2023
ACCOMPLISHMENTS

NATIONAL ACADEMY OF SCIENCE AND TECHNOLOGY

VISION, MISSION, AND MANDATES

MANDATE

- To recognize outstanding achievements in Science and Technology as well as provide meaningful incentives to those engaged in Scientific and Technological Researches (Presidential Decree 1003-A, series of 1976).
- To advise the President and the Cabinet on matters related to Science and Technology (Executive Order No. 818, s. 1982).
- To engage in projects and programs designed to recognize outstanding achievements in science and to promote scientific productivity (Executive Order No. 818, s. 1982).
- To embark on programs traditionally and internationally expected of an academy of science (Executive Order No. 818, s. 1982).
- To manage, operate and maintain the Philippine Science Heritage Center (Republic Act 9107, s. 2001).

VISION

The National Academy of Science and Technology, Philippines is the country's lead adviser towards the advancement of a strong science, technology, and innovation ecosystem for a prosperous, equitable, and sustainable society

MISSION

1. To recognize outstanding achievements of Filipinos in science, technology and innovation;
2. To provide authoritative and evidence-based advice to government and society, in general;
3. To promote a strong science culture in Philippine society; and
4. To facilitate collaboration with communities and institutions for scientific, technological, and innovative pursuits.

CORE VALUES

NAST is committed to promote and exemplify the values of INTEGRITY and EXCELLENCE in pursuit of science in the interest of Philippine society and the global community.

BENEFITS OF THE MEMBERS OF THE ACADEMY

Aside from the recognition awards, the Academy also provides incentives, benefits, and privileges to Academicians and National Scientists. These are research fellowship grants, travel and publication assistance, monthly gratuities, among others.

RESEARCH FELLOWSHIP GRANTS

Rhodora V. Azanza
"Critical Assessment of the Human Resource Needs for Philippine Blue Economy Development in the Area of Marine Ecosystem Health" (01 September-31 December 2023)
The project aims to map and assess existing trained/qualified human resources that undertake research, monitoring and management of marine ecosystems in selected/biodiversity hotspot sites in the western, northern, eastern and southern Philippine marine waters; provide estimates on the gaps and needs on trained/qualified human resource for research, monitoring and management of marine ecosytems in selected sites, i e. representing biodiversity hotspots in the western, northern, eastern and southern marine waters; and provide policy and other recommendations in support of the urgent needs to improve human resource requirements for the development of Philippine Blue Economy in the area of marine ecosystem health.

Jose Maria P. Balmaceda
"Futures of Philippine STEM Education" (01 November-31 December 2023)
This project aims to publish a book on futures of Philippine STEM Education and prepare a technical paper for submission to a refereed journal.

Allan B.I. Bernardo
"Lay Theories of Culture, Intercultural Attitudes, and Global Citizenship in the Philippine Basic Education Curriculum" (01 January-31 May 2023)
The project aims to empirically investigate how lay theories of culture, especially the lay theory of polyculturalism, relate to Filipino students' intercultural attitudes, cognitions, and behavioral intentions that are related to global citizenship education competencies; and analyze the current Philippine basic education curriculum to identify learning competencies and curriculum elements that reflect different lay theories of culture, identify gaps in the current learning competencies that relate to current global citizenship education competencies, and discuss possible curriculum reforms in the current basic education curriculum pertinent to the emergent developments in global citizenship education.

Christopher C. Bernido
"Stochastic Processes with Memory in a Complex Solar Dynamics that Impact Climate and Space-based Technologies" (01 June-31 December 2023)
This research is in line with two of the 12 key operational areas in PAGTANAW2050: The Philippine Foresight on Science, Technology, and Innovation: (a) Environment and Climate Change, and (b) Space Exploration. The objective of this research is to analyze the stochastic behavior and memory properties of sunspot numbers from 1823 to 2019 to better gauge solar activities that impact the earth's climate, our telecommunication system, power generation, and earth-orbiting satellites. The insights and expertise gained in the conduct of the research may help guide in determining possible directions that Philippine science may take in the internationally competitive area of solar physics.

Gisela P. Concepcion

“Study of the In Vivo Synergistic Antitumor Activity of Renieramycin M and Doxorubicin” (01 January-31 December 2023)

The projects aims to demonstrate that the marine compound renieramycin M isloated from a blue Xestospongia sp. sponge acts synergistically with the clinically used anticancer drug doxorubicin to reduce and/or delay the growth of 4T1 mouse mammary tumor in BALB/c mice; optimize the various parameters and conditions, i.e. tumor cell concentration, drug doses, time parameters, etc. of the combination treatment components; and determine the general toxicity of the combination treatment on the BALB/c mice.

Virginia C. Cuevas

“Field Trials on the Use of Trichoderma Microbial Inoculant (TMI) as Biofertilizer, and Biocontrol Agent of Fungal Corn Pathogens with Special Emphasis on Aflatoxin-Producers and of Fall Armyworm” (01 January-31 October 2023)

The project aims to conduct field trials in two (or three) locations -UPLB, Isabela province, with possibility of 3rd location in Pangasinan, on the use of Trichoderma microbial inoculant for control of soil-borne corn pathogens especially Aspergillus flavus and Aspergillus parasiticus, pathogens producing aflatoxin in corn grains; demonstrate in the field the efficacy of using TMI in combination with compost and other forms of organic fertilizer in reducing chemical fertilizer use in native corn cropping with corresponding yield improvement; and survey and monitor the effect of Trichoderma on the invasive insect pest of corn, the fall armyworm (Spodoptera frugiperda)**.**

Alvin B. Culaba

“Life Cycle Assessment of Carrageenan-Based Bioplastic” (16 October-31 December 2023)

The project aims to assess the environmental burdens associated with the production of carrageenan-based bioplastic using a life cycle assessment (LCA) approach. Specifically, the study intends to: establish the system's boundary of the carrageenan-based bioplastic material from cradle-to-grave; provide a detailed life cycle inventory covering energy, wastes, and emissions associated with the carrageenan-based bioplastic production; determine and quantify the potential environmental impacts of carrageenan-based bioplastic using ReCiPe Impact categories; compare the LCA results to petroleum-based based on available literature; and provide policy recommendations on the future of bioplastics development and utilization in the country.

Antonio Miguel L. Dans

“Voices from the Field: Undertstanding the Lived Experiences and Capacity-Building Needs of Community Health Workers in Rural and Remote Philippines” (01 June-31 December 2023)

The project aims to outline the roles that rural and remote community health workers (CHWs) occupy in delivering primary care services in the Philippines; identify the capacity-building needs of CHWs for their roles; and explore CHWs' perceptions of using UpToDate as a capacity-building tool.

Ernesto J. Del Rosario

“Bioplastics from Seaweeds in the Philippines: SWOT Analysis” (16 October-31 December 2023)

The project aims to obtain scientific information from the literature on seaweeds as source of biopolymers for bioplastic production; collect available data on Philippine seaweed production and export, as well as processing technologies, in comparison with other countries; prepare a comprehensive analysis of Strengths, Weaknesses, Opportunities, and Threats (SWOT) for bioplastic production from seaweeds in the Philippines; prepare technical recommendations for specific local R&D projects involving laboratory-scale, pilot-plant or village-level studies on the production of bioplastic packaging materials using raw or semi-processed seaweeds, or their extracted biopolymers; and prepare policy recommendations on suitable species of seaweeds to be farmed locally as bioplastic feedstocks, as well as appropriate processing technologies for producing bioplastic packaging materials.

Raul V. Fabella
"Investment and Inclusion in Low Income Countries: Highlighting the Role of Industrial Structure" (01 January-30 September 2023)
The project aims to pin down the important factors that advance the investment rate in low income countries with emphasis on industrial structure Manufacturing and Services.

Ceferino P. Maala
"Topographic Anatomy of the Carabao Foot for Medical and Surgical Procedures" (01 January-31 May 2023)
The project aims to characterize the gross anatomy of the bones, tendons, ligaments, nerves and blood vessels iin the foot of the carabao; describe the apprearance of these structures in radiographs and ultrasonographs; establish sites for effective or complete blocking of nerves in the foot of the carabao for nerve blocking purposes, and for other surgical procedures and acupuncture sites; and determine if there are superficially located veins for venipuncture in the foot**.**

Marco Nemesio E. Montaño
"Bioplastics from Marine Natural Resources" (16 October-31 December 2023)
The project aims to gather scientific and technical data on bioplastics/polymers, their properties, biodegradability, and bioavailability of raw materials in the Philippines; collect available data on the Philippine seaweed production and processing technologies in comparison with other countries; prepare a technical status production of bioplastics from raw and semi-refined biopolymers to include the processes and equipment relevant to local fabrication or importation; prepare technical material as the background for use in the preparation of the national and local LGU policies on seaweed bioplastic in relation to waste disposal, resource conservation, protection, and utilization; and prepare policy recommendations on the suitable species or variety of seaweeds to be farmed as well as processing technologies for bioplastic packaging materials.

Cristina J. Montiel
"Contested Portrayals of Martial Law Survivors: Social Representations of Historical Targets of Oppression Over Varying Democratic Conditions" (01 January-30 September 2023)
The project aims to examine how democratic conditions shape social representations of historical targets of oppression.

Cristina J. Montiel
"The Psychological Foundations of Territorial Rights" (01 November-31 December 2023)

This project aims to establish a theoretical framework for a psychology of territorial rights, contestations, and peacebuilding.

Maribel G. Nonato
"National Metrology Laboratory and the National Quality Infrastructure" (16 November-31 December 2023)
This project aims to review the status of the updated legal framework of the National Metrology Laboratory (NML) and the National Quality Infrastructure (NQI); assess the effectivity of the implemented NML policies; analyze the strengths and weaknesses of the technical and management capacity of NML and their relationship to trade; formulate indicators in the establishment of efficient and responsive NML's functions; determine the challenges/reasons for the trade rejection of certain commodities/technologies from various sectors; examine the status of integrating courses on metrology into the technical curricula; develop indicators in the establishment of metrology culture in the Philippines; and formulate appropriate policy recommendations to address challenges and/or weaknesses that limit export trade.

Carmencita D. Padilla
"Critical assessment of policies and regulations adversely affecting Philippine R&D output and recommendation of enabling policies that can be adopted from other countries" (01 October-31 December 2023)
The project aims to obtain relevant information from the literature on policies and regulations influencing Philippine R&D output; collect available data on the best practices of Philippine R&D in comparison with the other countries; prepare a comprehensive assessment report for the policies and regulations of the Philippine R&D output; prepare technical recommendations for policies and regulations on specific Philippine R&D output; and prepare policy recommendations on specific Philippine R&D output that can be practiced locally and internationally.

Agnes C. Rola
"Exploring Policy Support for Plastic Manufacturing and Food Packaging Industry to promote bioplastics use in the Philippines" (16 October-31 December 2023)
The project aims to describe the performance of the current policies on plastic use and plastic waste management both at the national and the local levels; determine the drivers that can potentially influence the plastic manufacturer's shift from synthetic plastics to bioplastic production in the Philippines; analyze the factors that may lead to the adoption of bioplastics in the food packaging industry at various levels (institutional users, supermarkets, wet markets); and identify necessary policy support for plastic manufacturers and food packaging industry players for a potentially robust bioplastics industry in the country.

