature rainy season of the Philippines, and tropical cyclone influence on long-term variability of Philippine summer monsoon onset.

Meanwhile, the other two women awardees are vital in promoting science education in the country. Dr. Biyo, director of the DOST-Science Education Institute, is responsible for the

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Screenshot of the dashboard of the 'Arms4dams' web portal for the real-time monitoring of the dams.

access levels for the public, government agencies, and other relevant stakeholders.

"Since data is transmitted in real-time, data retrieval is also available at the portal wherein users can view information from past occurrences of rainfall," he said.

Uy also added that data gathered from the ARMS can also be used for hydrologic simulations that can predict water availability among the monitored dams.

"These simulations can also help dam operators prepare for various climates and

the effects that come with them. For this purpose, the ARMS has also designed a model that can accurately and visually reflect these information on water levels," he said.

Uy added that these data can be used for hydraulic simulations that can alert operators on possible dam overflow, therefore providing readiness for water discharge and evacuation in the area as needed.

He expressed hope that ARMS can be deployed in all dams in the country to help government officials and dam operators in managing the water resource.

"Better water resource management is within 'ARMS reach' with our system as we can have predictive analysis in the future and create science-based decisions on our water resource," he said.

In the future, ARMS will also be installed and deployed in Magat and Pantabangan dams and reservoirs in partnership with the National Irrigation Administration.

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implementation of the DOST human resource program for students and teachers. As well, Dr. Habacon, current executive director of DOST-Philippine Science High School System (PSHSS), initiated the incorporation of STEM in the PSHSS curriculum to produce graduates equipped with 21st century skills.

The other awardees were not able to attend the ceremony. One is Dr. Zenaida P. Hadji Raof-Laidan, regional director of DOST-XII, who pushed for the establishment of the Philippine National Halal Science Center in Koronadal City, South Cotabato. The other is Dr. Imelda A. Agdeppa, a chief science research specialist from the DOST-Food and Nutrition Research Institute. She spearheaded several studies on probiotics and fiber in milk, vitamin D status of Filipino adults, and nutrient intakes and food sources of Filipino infants, toddlers, and young children.

In his speech, DOST Secretary Fortunato T. de la Peña shared the Department's commitment in creating an environment where our Filipina scientists would be encouraged and inspired to look and develop innovative solutions to some of the country's pressing problems.

"For many years, we have been recognizing the efforts and valuable contributions of our Filipina scientists, particularly towards providing better livelihood and career opportunities for many Filipinos," said de la Peña.

In this event, more than 300 officials and employees of DOST gathered in Hotel Jen to celebrate the crucial role of women in the field of science, technology, and innovation. Some of the highlights in this event were dance and singing competitions, zumba, and raffle prizes.

ABOUT US

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DOST pushes for gov't tie-up for inclusive innovation

By **Rodolfo P. De Guzman**, DOST-STII

The Department of Science and Technology (DOST) concretized its support for inclusive innovation by collaborating in the Global Innovation Policy Accelerator (GIPA) South East Asia Final Conference.

The GIPA conference, held 6-7 March 2019 at the Rizal Park Hotel Manila, carried the theme "Collaboration Across Government to Tackle Large-scale Inclusive Innovation Science, Technology, and Innovation Policy Challenges."

The conference aims to discuss the process of inclusive and open approaches in innovation policy development and share best practices; explore options to build deeper, more effective connections between the United Kingdom (UK) and South East Asia on inclusive innovation policymaking; and provide a platform for networking among the participants.

The two-day forum was spearheaded by the Newton Fund Philippines, the UK through the British Embassy Manila, and Nesta, an international innovation foundation based in the UK. Nesta acts through a combination of programs, investment, policy and research, and the formation of partnerships that promote innovation across a broad range of sectors.

The GIPA, a collaboration between UK and the Philippines, supports science, research, and innovation partnerships that promote economic development and social welfare.

"When innovation is mentioned, it is rare that people associate it with government so this program of GIPA is primarily targeting government innovation...and we would like to think that the government innovates," said Dr. Rowena Cristina L. Guevara, undersecretary for Research and Development of the DOST.

Usec. Guevara underscored the importance of innovation in research and development (R&D) to which the DOST is mandated to carry out. She added that it is important for different countries to collaborate in innovation for R&D.

"I thank the British government through Nesta in implementing this [GIPA] international program designed to motivate government executives to actively innovate together for the good of the country," added Usec. Guevara.

After the opening ceremonies, three forums were conducted with active discussions on current issues on innovation.

The first forum "Developing Inclusive Innovation Policies: Innovation Agencies and Innovation Systems" was facilitated by Alex Glennie, principal researcher of Nesta. Glennie introduced a range of important concepts and approaches to inclusive innovation policy. Glennie further stressed the importance of inclusion of people, places, and industries in innovation which involves processes and activities that identify those who would participate, who would benefit, and who would decide in terms of funding.

The next forum focused on the role of international collaboration in developing inclusive and effective science, technology, and innovation policies with sharing of experiences of the GIPA and other international collaboration programs. Leading the forum was Dr. Benjamin Reid, head of the International Innovation, Development Programmes of Nesta and director of the GIPA.