Fortunato B. Sevilla III
"Review and Assessment of the National Metrology Laboratory and its Role in Trade Facilitation" (16 October-31 December 2023)
The project aims to review the status of the NML particularly on its role in trade facilitation, considering its relation with designated institutes, calibration laboratories, regulators, industry and other members of NQI; analyze the strengths and weaknesses of the NML particularly in its role in trade facilitation; determine why some products/technologies from various sectors (agriculture, forestry, fisheries, health, mining, electronics, etc.) are not exported due to inability to meet international standards and choose a selected few as caes

studies; and develop appropriate policy recommendations to address problems/weaknesses that limit export trade.

Evelyn Mae Tecson-Mendoza
"Strengthening of Transactions NAST PHL towards sustained timely releases, wider readership, and accreditation" (01 January-31 July 2023)
The project aims to strengthen the Transactions NAST PHL journal to ensure timely, impactful, and sustained releases of issues and articles.

Evelyn Mae Tecson-Mendoza
"Transactions NAST PHL: Publication of Volumes 45-46 (2023-2024) and Digitation and Website Uploading of Volumes 23-25" (2001-2013) (01 November-31 December 2023)
The project aims to strengthen the Transactions NAST PHL journal to ensure timely, impactful, and sustained releases of issues and articles. Specifically, it aims to: process, edit, and finalize papers for Transactions NAST PHL Vol.45 (2023) and start processing of papers for Vol.46 (2024); edit, digitize, and upload Volume 23-35 (2001-2013) on the TNP website; take initial steps in the accreditation process from selected local, regional, and international journal accreditation bodies.

Filemon A. Uriarte Jr.
"Sustainable Solid Waste Management" (01 January-28 February 2023)
The project aims to write a book with the same title, which will present the latest developments in solid waste management in Metro Manila and selected cities, towns and island tourist sites in the Philippines using recently acquired primary data, scrutinize the impact of the COVID-19 pandemic on solid waste management, critically analyze the environmental impacts of landfills and waste incineration, and examine the political economy of solid waste.

Reynaldo B. Vea
"A Marine Transportation System for a Prosperous, Archipelagic, Maritime Nation" (01 January-31 December 2023)
The project aims to elaborate on PAGTANAW 2050, a foresight document for the Philippines over the next three decades with a focus on the role of Science, Technology and Innovation (STI), concentrating on the part to be played by the marine transportation system in the drive towards a prosperous, archipelagic, maritime nation.

TRAVEL ASSISTANCE

Edward H.M. Wang
15-17 June 2023; Penang, Malaysia
Attended the Malaysian Orthopedic Association meeting and the ASEAN Orthopedic Research Society where he is the secretary; Presented a research paper entitled “Study Reveals Gaps in Extremity Soft Tissue Sarcoma Care in the Philippines.

Mahar K. Mangahas
21-25 August 2023; Van der Valk Hotel in Schiedam, Rotterdam.
Participated in the 21st Annual Conference of the International Society for Quality-of-Life Studies (ISQOLS)

Lourdes J. Cruz
19-21 October 2023; Hoam Faculty House, Seoul, Korea
Participated in the 22nd Science Council of Asia Conference

Lourdes J. Cruz
22-27 October 2023; Anantara Siam Hotel in Bangkok, Thailand Participated in the symposium on “Fostering Collaborations at the Nexus of Climate and Health for Global Environmental Change Research - A Way Forward”. The event is being hosted by the US Department of State.

Lourdes J. Cruz
18-22 November 2023; Tokyo, Japan.
Participated in the International COAST Card Workshop in Japan (J-COAST) and the International Eelgrass Blue Carbon Workshop (Amamo2023)

RECOGNITION OF OUTSTANDING ACHIEVEMENTS IN SCIENCE, TECHNOLOGY, AND INNOVATION

The Academy recognizes and provides incentives to Filipino scientists for outstanding achievements in scientific research and development. Through the Recognition Function, it has contributed significantly in promoting and fostering excellence in science and technology research in the country.

ORDER OF NATIONAL SCIENTIST

The conferment of the Order of National Scientist by the President of the Republic of the Philippines is the highest honor given to a Filipino. Since 1978, 42 Filipinos have been conferred as National Scientist.

President Ferdinand R. Marcos Jr. conferred the Order of National Scientist on Academician Carmencita Dizon Padilla on 31 August 2023 at the Malacanan Palace.

Academician Padilla was recognized for her outstanding contributions in human genetics and genomics in the Philippines. Her pioneering works pioneering researches on inborn errors of metabolism among Filipinos provided the scientific basis for the enactment of Republic Act 9288 or the Newborn Screening Act of 2004 of which she was the most active advocate. This act results to the early detection of congenital disorders thus preventing mental retardation and deaths. It was also based on the researches led by Dr. Padilla that upon her strong and diligent advocacy led to the passage of Republic Act 10747 or Rare Disease Act of 2016, which protects patients with rare disease.

Dr. Padilla spearheaded the establishment of the Philippine Genome Center (PGC) at the University of the Philippines with the strong support from the Department of Science and Technology. The PGC is a multi-campus and multidisciplinary institution that combines basic and applied researches for the development of health diagnostics, therapeutics, preventive products, and DNA forensics as well as for the improvement of crops and livestock. As PGC's Executive Director from 2011 to 2016, she oversaw the growth of genomics in the fields of health, forensics, bioinformatics, biodiversity, and agriculture as well as the establishment of the most advanced DNA Sequencing Core Facility in the Philippines. The PGC has been playing a crucial role during the COVID-19 pandemic.

Dr. Padilla shepherded and strengthened the component 14 institutes and centers and 17 study groups of the National Institutes of Health at the University of the Philippines Manila, including the provision of the necessary facilities. She also facilitated the establishment of the following

laboratories and training programs in the Institute of Human Genetics: Cytogenetics Laboratory, Newborn Screening Center, Molecular Genetics Laboratory, Biochemistry Laboratory, MicroArray Laboratory, and the Hemoglobinopathy Laboratory.

For her outstanding role as an academic leader and mentor, the Philippines is assured of a pool of next generation clinical geneticists and genetic counselors. This role she extended to the other branches of the science thus guaranteeing future scientists and science leaders for the country.

Dr. Padilla earned national and international recognitions for her academic and leadership integrity and excellence. Some of these are: Outstanding Professional of the Year Award in the field of Medicine (Professional Regulation Commission), 2013 Outstanding Pediatrician (Philippine Pediatric Society), Dioscoro Umali Leadership Medal - Outstanding Science Administrator Award (Department of Science and Technology), Lingkod Bayan Award (Civil Service Commission), The Outstanding Young Men for Medicine (Philippine Jaycees), Robert Guthrie Award for 2017 (International Society for Neonatal Screening), R. Rodney Howell Award for Excellence in Newborn Health (US Newborn Screening Foundation), and 100 Most Influential Filipina Women in the World (Female Women's Network , San Francisco, USA), to name a few.

To date, there are 11 living National Scientists.

NATIONAL SCIENTISTS	FIELD OF SPECIALIZATION
Clare R. Baltazar	Systematic Entomology
Mercedes B. Concepcion	Demography
Lourdes J. Cruz	Biochemistry
Ernesto O. Domingo	Internal Medicine / Gastroenterology
Raul V. Fabella	Economics
Emil Q. Javier	Plant Breeding and Genetics
Ricardo M. Lantican	Plant Breeding and Genetics
Bienvenido F. Nebres, SJ	Mathematics
Carmencita D. Padilla	Human Genetics
Dolores A. Ramirez	Biochemical Genetics
Gavino C. Trono, Jr.	Marine Botany

MEMBERSHIP TO THE ACADEMY

Membership to the Academy is by peer recognition and carries with it the title of "Academician." Elected as members are resident Filipino scientists who have made exemplary contributions to science and technology and have advanced its cause in the Philippines. To date, there are 79 living members (11 of which are National Scientists).

ROEL R. SURALTA, Ph.D.
Agricultural Sciences
For his outstanding contributions to the advancement of root science in the Philippines. His pioneering studies on crop "root plasticity" offered new perspectives in matching the type, timing and magnitude of water stress environment with the root morphological, physiological, and genetic traits, and optimum agronomic management. This knowledge can improve crop resilience in climate change affected environments and consequently, help farmers in the Philippines and in Asian monsoon regions enjoy better yield. He is also recognized for his commitment to educating the next generation of crop scientists by mentoring many graduate, undergraduate, and high school students on root science. His consultative leadership has capacitated the Department of Agriculture-Crop Biotechnology Center by modernizing its facilities, and building capabilities of its researchers towards a high impact biotech research and development addressing climate change resilience of agricultural crops.

MARIA CORAZON A. DE UNGRIA, Ph.D. Microbiology

For her pioneering contribution to DNA forensics in the Philippines and in leading the DNA Analysis Laboratory, Natural Sciences Research Institute, UP Diliman in promoting the use of DNA technology for forensic applications and human genomics research, particularly on the genetic history of the Filipino people. Her work was valuable in the 2007 Supreme Court promulgation of the Rule on DNA Evidence that is now followed by all Philippine courts when DNA evidence is presented at trial. A *Dangal ng Bayan* awardee from the Civil Service Commission, she actively advocates for effective research communication, science-driven national policies on forensic DNA databases, institutional protection of the rights of indigenous peoples, and proper governance to ensure the ethical conduct of research in the Philippines. Dr. De Ungria identifies herself as a changemaker who uses "DNA" as her catalyst for change.

ELMER P. DADIOS, Ph.D.
Manufacturing Engineering

For his significant contribution to the development and application of intelligent systems using robotics, artificial intelligence (AI), and industrial automation in the country. He is part of the next generation of pure engineering researchers as an early pioneer in artificial neural networks (ANN) and fuzzy logic systems even before its popularity where he worked on disaster response and smart agriculture applications to address national issues. He also co-founded the International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment and Management (HNICEM) IEEE conference series, that accounts for 2% of the Philippines' Scopus publications across all disciplines, providing an opportunity for Filipino researchers' visibility in the international scientific community.

GIL S. JACINTO, Ph.D.
Chemical Oceanography

For his significant contributions to the establishment of the first chemical oceanography laboratory in the Philippines and pioneering research in marine pollution chemistry, particularly eutrophication caused by nutrient loading and its effects on water column chemistry and deoxygenation. His work on the speciation of trace metals in Manila Bay was one of the first accurate measurements of dissolved trace elements in seawater in the country. He led large-scale oceanographic surveys of Manila Bay which established episodic hypoxic conditions – near the bottom. Studies with his students that quantified and identified nutrient sources entering the bay using modeling tools have been used in other countries. His research on hypoxia in Manila Bay and Bolinao contributed to a seminal review paper published in *Science* and raised awareness on the problem of deoxygenation in tropical environments and developing countries, particularly in East Asia.

CORRESPONDING MEMBERSHIP

Corresponding membership, on the other hand, is conferred on non-resident Filipino scientists who have made exemplary contributions to the advancement of science and technology, must have continuing connections and contributions to Philippine science, and regularly come to the Philippines to practice their field of expertise. Filipino citizenship and residency are waived as long as the three qualifications are met. To date, there are 19 living Corresponding Members.

LEODEVICO L. ILAG, Ph.D.
Microbiology and Immunology

In recognition of his significant contributions to research across a broad spectrum of biotechnology, from understanding biological mechanisms of action to translational research needed to commercialize products. He has served as an adjunct/visiting faculty, adviser, research collaborator, industry partner, and mentor to students in public and private institutes in the Philippines. He also assisted in the establishment of the Virology Institute of the Philippines by the Philippine government.

HONORARY MEMBERSHIP

To recognize exceptional outstanding contributions to science and technology, the Academy established the Honorary Membership, which may be conferred on recipients of internationally recognized prestigious scientific awards such as Nobel Prize, the Food Prize and the like, whose researches have contributed to the development of the Philippines and who come to the country to deliver a lecture for the Academy.

MAJOR RECOGNITION AWARDS

Outstanding Young Scientist (OYS) Award

The Outstanding Young Scientist (OYS) award is given to young Filipino scientists (must not be 41 years old within January to December in the year of the award) who have made significant contributions to science and technology. Eleven (11) young Filipino scientists received the award.

For CY 2023, nine (9) young Filipino scientists received the Outstanding Young Scientist (OYS) Award.

NONAWIN L. AGUSTIN, Ph.D.
Agricultural Sciences
Philippine Rice Research Institute

In recognition of her significant work on identification of genetic determinants and mechanisms regulating *L-type* lateral root formation. Such roots are useful for stable growth, adaptation, and productivity of rice under abiotic-stressed environments. The identified mutation genes (*weg1, plr1, Osmed25*) that promote highly developed root systems with no detrimental effects on aerial parts are reported for the first time. The mutants are useful as parent materials for genetic improvement and breeding of rice. She also demonstrated that nutrient manipulations could further enhance lateral root development, with impacts on natural resource and crop management strategies for improvement of root system architecture under water stress and nutrient shortages.

ALBERT REMUS R. ROSANA, Ph.D.
Microbial Biotechnology
University of the Philippines Los Baños

In recognition of his outstanding achievements in the field of microbial biotechnology and natural products chemistry; for his research outputs on novel genomics-driven drug discovery and development in the Philippines in collaboration with Filipino scientists as well as his ingenious research in fighting an epidemic of mountain pine beetle utilizing pheromone pathway engineering in entomopathogenic fungi.

FULGENT P. CORITICO, Ph.D.
Biology (Systematics)
Central Mindanao University

In recognition of his contributions to plant taxonomy and biodiversity particularly his pioneering works on the taxonomy of tree ferns (Cyatheaceae and Dicksoniaceae), publishing 22 new species, 12 new records and 9 new combinations of ferns, mosses, carnivorous and flowering plants; for his productive research as manifested by publications in high impact journals and utility models; for his successful collaborations with international scientists; and for training members of local communities as parataxonomists and saving endangered and endemic plants by propagating them using spores and cheaper modified growing media.

RONNIE S. CONCEPCION II, Ph.D.
Electronics and Communications Engineering
De La Salle University

In recognition of his outstanding contributions in advanced computational intelligence models for precision and sustainable agricultural and decision-support systems that result in high nutrient use efficiency and reduced chemical waste discharges. He played a key role in developing clean food production technologies, aquaponic water quality sensor, alternative energy resource design, agricultural life cycle analysis, stakeholder's quality-of-life models, and the initialization of the platform for simulated gravity farming.

OURLAD ALZEUS G. TANTENGCO, M.D., Ph.D.
Molecular Medicine
University of the Philippines Manila

In recognition of his significant contributions as a physician-scientist in bridging biomedical science and clinical medicine to improve research on infectious and tropical diseases and women's health, collaborating with both clinicians and public health experts. His expertise in cell and molecular biology helped unravel mechanisms involved in cervical remodeling during pregnancy and parturition. Microfluidic organ-on-a-chip devices that he has developed mimic the human female reproductive tract and are useful tools in disease modeling, preclinical testing of drugs, and toxicologic studies.

REINABELLE C. REYES, Ph.D.
Astrophysics
University of the Philippines Diliman

In recognition of her significant research works on astrophysics and cosmology, including pioneering work in the confirmation of the theory of general relativity on cosmic scales and her leadership of an active research group nurturing future astrophysicists at the National Institute of Physics, UP Diliman. She has provided extensive technical support to the Philippine government as an expert in data science and analytics, contributing to COVID-19 pandemic response through enabling anticipatory data-driven governance and strengthening procurement. Her extensive outreach initiatives have made a significant impact in encouraging and opening opportunities for the next generation of young Filipinos to pursue careers in STEM.

JILLIAN AIRA S. GABO-RATIO, D.Eng.
Earth Resources Engineering
University of the Philippines Diliman

In recognition of her significant research works that focus on geochemistry, petrology, and mineralogy investigations to understand the origin of igneous and sedimentary rocks in different areas in the Philippines. Using geochemical and mineralogic data, her research explains how certain geologic processes result in the formation of mineral deposits. The detailed characterization of mineralized areas will help ensure the effective exploration and management of resources. Dr. Gabo-Ratio's work in several areas in Benguet and in Davao de Oro showcases the capability of Filipino scientists to conduct research on geologically complex mineral deposits in the Philippines.

MOISES NEIL V. SERIÑO, Dr. rer. pol.
Economics
Visayas State University

In recognition of his researches in the fields of development and socio-economics in the Visayas; his scientific and technical results have been used as inputs to local policymaking and helped promote sustainable development and agricultural productivity. A leader in local capacity building in data-driven socio-economic analysis, he led the establishment of a socio-economic research center and served as a founding editor-in-chief of a peer reviewed journal in economic and development studies.

JOHN JAMIR BENZON R. ARUTA, Ph.D.
Counseling Psychology
De La Salle University

In recognition of his significant and high quality contributions in the field of psychology of environmental sustainability and climate change in the Philippines, the mental health and well-being of vulnerable populations, and his cross-cultural research on psychological functions during the COVID-19 pandemic that have practical and policy applications.

NAST Environmental Science Award

The NAST Environmental Science Award recognizes outstanding scientific and technological research works that contribute to environmental protection and conservation.

DRANREB EARL O. JUANICO, Ph.D.
Physics
Technological Institute of the Philippines

In recognition of his outstanding research entitled "Does Mangrove Restoration Imply Coastal Protection? A Prospective Simulation Study." This study assesses the coastal protection potential of mangroves by examining the "bio-shielding" effect against storm surges driven by category-5 winds.Two coastal sites—Tacloban, Leyte, and Pan de Azucar, Iloilo—in the Philippines along the track of a category-5 storm, were considered.

The underlying work established the claims that restoration efforts based on *Rhizophora spp* can generate dense mangrove forests with suitable bio-shield characteristics within a reasonable period. The study may help settle policy-oriented debates on whether governments, especially in the Philippines and Southeast Asia, must invest massively in coastal mangrove restoration for long-term community benefits.

NAST Talent Search for Young Scientist

The NAST Talent Search for Young Scientist is a project of the Academy that encourages young people (must not be more than 35 years old within January to December in the year of the award) to pursue a career in science.

First Prize

JAYSON G. COSME, Ph.D.
Physics
University of the Philippines Diliman

In recognition of his outstanding scientific and technological research entitled:
"Observation of a Continuous Time Crystal"

Second Prize

MICHAEL T. CASTRO, M.Sc.
Chemical Engineering
University of the Philippines Diliman

In recognition of his outstanding scientific and technological research entitled:
"Techno-Economic and Financial Analyses of Hybrid Renewable Energy System Microgrids in 634 Philippine Off-Grid Islands: Policy Implications on Public Subsidies and Private Investments"

Special Citations

NEIL JEROME A. EGARGUIN, Ph.D.
Mathematics
University of the Philippines Los Baños

In recognition of his outstanding scientific and technological research entitled:
"Active Manipulation of Helmholtz Scalar Fields in an Ocean of Two Homogeneous Layers of Constant Depth"

IVAN HENDERSON V. GUE, Ph.D.
Mechanical Engineering
De La Salle University

In recognition of his outstanding scientific and technological research entitled:
"Sector Perception of Circular Economy Driver Interrelationships"

JOHN PAUL MATTHEW D. GUZMAN, M.Sc.
Microbiology
Department of Science and Technology-
Industrial Technology Development Institute

In recognition of his outstanding scientific and technological research entitled:
"*Piper betle* L. Leaf Extracts Inhibit Quorum Sensing of Shrimp Pathogen *Vibrio harveyi* and Protect *Penaeus vannamei* Postlarvae against Bacterial Infection"

Outstanding Book/ Monograph

These awards are given annually for outstanding books and/or monographs published in the Philippines by Filipino authors or co-authors within five years preceding the award.

These awards are given annually for outstanding books and/or monographs published in the Philippines by Filipino authors or co-authors within five years preceding the award. For 2023, the winners are:

1. Canuday, J.J.P. and Sescon, J.T. (eds.) (2022). **Transfiguring Mindanao: A Mindanao Reader.** Quezon City, Philippines: Ateneo de Manila University Press.

2. Reyes, C.M. (ed). (2022). **The Philippines' Response to the COVID-19 Pandemic: Learning from the Experience and Emerging Stronger to Future Shocks.** Quezon City, Philippines: Philippine Institute for Development Studies.

Outstanding Scientific Paper Award

The Outstanding Scientific Paper Award is given annually for papers published in Philippine scientific or technical journals within five years preceding the award.

The following are the winners for 2023:

1. De Chavez, P.D., Calderon, G.J.A., Santos, S.B., Vera Cruz, E.M., Santos, M.D. (2021). **Vulnerability to Climate Change of "Giant Squid" (*Thysanoteuthis rhombus*) Fishery in Marinduque, Philippines**. The Philippine Journal of Fisheries, 28 (2): 171-180.

2. Garabiles, M.R. (2020). **Social Support, Well-being, and Involvement of Fathers with Transnational Families in the Philippines.** Asian and Pacific Migration Journal, 4 (29): 492-510.

Department of Science and Technology (DOST) Awards

National Science and Technology Week (NSTW) Awards

The National Science and Technology Week (NSTW) is an annual celebration of the Department of Science and Technology (DOST) that highlights the important contributions of science and technology to national development. During the NSTW, outstanding scientists and technologists are recognized. It also serves as a venue for scientists and researchers to interact with entrepreneurs and businessmen.

The NSTW Awards recognize individuals and institutions that have made significant accomplishments and contributions to the generation of knowledge and technologies, utilization of research results and promotion of S&T in the country. The NAST handles the awards on behalf of DOST.

The awards were given during the opening ceremony of the NSTW celebration on November 22, 2023 at the Iloilo Convention Center, Iloilo city. The ceremony was led by DOST Secretary Renato U. Solidum.