An open forum followed with panelists that included: Dr. Carlo A. Arcilla, director of the DOST-Philippine Nuclear Research Institute (PNRI); Niraj Saraf, manager of the Newton Fund, Innovate UK; Tran Anh Tu, head of Division of Technology Innovation Policy, State Agency for Technology Innovation of Vietnam; Kanchana Wanichkom, assistant secretary general, National Science Technology and Innovation Policy Office of Thailand; Ahmad Razif, manager of the CEO's Office, Malaysia Industry-Government Group for High Technology, Malaysia; and Erizal Jamal, director of Center for Plant Variety Protection and Agriculture Permit, Ministry of Agriculture of Indonesia.

The last forum included a hands-on workshop that explored some techniques and approaches in open innovation and their potential application within science, technology, and innovation policymaking. It was moderated by David Simoes-Brown, chief executive officer of 100% Open, a spin out initiative from Nesta in 2010.

Aside from the DOST, other collaborators from the Philippines include the trade and industry, information and communication technology, and agriculture departments; Bureau of Agricultural Research, an attached agency of the Department of Agriculture; and the National Economic Development Authority.

PH's first simulation packaging testing lab soon to rise on DOST grounds

Text and photo by Rodolfo P. De Guzman, DOST-STII

A state-of-the-art packaging laboratory with the capacity to simulate stress conditions will soon rise at the Department of Science and Technology (DOST) grounds in Bicutan, Taguig City.

At the ground breaking ceremony for the establishment of the first Simulation Packaging Testing Laboratory (SPTL) and Green Packaging Laboratory (GPL) in the country held 5 March 2019, DOST Secretary Fortunato T. de la Peña stressed the need to improve packaging technology with better equipment and facilities.

The DOST-Industrial Technology Development Institute (ITDI) has made great strides in the packaging industry through its own packaging research and development and testing laboratory, according to the science chief. However, there is still a need to step up to global industry leaders, which is one of the reasons for the establishment of the modern SPTL and GPL, he said.

"We can see the evolution of the packaging center," said Sec. de la Peña. "While it has achieved a certain level of expertise on its own, on learning by doing, they have a strong belief that they need to partner with world leaders in packaging technology to further harness its people and facilities in developing new packaging technologies."

According to the DOST-ITDI, the packaging laboratories, once completed, will help the local packaging industry level up with other players particularly in the ASEAN region. The industry will increase its competitiveness and will forge possible collaborations with other global market players.

The facility will provide opportunity for small and medium enterprises to avail of its services so they can improve on quality packaging materials and processes that will eventually make their products stand out in both the domestic and world markets.

The SPTL and GPL facilities will offer more cost-effective stress testing of product packaging as the facilities can easily simulate the stress conditions that affect products when transported.

"Imbes na isasakay mo pa nang maraming beses, dito sa laboratory mo na i-simulate. Sa buong Pilipinas, dito lang meron niyan (Instead of transporting the products many times over, the transport process

can be simulated in our laboratory which is the first of its kind in the country)," said DOST Undersecretary for Research and Development Dr. Rowena Cristina L. Guevara.

"The establishment of the SPTL and the GPL will become part of the long term facilities strategic plan that we are doing," added Sec. de la Peña.

Also present during the ground breaking ceremony were DOST-ITDI Director Dr. Annabelle V. Briones, DOST-Philippine Council for Industry, Energy and Emerging Technology Research and Development Executive Director Dr. Enrico C. Paringit, Daisy E. Tañafranca, project leader and chief Science Research Specialist of the Packaging Technology Division of DOST-ITDI, and Stefano Paolo G. Buñag, president of the Packaging Institute of the Philippines.



DOST Secretary Fortunato T. de la Peña (rightmost) leads the ground breaking ceremony for the establishment of the first SPTL and GPL with DOST-ITDI Director Dr. Annabelle V. Briones (middle), DOST Undersecretary for Research and Development Dr. Rowena Cristina L. Guevara (second from right), DOST-PCIEERD Executive Director Enrico C. Paringit (third from left), Daisy E. Tañafranca (fourth from left), and Stefano Paolo G. Buñag (fourth from right), president of the Packaging Institute of the Philippines.

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DOST-ITDI researchers cited at Asian Scientist 100. Dr. Rosalinda C. Torres (left) and Dr. Marissa A. Paglicawan (right) were two of eight Filipino scientists who were featured in the 2019 edition of the Asian Scientist 100. Dr. Torres is from the Standards and Testing Division, while Dr. Paglicawan is from the Materials Science Division, both under the Department of Science and Technology-Industrial Technology Development Institute (DOST-ITDI). Dr. Torres was recognized for her research on larvicidal potential of Philippine medicinal plants like avocado, guyabano, and pomelo. These plants, based on her studies, have extracts that are toxic for pests like mosquito while in their larva stage. Meanwhile, Dr. Paglicawan's research efforts to use Manila hemp or abaca in engineering materials led to her citation. In their previous project, "Tryk ni Juan", Dr. Paglicawan developed a composite material made of resin and abaca fiber as roofing for tricycles. This innovation makes tricycles more appealing and lighter as well. The Asian Scientist Magazine aims to highlight the most outstanding Asian researchers for their achievements in their respective disciplines. Accordingly, the recognition cites that "the honoree must have received a national or international prize in 2018 for his or her research. Alternatively, he or she must have made a significant scientific discovery or provided leadership in academia or industry." The listing began in 2016 and have included at most ten Filipinos each year. (Text from David Matthew C. Gopilan, DOST-STII and photos from www.asianscientist.com)



Dr. Rosalinda C. Torres



Dr. Marissa A. Paglicawan