Outstanding Technology Commercialization Award
Gregorio Y. Zara Medal

The Outstanding Commercialization Award is given in recognition of the efforts of technology generators and developers whose technologies have been commercialized. The award was named after National Scientist Gregorio Y. Zara, a renowned Filipino engineer and inventor. The Board of Judges did not declare a winner for 2023.

Outstanding Research and Development Award (for basic research)
Eduardo A. Quisumbing Medal

The award is given to an individual or group who has made outstanding contributions through basic research. The award was named after National Scientist Eduardo A. Quisumbing, the Father of Philippine Orchidology and a conservationist of the Philippine Herbarium.

MERDELYN CAASI-LIT, Ph.D.
University of the Philippines Los Baños

Dr. Merdelyn Caasi-Lit (Bing Lit) is an accomplished entomologist by profession. She studied at UP Los Baños for her Bachelor of Science in Agriculture, majoring in Entomology, and Master of Science in Entomology and Doctor of Philosophy at the Australian National University in Plant Stress Physiology.

Another area of her interest is Bamboo. Doc Bing is hailed as the "Bamboo Queen" or "Bamboo Lady of Los Baños" due to her deep enthusiasm and passion for studying bamboo shoots and promoting bamboo as a renewable community resource and its importance in this time of changing climate.

She now works as a University Researcher IV at the Institute of Plant Breeding, UP Los Baños, and has been conferred as Career Scientist II by the Scientific Career Council.

EDSEL MAURICE T. SALVAÑA, M.D.
University of the Philippines Manila

Edsel Maurice T. Salvana, MD, DTM&H, FPCP, FIDSA is a Professor of Medicine and Infectious Diseases and is the Director of the Institute of Molecular Biology and Biotechnology at the National Institutes of Health at the University of the Philippines. He also serves as a Special Adviser for HIV and AIDS to the Secretary of Health. He is an adjunct faculty for Global Health at the University of Pittsburgh.

He was chosen as a TED Fellow in 2017 for his work on HIV. He was awarded a Senior TED Fellowship in 2020 for his work on restoring vaccine confidence and improving science communication. He was conferred the Order of Lapulapu, Rank of Magalong by the President of the Philippines for his contributions as a senior government adviser during the COVID-19 pandemic.

Dr. Salvana writes a weekly column entitled “Clinical Matters” for the Manila Bulletin which offers scientific perspectives on the COVID-19 pandemic and other diseases. His research interests are HIV molecular epidemiology and drug resistance.

Outstanding Research and Development Award (for applied research)
Julian A. Banzon Medal

The award is given to an individual or group who has made outstanding contributions through applied research. The award was named after National Scientist Julian A. Banzon, who dedicated a good portion of his life to scientific endeavors and concentrated his attention on coconut.

MICHAEL ANGELO B. PROMENTILLA, Ph.D.
De La Salle University

Michael Angelo B. Promentilla is a Professor of Chemical Engineering and the founding head of the Waste and Resource Management Unit of the Center for Engineering and Sustainable Development Research (CESDR) at De La Salle University (DLSU). Dr. Promentilla received his BS in chemical engineering (cum laude) and MS in chemical engineering from the University of the Philippines Los Banos (UPLB) and UP Diliman (UPD), respectively. He received his doctorate in socio-environmental engineering with a Monbukagakusho scholarship from Hokkaido University, Japan.

Dr. Promentilla is a multi-awarded scientist, among these are the 2013 Outstanding Young Scientists in the field of socio-environmental engineering by the National Academy of Science and Technology, Philippines, UPLB Alumni Association's 2017 Distinguished Alumni Award, and DLSU's Pillar of Lasallian Excellence Award in Research.

Outstanding Science Administrator Award
Dioscoro L. Umali Medal

The Outstanding Science Administrator Award is given in recognition of S&T or R&D administrators who have made significant contributions to science and technology through effective management and implementation of plans and programs. The S&T or R&D administrator may come from the academe, private sector or government. This award was named after National Scientist Dioscoro L. Umali, the father of Philippine plant breeding. No winner was declared in 2023 for this category.

DOST Intellectual Property Award

The Academy, in partnership with the DOST, conducted the awarding ceremony on 23 November 2022 in Pasay City, Metro Manila.

There were 119 publications that were awarded with the International Publication Award (IPA), which came from 14 DOST agencies and regional offices, namely: Food and Nutrition Research Institute (FNRI), Forest Products Research and Development Institute (FPRDI), Industrial Technology Development Institute (ITDI), Metals Industry Research and Development Center (MIRDC), Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA), Philippine Council for Industry, Energy and Emerging Technology Research and Development (PCIEERD), Philippine Institute of Volcanology and Seismology (PHIVOLCS), Philippine Nuclear Research Institute (PNRI), Philippine Textile Research Institute (PTRI), Philippine Science High School (PSHS), Science Education Institute (SEI), DOST I, DOST V and DOST XI.

The ITDI was awarded with Granted Patent Award for their technology entitled “A Continous Screw-Tupe Salt Washer”.

There were 20 recepients of Utility Model Registration Award from FNRI, ITDI, MIRDC, and PTRI. Six industrial designs from MIRDC and ITDI were awarded the Industrial Design Award.

The PNRI was recognized as the DOST institutions with the highest number of international publication awardees while the FNRI was awarded with the highest number of utility model registration awardees. The ITDI was recognized as the sole DOST agency with granted patent registration. These three (3) agencies received a certificate of recognition and cash incentive of Php 50,000.00 each.

All the winners received a plaque together with a cash incentive. In addition, the PNRI and ITDI received cash incentives of ₱50,000.00 each for having the highest number of IPub awardees and highest number of granted patent awardees, respectively.

Magsaysay Future Engineers/Technologists Award

The Magsaysay Future Engineers/Technologists Award is an annual award that aims to recognize outstanding research outputs on engineering and technology at the collegiate level and encourage young Filipino students to pursue a career in science.

1st Prize Winner
JOSHUA ANTONY G. CRUZ
University of the Philippines Visayas

In recognition of his outstanding scientific and technological research entitled:
"Adsorptive Removal of Doxycycline Hyclate from Aqueous Solution using KOH-Modified Iron-Impregnated Bamboo Biochar**"**

2nd Prize Winner
MARK EDWARD M. GONZALES
De La Salle University

In recognition of his outstanding scientific and technological research entitled:
"Protein embeddings improve phage-host interaction prediction**"**

3rd Prize Winner
SANDRO RICO MUYCO
University of the Philippines Visayas

In recognition of his outstanding scientific and technological research entitled:
"Biosynthesis of Silver Nanoparticles Using Artillery Weed (*Pilea micropylla*) Extract and Its Antibacterial Activity Against Methicillin-Resistant Staphylococcus aureus**"**

Special Citations

CAITLYN DANIELLE O. SEE
De La Salle University

In recognition of her outstanding scientific and technological research entitled:
"Fuzzy Optimization of the Esterification Conditions of Biodiesel Production from Karanja Oil**"**

CRISTINA BEATRICE C. MALLARI
De La Salle University

In recognition of her outstanding scientific and technological research entitled:
"The university coursework timetabling problem: An optimization approach to synchronizing course calendars**"**

ADVISORY AND FORMULATION OF POLICY RECOMMENDATIONS

The Academy, through Executive Order No. 818, was mandated to advise the President and the Cabinet on matters related to Science and Technology. Through the different advisory activities, the NAST heightens public awareness, understanding, and appreciation of the role that science and technology play in national development.

RESOLUTIONS of the 45th ANNUAL SCIENTIFIC MEETING

Republic of the Philippines
Department of Science and Technology
NATIONAL ACADEMY OF SCIENCE AND TECHNOLOGY

ANNUAL SCIENTIFIC MEETING
Theme: "*Agham at Teknolohiya para sa Demokrasya*
(Science and Technology for Democracy)"

12-13 July 2023

RESOLUTIONS

WHEREAS, the Philippines, as enshrined in the 1987 Constitution, is a democratic and republican state;

WHEREAS, the State recognizes the importance of promoting general welfare in the enjoyment by all people of the blessings of democracy; protecting life, liberty, and property; and maintaining peace and order;

WHEREAS, not all developmental programs and projects are democratic; therefore, the science community should endeavor to identify and separate exploitative from developmental empowerment;

WHEREAS, it is the policy of the state:

to prioritize science and technology together with education, arts, culture, and sports in fostering patriotism and nationalism, accelerating social progress, and promoting total human liberation and development, including those marginalized and underserved sectors;

to promote the adoption of technology for the national benefit while encouraging the widest participation in the generation and utilization of science and technology;

to promote and protect the rights of the people, civil society organizations, and platforms for effective and reasonable participation at all levels of social, political, and economic decision-making;

WHEREAS, the Agrarian Reform Program of the Philippines has almost largely achieved its target social justice objective; it is time to shift emphasis to economic objectives targeting land productivity and farm income;

WHEREAS, there is a continuous need to promote access and improve the quality of basic and higher education to ensure its relevance and fulfill society's multiple expectations;

WHEREAS, water and energy are closely linked resources; the exponentially growing population, existing climate realities, and intensive water use put pressure on the existing water and energy supply needed to live comfortably and sustain growth;

WHEREAS, Universal Health Care (UHC), as provided by Republic Act 11223, aims to provide all Filipinos access to a comprehensive set of quality, accessible, and cost-effective health services without causing financial hardship;

WHEREAS, there is a need to enhance local government capacity and address the systemic gaps in the pillars of the healthcare system, specifically health information system, human resource development, private sector and community participation, and health financing, in order to ensure UHC implementation;

WHEREAS, science, technology, and innovation (STI) play a critical role in strengthening democratic institutions and processes and advancing developmental empowerment in a democracy;

NOW, THEREFORE, it is hereby resolved to recommend that the concerned sectors take the following actions:

I. MOVE FORWARD THE AGRARIAN REFORM

1. For the Senate and Congress to consider the following recommendations:
    a. stop further issuances of new Notices of Coverage of Comprehensive Agrarian Reform Program (CARP)'s land acquisition and distribution (LAD) and the immediate lifting of the restriction on resale of awarded lands;
    b. convert the lands consistent with the National Physical Framework Plan guided by the Regional Development Plan (RDP) and Comprehensive Land Use Plan (CLUP) of the local government units (LGUs); tax the conversion and earmark the tax utilization for poor farmers;
    c. revise land rent/share and decriminalize share tenancy;
    d. lift land ownership ceilings for investors in commercial scale agribusiness; and
    e. phase out the Department of Agrarian Reform (DAR) in five (5) years and merge with the Department of Agriculture (DA) into a Department of Agriculture and Rural Development (DARD); and ensure the appropriate utilization of idle lands by progressive taxation;

2. For the National Economic Development Authority (NEDA), DA, DAR, Senate, and Congress to call for a complete review of the CARP on the basis of balancing social justice and economic productivity features of the land reform program.

3. For the new DARD to ensure convergence of support services by government agencies to farmers;

4. For the DA and LGUs to promote farm clustering and consolidation;

5. For the banking system to codify acceptance of agricultural lands as collateral, and assert the Land Bank of the Philippines' primary mandate on small farm finance; and

6. For the DA, LGUs, DAR, Department of Science and Technology (DOST), and the private sector-led agri-fishery enterprises to fully implement the current Philippine Development Plan (PDP) 2023-2028;

II. DEMOCRATIZE ACCESS TO QUALITY AND CIVIC EDUCATION

1. For the National Government to increase funding for higher education to at least 4% of the GDP, as recommended by the World Bank, to support equitable access to quality education;

2. For the Senate and Congress to adopt the policy of socialized education in lieu of free tuition in public schools;
3. For the Department of Education (DepEd) to:
    a. Develop a long-term plan for Basic Education and public-private partnership (PPP) to strengthen capacity in sustainable development, climate change action, and development of blue economy;
    b. Review and strengthen democratic citizenship curriculum in basic education;
    c. Strengthen and expand the Educational Service Contracting and Senior High School (SHS) voucher programs through PPP;
    d. Sustain and invigorate its school feeding and related programs;
    e. Support the development of science culture in elementary and high schools through the conduct of science camps such as the DOST's National Youth Science, Technology, and Innovation Festival (NYSTIF), educational tours to science parks and science centers/museums, among others;

4. For the Commission on Higher Education (CHED) to:
    a. Provide stackable/ladderized programs with multiple entry and exit points in and out of the formal system;
    b. Retool graduates and professionals through microcredentials aside from degrees;
    c. Initiate and/or intensify faculty development programs, through a university consortium, explore flexible options for professional development, and create more graduate degree programs in the region;
    d. Provide equivalencies and credit transfer systems;
    e. Encourage public and private Higher Educational Institutions (HEIs) to prioritize STEM senior high school graduates for admission in STEM degrees;
    f. Strictly implement the phasing-out of substandard programs;
    g. Support policies, programs, and processes that encourage academy-industry linkages;
    h. Expand the system for accreditation and enhancement of distance learning modalities;

5. For the Technical Education and Skills Development Authority (TESDA) to strengthen its role and involvement in the accreditation and credit transfer system of the country;

6. On the development of education programs for marine and environmental issues:
   a. For the CHED and HEIs to address the need for the development of curricula, faculty, infrastructure, and research support for marine and environmental concerns; and
   b. For the DepEd, CHED, TESDA, and HEIs to integrate environmental issues in classroom education and provide interventions to allow active participation of students and the youth on local marine and environmental concerns;

7. For the CHED, DepEd, TESDA, and HEIs to:
   a. Strengthen information literacy education in schools; and
   b. Develop and implement evidence-based community-based information literacy programs by supporting local research on interventions to counter misinformation;

8. For the Department of Information and Communications Technology (DICT) to:
   a. Review and strengthen regulatory and accountability systems for governance of social media and influencers (similar to traditional media and journalists); and
   b. Related to social media platforms, review the role of other information sciences and sociocultural factors in the dissemination and consumption of misinformation;

III. CONSIDER THE ENERGY-WATER-FOOD NEXUS

1. For the Office of the President to establish the Department of Fisheries and Oceans;

2. For the National Economic Development Authority (NEDA) to lead an in-depth assessment of the synergies and tradeoffs in the use of freshwater resources for food, energy, and other uses, and to identify options and the policies and programs needed for optimal allocation of such resources.

3. For the Department of the Interior and Local Government (DILG) and the Regional Development Councils (RDCs) to require the LGUs to integrate energy-water-food programs into their development plans;

4. For the LGUs to optimize the utilization of the funds provided under the Mandanas-Garcia Ruling in the implementation of projects that will promote food, energy, and water security;

5. For the Department of Energy (DOE) to ensure commissioning of additional renewable energy projects for a good energy mix;

6. For the National Government and the Bangsamoro Autonomous Region in Muslim Mindanao (BARMM) to resolve potential issues in the power sector;

7. For the DOE to promote the development of alternative sources of renewable energy for desalination technology projects in small islands; and

8. For the Department of Environment and Natural Resources-Water Resources Management Office (DENR-WRMO) to incentivize rainwater harvesting;

IV. DEMOCRATIZE HEALTH AND HEALTH CARE THROUGH EQUITY

1. Health Governance
    a. For the Department of Health (DOH) and the DILG to update the capacity of the LGUs by providing direction and technical knowledge in implementing Universal Health Care (UHC);
    b. For DOH and Philippine Health Insurance Corporation (PhilHealth) to strengthen primary healthcare implementation including necessary health systems components in all LGUs;
    c. For DOH and PhilHealth to promote and incentivize PPP for the implementation of UHC;
    d. For DOH to form an advisory group to formulate specific targets for the monitoring and implementation of UHC;
    e. For the DOST to further strengthen the Health Technology Assessment Council (HTAC) in its periodic review of emerging scientific knowledge and recently developed medical technology that may be adopted in implementing UHC;
    f. For LGUs, HEIs, and health-related Research and Development Institutions (RDIs) to further strengthen programs that support equity in health;
    g. For LGUs to develop policies to support PPP and promote collaboration with private health endeavors and the academe to ensure continuous improvement of LGU health capacity; and
    h. For LGUs to promote proper nutrition, including feeding programs for the disadvantaged;

2. Health Information System
    a. For the DOH, PhilHealth, DILG, and DICT to:
        i. prioritize the development and implementation of an interoperable, secured, and demand-driven health information system and infrastructure at the national and local levels; and
        ii. make the health information system accessible and usable by local health professionals and health workers;

3. Human Resource Development
    a. For the DOH, the Department of Labor and Employment (DOLE), CHED, and the Professional Regulation Commission (PRC) to develop the policy toward the responsive production and equitable distribution of highly skilled, ethical, motivated, and practice-ready health workforce in both the public and private sector with competitive compensation, benefits, and incentives;
    b. For the DOH and the DICT to fast-track the operationalization of the National Health Workforce Registry as specified in the UHC Law to resolve the healthcare workforce crisis, especially at the primary health care level; and
    c. For the CHED, PRC, DOH, HEIs, and all health professional societies to reorient the education of all health professionals and health workers; and start faculty development programs, to develop their competencies in nutrition and related fields toward public health and primary health care, as mandated by the UHC Law;

4. Private Sector and Community Participation
    a. For the Office of the President to issue an Executive Order enjoining national and local governments to engage the private sector and communities for the planning and implementation of public health programs; and
    b. For the DOH to conduct training on social participation for policymakers and government planners based on the World Health Organization (WHO) handbook on social participation for UHC;

5. Health Financing
    a. For PhilHealth to develop and deliver a comprehensive primary care package through capitation that addresses the triple burden of disease while engaging relevant agencies (e.g., DILG, Commission on Audit, and Bureau and Internal Revenue) in the process to facilitate its coordinated implementation and implement efficient payments systems; and
    b. For the HTAC to determine the most cost-effective primary care services and submit their recommendations to the DOH for implementation;

6. Health Research
    a. For the DOST, DOH, and CHED to continue supporting research on UHC; and
    b. For HEIs and RDIs to develop and implement research programs on UHC;

V. STRENGTHEN THE 4Ps AND THE GOVERNMENT'S ANTI-POVERTY PROGRAMS

For the Department of Social Welfare and Development (DSWD) to:

1. strengthen and improve program implementation, particularly the monitoring and enforcement of health conditions and the identification and measurement of outcome indicators related to the Family Development Sessions;

2. conduct further studies on factors affecting results (e.g., nutrition outcomes) and adjustments in policies and incentives; and

3. adopt an efficient and suitable payment infrastructure for emergency response, creation of grants-in-aid programs in education, and enhancement of other social programs or services.

VI. PROMOTE THE APPROPRIATE UTILIZATION OF ARTIFICIAL INTELLIGENCE

1. For the DICT to endeavor universal and affordable internet access and launch awareness campaigns, address inequality, and establish oversight for ethical AI development;

2. For the CHED, DepEd, and TESDA to integrate artificial intelligence (AI) literacy programs into the curriculum, train teachers, and emphasize AI ethics ensuring students are prepared for the AI-driven future; and

3. For the Office of the President to encourage the government and business sector to incentivize AI adoption, foster collaboration, and establish regulations for responsible AI use.

POLICY RECOMMENDATIONS

1. On substance abuse and new emerging drugs:
   a. Strengthen the role of basic education and family in substance abuse prevention;
   b. Foster collaboration among law enforcement agencies to disrupt the influx of narcotics in the country; and
   c. Prepare a drug reduction roadmap with the Asian Center for Drug Policy;

2. On antimicrobial resistance:
   a. Develop workforce in antimicrobial surveillance in a holistic manner;
   b. Harmonize methods and protocols; and
   c. Support research on antimicrobial alternatives and preventive interventions;

LINKAGES AND COORDINATION WITH OTHER SCIENCE ACADEMIES AND SOCIETIES

The NAST continuously explores and maintains linkages with foreign academies of science, technology, and engineering, as well as with international and regional networks and local science organizations, to promote close scientific cooperation. These linkages aim to: (1) promote collaborative efforts among Filipino scientists, and between Filipino and foreign scientists; (2) promote and encourage scientific cooperation through its Scientist Exchange Visit Program under the memorandum of agreement between NAST and a foreign science academy; (3) endorse participation in international conferences, meetings, fora, seminars, workshops, and similar scientific activities; and (4) publish and exchange scientific literature.

Through these scientific linkages, interested scientists may seek grants for scientific and technological undertakings, including fellowships, research grants, study visits, and grants for other collaborative projects from the academies associated with the National Academy of Science and Technology.

SCIENCE ACADEMIES AND SOCIETIES

- Academie des Sciences (French Academy of Sciences) - Ongoing agreement (2006-present)
- German Research Society (Deutsche Forshungsgemeinschaft) - Ongoing agreement (since 12 December 1983)
- Indian National Science Academy (INSA) - Ongoing agreement (since 08 July 1983)
- Academy of Sciences Malaysia (ASM) - Ongoing agreement (since 26 August 1997)
- The Royal Society of London (RSL) - Ongoing agreement (since 20 December 1980)
- The Royal Swedish Academy of Sciences - Ongoing agreement (since 6 March 2001)
- Turkish Academy of Science (TÛBA) – Ongoing agreement (since 18 October 2002)
- US National Academy of Sciences (US NAS) - Ongoing agreement (since 02 April 2002)

AFFILIATIONS TO INTERNATIONAL SCIENTIFIC ASSOCIATION

- InterAcademy Partnership (IAP)
- Association of Academies and Societies of Sciences in Asia (AASSA)
    - Women in Science and Engineering (WISE) Committee
- The World Academy of Sciences for the advancement of science in developing countries (TWAS)
- Third World Network of Scientific Organizations (TWNSO)

OTHER LINKAGES

- National Research Foundation of Korea
- Philippine-American Academy of Science and Engineering (PAASE)
- Philippine Association for the Advancement of Science and Technology (PhilAAST)
- The Outstanding Women in Nation's Service (TOWNS) Foundation, Inc.

S&T ENGAGEMENT AND PROMOTION

Management of the Philippine Science Heritage Center (PSHC)

The Philippine Science Heritage Center (PSHC) was established in 1998 to honor Filipino scientists and their contributions to the world of science. It was institutionalized through Republic Act 9107, or the Philippine Science Heritage Center Act (2001). The law mandated the Academy to manage, operate, and maintain the Center to serve as the main repository of the country's contributions, achievements, and accomplishments in the field of science and technology.

The Center has a total of 3,063 sq. m. and occupies the first and second floors of the Science Heritage Building inside the DOST Compound. The PSHC is also called *Salinlahi*, which means "Heirloom of a Generation".

Conduct of S&T Activities

For 2023, the NAST conducted 59 activities composed of scientific meetings (including the 44th ASM and three RSMs), legislative and policy fora, focus group discussions (FGDs), workshops, paper presentations, Speakers Bureau, symposium, information fora or *kapehan*, launching, and science career orientation.

1. Scientific Meetings
    a. 45th Annual Scientific Meeting
    City of Manila and virtual; 12-13 July 2023
    Host Division: Social Sciences Division (SSD)
    Focal Persons: NS Raul V. Fabella and Acd. Allan B.I. Bernardo

    Plenary Speakers and Discussants: Dr. Prudenciano U. Gordoncillo, professor, College of Economics and Management (CEM), University of the Philippines Los Baños (UPLB); Calixto V. Chikiamco, president, Foundation for Economic Freedom; Dr. Ben S. Malayang III, professor emeritus, Silliman University; Dr. Ma. Cynthia Rose Banzon-Bautista, OYS 1988, former vice president for academic affairs, UP Diliman; Dr. Ephrime B. Metillo, OYS 2007 and professor, Mindanao State University-Iligan Institute of Technology (MSU-IIT); Dr. Jomar F. Rabajante, OYS 2021, dean, UPLB Graduate School; Assistant Secretary Romeo M. Montenegro, deputy executive director, Mindanao Development Authority; Engr. Ruby B. De Guzman, assistant director, Renewable Energy Management Bureau, Department of Energy; Dr. Sevillo D. David, Jr., executive director, National Water Resources Board (NWRB); NS Ernesto O. Domingo; Secretary Teodoro J. Herbosa, Department of Health (DOH); Acd. Antonio Miguel L. Dans; Dr. Enrique T. Ona, former Secretary, DOH; Dr. Aniceto C. Orbeta, Jr., president, Philippine Institute for Development Studies (PIDS); NS Bienvenido F. Nebres, SJ; Acd. Christopher C. Monterola; Acd. Allan B.I. Bernardo; *Presenter of Resolutions*: Acd. Cristina J. Montiel; *Responders to the Resolutions*: Undersecretary Joseph J. Capuno, National Economic Development Authority (NEDA); Undersecretary Maridon O. Sahagun, DOST; *Moderators:* Acd. Eufemio T. Rasco, Jr.; Acd. Windell L. Rivera; Acd. Alvin B. Culaba; Acd. Jaime C. Montoya; Acd. Arnel A.

Salvador; NS Raul V. Fabella; *Rapporteurs/Synthesizers*: Dr. Rico C. Ancog, OYS 2019 and dean, School of Environmental Science and Management (SESAM), UPLB; Dr. Pierangeli G. Vital, OYS 2021 and head, Biological Research and Services Laboratory, UP Diliman; Dr. Arnel B. Beltran, OYS 2022 and associate professor, Gokongwei College of Engineering, De La Salle University (DLSU); Dr. John Mark S. Velasco, OYS 2014 and research associate professor, National Institutes of Health, UP Manila; Dr. Marlon T. Conato, OYS 2020 and associate professor, Institute of Chemistry, UP Diliman; Dr. Francisco A. Magno, OYS 2000 and professor, DLSU

b. Luzon Regional Scientific Meeting
Baguio City and Online; 17-18 May 2023
Hosts: HSD, SSD, and DOST Cordillera Administrative Region (CAR)

Speakers and Discussants: NS Ernesto O. Domingo; Ernesto D. Garilao, chairman, Zuellig Family Foundation; Jovita V. Aragona, senior vice president and chief information officer, PhilHealth; Fely Marilyn E. Lorenzo, project director, HRH2030 Philippines and member, Universal Health Care (UHC) Study Group, UP Manila; Dr. Manuel M. Dayrit, OYS 1990, former DOH Secretary and professor, Ateneo School of Medicine and Public Health; Dr. Junice L. Demetrio-Melgar, executive director and co-founder, Likhaan Center for Women's Health; Dr. Ramon P. Paterno, member, UHC Study Group, UP Manila and member, Philippine Academic Society of Social and Community Medicine, Inc.; Dr. Rio L. Magpantay, director, Center for Health Development, DOH CAR; Dr. Ronald U. Mendoza, OYS 2012 and southeast Asia regional director, IDInsight; Acd. Allan B.I. Bernardo; Dionisio C. Ledres, Jr., regional director, NEDA Region II; Dr. Joselito C. Gutierrez, executive assistant to the President and professor, School of Teacher Education and Liberal Arts, St Louis University; Dr. Aries A. Arugay, OYS 2020, professor and chair, Department of Political Science, UP Diliman; Dr. Jean S. Encinas-Franco, professor, Department of Political Science, UP Diliman; Atty. Rozzanne Victoria B. Villamin, university legal officer, Don Mariano Marcos Memorial State University; Atty. Grizelda Mayo-Anda, executive director, Environmental Legal Assistance Center; Acd. Jaime C. Montoya, Dr. Charles Y. Yu, vice-chancellor for research, De La Salle Medical and Health Sciences Institute; Acd. Christopher C. Monterola; Engr. Felipe L. Puzon, Jr., executive assistant and chief of staff, Office of the Mayor, City of Baguio; *Moderators*: Acd. Charlotte M. Chiong; Acd. Camilo C. Roa, Jr.; NS Raul V. Fabella; Acd. Allan B.I. Bernardo; Acd. Michael L. Tan; *Rapporteurs*: Dr. Ronnie E. Baticulon, OYS 2022 and associate professor, College of Medicine, UP Manila; Dr. Maria Ruth B. Pineda-Cortel, OYS 2022 and assistant professor, Department of Medical Technology, University of Santo Tomas; Dr. Francisco A. Magno, OYS 2000 and professor, Department of Political Science and Development Studies, DLSU; Dr. Paul Gideon D. Lasco, OYS 2022 and senior lecturer, Department of Anthropology, UP

Diliman; Dr. Raymond Francis R. Sarmiento, OYS 2019 and director, National Telehealth Center, National Institutes of Health, UP Manila

c. Visayas Regional Scientific Meeting
Virtual; 26-27 April 2023
Hosts: ASD, BSD, and DOST Region VIII

Speakers and Discussants: Rory Jay S.C. Dacusmos, officer-in-charge, Office of the Director, Agriculture, Natural Resources, and Environment Staff, NEDA; Dr. Prudenciano U. Gordoncillo, professor, UPLB-CEM; Dr. Edgardo E. Tulin, president, Visayas State University; Dr. Vicente Paqueo, OYS 1983 and distinguished visiting research fellow, PIDS; Dr. Leni Yap-Dejeto, professor, UP Visayas, Tacloban College; Dr. Alice Joan G. Ferrer, dean, College of Arts and Sciences, UP Visayas; Hon. Carlos Jericho L. Petilla, governor, Province of Leyte; Prof. Jorge S. Ebay, director, Center for West Visayan Studies, UP Visayas; Atty. Asis G. Perez, former director, Bureau of Fisheries and Aquatic Resources, Department of Agriculture; dr. Harold M. Monteclaro, vice-chancellor for research and extension, UP Visayas; Acd. Jurgenne H. Primavera, Dr. Robert Guino-o II, acting director, Silliman University Angelo King Center for Research and Environmental Management; Dr. Ben S. Malayang III, professor emeritus, Silliman University; Capt. Gaudencio C. Morales, president, Filipino Association for Mariners' Employment; Dr. Doralyn S. Dalisay, professor and director, Center for Chemical Biology and Biotechnology (C2B2), University of San Agustin; Luisito U. Delos Santos, director, Planning and Policy Service, Maritime Industry Authority; *Moderators*: Acd. Glenn B. Gregorio; Acd. Gisela P. Concepcion; Acd. Mudjekeewis D. Santos; Acd. Rex Victor O. Cruz; Acd. Marie Antonette Juinio-Meñez; *Rapporteurs*: Dr. Reynante L. Ordonio, OYS 2019 and project leader, DA-PhilRice Healthier Rice project; Dr. Pierangeli G. Vital, OYS 2021 and head, Biological Research and Services Laboratory, UP Diliman; Dr. Angel B. Encarnacion, OYS 2018 and regional director, DA-BFAR Region II; Dr. Rico C. Ancog, OYS 2019 and dean, UPLB-SESAM; Dr. Laura T. David, OYS 2017 and director, Marine Science Institute (MSI), UP Diliman

d. Mindanao Regional Scientific Meeting
Davao City and online; 12-13 April 2023
Hosts: ESTD, MPSD, and DOST Region XI

Speakers and Discussants: Dr. Florencio D. Recoleto, dean, College of Natural Sciences and Mathematics, MSU Marawi; Acd. Benito M. Pacheco; Dr. Luis D. Perez, OIC, Commission on Higher Education (CHED) Region XI; Dr. Adoracion M. Navarro, senior research fellow, PIDS; Assistant Secretary Romeo M. Montenegro, deputy executive director, Mindanao Development Authority; Dr. Randell U. Espina, dean, School of Engineering and Architecture, Ateneo de Davao University; Dr. Hussein L. Lidasan, professor, School of Urban and Regional Planning, UP Diliman; Atty. Hernani N. Fabia, administrator,

Maritime Industry Authority; Engr. Rey Peter B. Gille, regional director, Department of Public Works and Highways (DPWH) Region XI; Atty. Jasper Alberto H. Lascano, regional director, Mines and Geosciences Bureau (MGB) Region XI, Department of Environment and Natural Resources (DENR); Dr. Gabriel P. Pamintuan, Jr., professor, department of Mining, Metallurgical, and Materials Engineering, College of Engineering, UP Diliman; Dr. Gernelyn Logrosa, head, Office for Research, Development, and Innovation, Mapua Malayan Colleges Mindanao; Dr. Hilly Ann Roa-Quiaout, professor, MSU-IIT; Dr. Richard N. Muallil, OYS 2016 nad professor, Institute for Oceanography, MSU Tawi-Tawi; Dr. Wilfredo H. Uy, professor, MSU Naawan; Dr. Cleto L. Nañola, Jr., professor, Department of Biological Science and Environmental Studies, UP Mindanao; Dr. Girley S. Gumanao, professor, Marine Biology Department, Davao del Norte State College; *Moderators*: Acd. Christopher C. Bernido; Acd. Guillermo Q. Tabios III; Acd. Alvin B. Culaba; Acd. Arnel A. Salvador; Acd. Fernando P. Siringan; *Rapporteurs*: Dr. Marlon T. Conato, OYS 2020 and associate professor, Institute of Chemistry, UP Diliman; Dr. Arnel B. Beltran, OYS 2022 and associate professor, DLSU; Dr. Ryan Rhay P. Vicerra, OYS 2019 and associate professor, DLSU; Dr. Michael Angelo B. Promentilla, OYS 2013 and professor, Chemical Engineering Department, DLSU; Dr. Ephrime B. Metillo, OYS 2007 and professor, MSU-IIT

2. Science Summit at the 78th United Nations General Assembly (UNGA78): Sharing "Best Practices" and Foresighting as Tools in Attaining the SDGs
   Alabang, Muntinlupa City and online; 20 September 2023
   In partnership with the ASEAN Foresight Alliance and Akademi Sains Malaysia
   Focal Person: NS Lourdes J. Cruz

Part 1: ASEAN Best Practices and Challenges in Attaining the SDGs
Speakers: Dr. Abby Tan, associate professor and vice president for research, Universiti Brunei Darussalam, Brunei; H.E. Dr. Hul Seingheng, national COSTI chairman and undersecretary of state, Ministry of Industry, Science, Technology, and Innovation, Cambodia; Dr. Suraya Abdulwahab Afiff, Faculty of Social and Political Sciences,

Department of Anthropology, Universitas Indonesia, Indonesia; Sisamout Saenbouttaraj, deputy director general, International Cooperation Department, Ministry of Education and Sports, Lao PDR; Datuk Ts. Dr. Haji Aminuddin Bin Hassim, secretary general, Ministry of Science, Technology and Innovation, Malaysia; Dr. Napoleon K. Juanillo, Jr., assistant secretary, DOST; Dr. Janice Lee, assistant professor, The Asian School of the Environment, Nanyang Technological University, Singapore; Dr. Vilas Nitivattananon, professor, Urban Innovation and Sustainability Program, School of Environment, Resources and Development, Asian Institute of Technology, Thailand; *Moderator*: Acd. Mahar K. Mangahas; *Rapporteur*: Dr. Segundo Joaquin E. Romero, Jr., professorial lecturer, Development Studies Program, Ateneo de Manila University

Part 2: Foresighting as a Tool in Attaining the SDGs
Speakers: Dr. Kartini Rahman, associate researcher and co-deputy project lead, Brunei Futures Initiative, Centre for Strategic and Policy Studies, Brunei; Dr. Khairul Rizal, director of measurement and indicators for research, technology and innovation, The National Research and Innovation Agency, Indonesia; Prof. Dr. Pervaiz K. Ahmed, director, Sunway Institute for Global Strategy and Competitiveness, Sunway University, Malaysia; Acd. William G. Padolina; Dr. Bach Tan Sinh, senior associate fellow, Institute of Policy and Management, University of Social Sciences and Humanities, Hanoi National University, Vietnam; *Moderator*: Acd. Rhodora V. Azanza; *Rapporteur*: Dr. Segundo Joaquin E. Romero, Jr., professorial lecturer, Development Studies Program, Ateneo de Manila University

3. Legislative and Policy Forum
    a. Rethinking Civic Citizenship, Elections, and Governance: Social Science Perspectives on Democratization and Social Media
    Quezon City, 06 February 2023
    Focal Persons: Acd. Allan B.I. Bernardo, Acd. Cristina J. Montiel, and Acd. Michael L. Tan

Speakers and Discussants: Dr. Ronald U. Mendoza, OYS 2012 and southeast Asia regional director, IDInsight; Dr. Cleo Anne A. Calimbahin, associate professor, Department of Political Science, DLSU; Dr. Aries A. Arugay, OYS 2020, professor and chair, Department of Political Science, UP Diliman; Dr. Maria Serena I. Diokno, professor emeritus, Department of History, UP Diliman; Dr. Cheryll Ruth R. Soriano, professor, Department of Communication, DLSU; Dr. Jason Vincent A. Cabañes, OYS 2020 and professor, DLSU; Dr. Jayeel S. Cornelio, OYS 2017 and director, Development Studies Program, Ateneo de Manila University; Dr. Diwa Malaya A. Quiñones, assistant professor, Department of Psychology, UP Diliman; Dr. Ador R. Torneo, full professor, Department of Political Science and Development Studies, DLSU; *Moderators*: Acd. Allan B.I. Bernardo; Acd. Cristina J. Montiel; Acd. Michael L. Tan

The discussion explored the role of media and data in governance and civic engagement, highlighting ways to counter misinformation and deepen political discourse.

b. Fiscal Democratization: Emphasis on 4Ps and the Mandanas Ruling
Quezon City, 08 February 2023
Focal Person: Acd. Mahar K. Mangahas
Speakers and Discussants: Dr. Aniceto C. Orbeta, Jr., president, PIDS; *Moderator*: Dr. Michael Ralph M. Abrigo, OYS 2022 and senior research fellow, PIDS; Dr. Vicente Paqueo, OYS 1983 and distinguished visiting research fellow, PIDS

The discussion explored fiscal democratization and the need to strengthen fiscal structures to promote economic growth.

c. Strengthening the Advisory Role of NAST through the Special Concerns Program
01 September 2023; Philippine International Convention Center, Pasay City
Focal Person: Acd. William G. Padolina

Speakers: Acd. Padolina; Dr. Sarah Lynne S. Daway-Ducanes, assistant secretary, Policy and Planning Group, NEDA; CM Josefino C. Comiso; Dr. Joel Joseph S. Marciano, director general, PhilSA; Dr. Carlos Primo C. David, undersecretary for integrated environmental science, DENR; Engr. Arnel L. Tenorio, OIC, Bureau of Agriculture and Fisheries Engineering, Department of Agriculture; Prof. Moises A. Dorado, professor, College of Engineering and Agro-Industrial Technology (CEAT), UPLB; *Moderator*: Acd. Aura C. Matias; *Rapporteur*: Dr. Dixon T. Gevaña, OYS 2018 and professor and director, Forestry Development Center (FDC), College of Forestry and Natural Resources (CFNR), UPLB

Through the Special Concerns Program, NAST implements 14 projects on a wide range of topics such as the country's education and R&D system, health and space technologies, and agriculture and rural competitiveness. The forum emphasized how the studies under the Special Concerns Program support the PAGTANAW 2050, the Philippine Development Plan, and other sectoral development plans.

The forum also highlighted the country's space initiatives in relation to agriculture and natural resource management. Relevant to the work done by Technical Working

Group (TWG) 14, insights from the discussions were forwarded to inform the TWG's future research endeavors.

d. Scientific Permits: *Kailangan ba ng scientific permit? Kailan, paano, at bakit?*
Alabang, Muntinlupa City and online; 26 September 2023
Focal Persons: Acd. Mudjekeewis D. Santos and Acd. Arvin C. Diesmos

Speakers: Katherine E. Soriano, senior ecosystem management specialist, Wildlife Resource Division, Biodiversity Management Bureau, DENR; Atty. Michael S. Andayog, OIC, Fisheries Regulatory and Licensing Division, Bureau of Fisheries and Aquatic Resources, Department of Agriculture; Jhaydee Ann Pascual, head, Botany and National Herbarium Division, National Museum; Marivene Santos, head, Zoology Division, National Museum

The forum tackled the scientific permitting system in the Philippines and how it impacts research and discovery. The forum served as a venue to reintroduce and clarify concepts to relevant stakeholders regarding the scientific permitting process for biological species. Researchers, students, and representatives from scientific institutions and regulatory agencies assembled to identify gaps and problems in the current system and propose potential recommendations.

e. Special Concerns Program: Drug Discovery and Development
PICC, Pasay City and online; 24 October 2023
In partnership with the DOST Tuklas Lunas Program and DOST-Philippine Council for Health Research and Development (PCHRD)
Focal Person: Acd. Jaime C. Montoya

Speakers: Manuel J. Cruz, acting director, Manufacturing Industries Service, Board of Investments, Department of Trade and Industry (DTI); Dr. Fides Maria Aileen V. Buenafe, chief, Pharmaceutical Division, Department of Health; Dr. Doralyn S. Dalisay, professor and director, Center for Chemical Biology and Biotechnology (C2B2), University of San Agustin; Teodoro B. Padilla, executive director, Pharmaceutical and Healthcare Association of the Philippines; CM Annabelle P. Villalobos; *Moderators*: Dr. John Carlo M. Malabad, assistant scientist,

DOSTPCHRD; Dr. Ruby Anne King, assistant scientist, DOST-PCHRD; *Rapporteur*: Dr. Albert Remus R. Rosana, OYS 2023 and S&T Fellow III, DOST-PCHRD

The Special Concerns Program TWG 9 held a discussion to present the current landscape of drug discovery and development in the Philippines. The activity gathered experts and leaders from pharmaceutical, government, and academic institutions to explore the advances and gaps in drug research and development. The consultation-workshop identified sectoral issues and developed evidence-based recommendations.

f. Regional Water Forum in Davao Region
Tagum City, Davao del Norte; 10 November 2023
In partnership with DOST Region XI
Focal Person: NS Lourdes J. Cruz

The forum aimed to explore the water resource and quality problems in Davao Region and recommend SDG problem-solving concepts to local stakeholders. The forum introduced relevant strategies for diagnosing problems regarding water and designing effective solutions. It also proposed communication strategies to improve how the problems and their consequences can be better conveyed to policymakers.

g. Special Concerns Program: Factors Affecting Export Trade in the Philippines: Product Standards, Accreditation, Metrology, and Regulatory Laboratories
Quezon City; 14 November 2023
Focal Person: Acd. Evelyn Mae Tecson-Mendoza

Speakers: Engr. Manuel M. Ruiz, chief, National Metrology Division, DOST-Industrial Technology Development Institute (ITDI); Ernani M. Dionisio, assistant director, Philippine Accreditation Bureau, DTI; Neil P. Catajay, director, Bureau of Philippine Standards, DTI; Mary Grace R. Mandigma, assistant director-designate, Bureau of Agriculture and Fisheries Standards, Department of Agriculture; Engr. Cirila S. Botor, president, Philippine Metrology, Standards, Testing and Quality (PhilMSTQ); *Moderators*: Acd. Maribel G. Nonato; Dr. Cynthia P. Saloma, OIC DNA Sequencing Core Facility, Philippine Genome Center and professor, National Institute of Molecular Biology and Biotechnology, UP Diliman; *Rapporteur*: Dr. Ian Kendrich C. Fontanilla, professor and director, Institute of Biology, UP Diliman

The forum discussed factors that affect export trade leading to rejections, engaged the National Quality Infrastructure (NQI) to strengthen the regulatory framework and promote trade and investments, and served as an initial activity to discuss issues and concerns in export trade with representatives from NQI-associated agencies.

h. Antimicrobial Resistance (AMR)
Online; 20 November 2023
Focal Person: Acd. Jaime C. Montoya

Speakers: Dr. David Sutherland, regional AMR and One Health coordinator, Food and Agriculture Organization Regional Office for Asia and the Pacific (FAORAP); Dr. Mary Joy N. Gordoncillo, regional AMR surveillance coordinator, FAORAP; Dr. Muhammad Usman Zaheer, regional AMR surveillance specialist, Regional Tripartite AMR Project, FAORAP; Dr. Regina P. Berba, chair, National Steering Committee, Antimicrobial Stewardship Program, DOH; Dr. Sonia B. Sia, head, DOH Antimicrobial Resistance Surveillance Reference Laboratory; Dr. Remil L. Galay, OYS 2020 and associate professor, College of Veterinary Medicine, UPLB; Dr. Ramon Lorenzo Luis R. Guinto, director, Planetary and Global Health Program, College of Medicine, St. Luke's Medical Center; Dr. Micael L. Tee, chairperson, Philippine One Health University Network and chancellor, UP Manila; *Moderator*:

Dr. John Carlo M. Malabad, assistant scientist, DOST-PCHRD; *Rapporteur*: Dr. Karell Jo Angelique C. Calpito, S&T Fellow, DOST-PCHRD

The forum highlighted One Health, a multisectoral and transdisciplinary approach to combat AMR and other health concerns. Experts in human, animal, and environmental health, as well as education and capacity-building, shared how their respective sectors tackle AMR and how their initiatives synergize through the One Health approach.

i. Special Concerns Program: Tech Trends and Policy Directions Towards Philippine Niche in Energy Storage Development
Quezon City; 23 November 2023
Focal Person: Acd. Alvin B. Culaba

Speakers: Acd. Alvin B. Culaba; Dr. Jose Bienvenido Manuel M. Biona, OYS 2011, professor, DLSU, and executive director, Electric Vehicle Association of the Philippines; Dr. Rinlee Butch M. Cervera, OYS 2018 and professor, Department of Mining, Metallurgical and Materials Engineering, UP Diliman; Dr. Joey D. Ocon, OYS 2015 and professor, department of Chemical Engineering, UP Diliman; Mertella Lenie M. Ysulat, senior SRS, DOST-ITDI; Sherwin Nones, strategic planning and marketing manager, Integrated Micro-Electronics Inc.

j. Future Earth Philippines (FEP) Program: National Multi-stakeholder Conference on Exploring the Water Futures of the Philippines
PICC, Pasay City; 28 November 2023
In partnership with DOST Region III, Bulacan and Pampanga Science and Technology Centers
Focal Person: NS Lourdes J. Cruz

Representatives from various NGAs, NGOs, LGUs, and universities shared their different perspectives and recommendations to address the flooding problem and work toward sustainable futures for water in the country. Insights from the conference will be used to formulate policy recommendations that promote a transdisciplinary, inclusive, and systems approach in addressing flooding problems in different regions of the country.

k. Cursory Stakeholder Analysis on the Government Procurement Reform Act
Alabang, Muntinlupa City and online; 29 November 2023
Focal Person: Acd. William G. Padolina

Speakers: Acd. William G. Padolina; Secretary Renato U. Solidum, Jr., DOST; Karen S. Janiya, Center for Strategic Planning and Policy Studies, UPLB; Catherine Falcon, dealer-manager, Merck, Inc. Life Science; Dr. Ricardo Jose S. Guerrero, *Balik* Scientist and research fellow, Ateneo Research Institute of Science and Engineering; *Moderator*: Engr. Ernilyn B. Brown, S&T Fellow I, NAST; *Rapporteur*: Nova Z. Navo, S&T Fellow I, NAST

The activity discussed the Government Procurement Reform Act and how it affects scientific research. Researchers, procurement professionals, suppliers, and agency representatives assembled to identify pain points in public procurement and develop potential recommendations.

4. Focus Group Discussions (FGDs)
    a. Microbes and Climate Change: Terrestrial and Marine Environment
    Virtual; 27 January 2023
    In partnership with the Microbiology Consortium of the Philippines
    Focal Persons: Acd. Virginia C. Cuevas, Acd. Asuncion K. Raymundo, Acd. Windell L. Rivera, and CM Francis de los Reyes III

Speakers: Dr. Jan E. Leach, associate dean for research, College of Agricultural Sciences, Colorado State University, USA; Dr. Noel G. Sabino, associate professor, Institute of Biological Sciences, UPLB; Dr. Deo Florence L. Onda, deputy director for research, MSI, UPD; Dr. Charina Gracia B. Banaay, professor, UPLB; *Moderator*: Dr. Aletta T. Yñiguez, OYS 2017 and professor, MSI, UP Diliman; *Rapporteur*: Dr. Rico C. Ancog, OYS 2019 and dean, UPLB-SESAM

The FGD focused on microbes in terrestrial and marine environments, discussing the impact of climate change on plant-microbe interactions and the role of microbes in waste conversion.

    b. Microbes and Climate Change: Human and Animal Health
    Virtual; 17 February 2023
    In partnership with the Microbiology Consortium of the Philippines
    Focal Persons: Acd. Virginia C. Cuevas, Acd. Asuncion K. Raymundo, Acd. Windell L. Rivera, and CM Francis de los Reyes III

Speakers: Dr. Francisco S. Sy, professor and chair, Department of Environmental and Occupational Health, NIH, UP Manila; Dr. Jason P. Burnham, assistant professor, Division of Infectious Diseases, Washington University School of Medicine; Dr. John Mark S. Velasco, OYS 2014 and research associate professor, NIH, UP Manila; Dr. Adrian P. Ybañez, OYS 2020 and professor, College of Veterinary Medicine, Cebu Technological University; Dr. Vachel Gay V. Paller, director, IBS, UPLB; Dr. Leslie Michelle M. Dalmacio, OYS 2012 and professor, College of Medicine, UP Manila; *Moderator*: Dr. Raymond Francis R. Sarmiento, OYS 2019 and director, National Telehealth Center, NIH, UP Manila; *Rapporteur*: Dr. Lucille C. Villegas, OYS 2009 and professor, IBS, UPLB

The FGD focused on microbes in human and animal health, discussing antibiotic resistance and emerging infectious diseases brought about by climate change.

c. Green Technology for the Food System: Coastal
Online, 10 May 2023
Focal Persons: Acd. Eufemio T. Rasco, Jr. and Acd. Virginia C. Cuevas

Speakers: Acd. Glenn B. Gregorio; Dr. Romeo V. Labios, Career Scientist I and member, Philippine Association of Career Scientists, Inc.; Acd. Marco Nemesio E. Montaño; Acd. Acd. Marie Antonette Juinio-Meñez; *Moderator*: Acd. Roel R. Suralta; *Rapporteur*: Dr. Reynante L. Ordonio, OYS 2019 and project leader, DA-PhilRice Healthier Rice project

The FGD tackled saline-tolerant rice farming, seaweed farming, and coastal mariculture.

d. Green Technology for the Food System: Hilly Land Agriculture
Online, 14 June 2023
Focal Persons: Acd. Eufemio T. Rasco, Jr. and Acd. Virginia C. Cuevas

Speakers and Discussants: Acd. Rasco; Acd. Rex Victor O. Cruz; Acd. Romulo G. Davide; Henry Binahon, owner, Binahon Agroforestry Farm; Maria Soleda Tibor Preña, city environment and natural resources officer, City of Ligao, Albay; Ramon benito Tamayo, consultanton sustainable apiculture, agriculture, and natural resources development, Provincial Government of La Union; *Moderator*: Dr. Ian A. Navarrete, OYS 2016 and associate professor, College of Agriculture, Food, and Environmental Sciences, Southern Leyte State University; *Rapporteur*: Dr. Dixon T. Gevaña, OYS 2018 and professor and director, FDC, CFNR, UPLB

The FGD tackled green technology for hilly land farming to make the practice more sustainable and environmentally friendly.

e. Special Concerns Program: Cacao/Coffee/Coconut Post-Harvest Processing Roundtable: Advancing Innovation Coordination in the Food Manufacturing Industry
General Santos City; 05 December 2023
Focal Person: Acd. Manolo G. Mena

Speakers: Dr. Noel S. Gunay, professor, MSU General Santos City; Acd. Raymond Girard R. Tan; Engr. Edwin O. Banquerigo, retired regional director, DTI; Dr. Andres M. Tuates, Jr., acting chief, Bioprocess Engineering Division, Philippine Center for Postharvest Development & Mechanization (PhilMech), DA; Giselle Eve O. Siladan, senior SRS, DOST Region XII; *Moderator and Rapporteur*: Acd. Elmer P. Dadios

The activity introduced the Innovation Ecosystem Stakeholder model to local farmers for developing micro-, small, and medium-sized enterprises (MSMEs) in post-harvest processing. Members from local higher education institutions and government agencies were also invited to initiate collaborations in research and innovation.

f. Special Concerns Program: Assessment of the National Greening Program (NGP)
Davao City; 07 December 2023
Focal Person: Acd. Rex Victor O. Cruz

Speakers: Gil V. Bigcas, NGP coordinator for Region XI; Ma. Teresa G. Aquino, chief, Forest Resources Conservation Division (FRCD), Forest Management Bureau (FMB), DENR; *Facilitators*: Dr. Lorena L. Sabino, assistant professor, CFNR, UPLB; Dr. Jessa P. Ata, assistant professor, CFNR, UPLB; *Rapporteur*: Dr. Dixon T. Gevaña, OYS 2018 and professor and director, FDC, CFNR, UPLB

5. Workshops
    a. NAST-TOWNS Workshop on Regional Assessment of Climate Risks and Vulnerabilities (Visayas Cluster)
    Tacloban City and online; 01 August 2023
    In partnership with The Outstanding Women in Nation's Service (TOWNS) Foundation, Inc. and DOST Region VIII
    Focal Persons: Acd. Rex Victor O. Cruz and Acd. Juan M. Pulhin

    Speakers: Dr. Bonifacio G. Pajuelas, deputy administrator for operations and services, DOST-Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA); Acd. Cesar L. Villanoy; Acd. Glenn B. Gregorio; Acd. Marie Antonette Juinio-Meñez; Hon. Carlos Jericho L. Petilla, governor, Province of Leyte; Dr. Aletta T. Yñiguez, OYS 2017 and professor, MSI, UP Diliman; Dr. Laura T. David, OYS 2007 and director, MSI, UP Diliman; *Moderators*: Cecilia Oreña-Drilon, president, TOWNS Foundation, Inc.; Hon. Sandy Javier, vice governor, Province of Leyte; *Rapporteur*: Dr. Rico C. Ancog, OYS 2019 and dean, UPLB-SESAM

The workshop assembled scientists, local officials, members of the private sector, and other stakeholders to share multi-sectoral initiatives for climate change adaptation and disaster risk reduction. A workshop on resilience planning and

design was conducted to help develop integrated responses to improve the cluster's climate resilience.

b. Special Concerns Program: Use of Space Technology for Agriculture and Natural Resource Management
Quezon City; 15-16 August 2023
Focal Person: Corresponding Member Josefino C. Comiso

Speakers: Acd. William G. Padolina; CM Josefino C. Comiso; Dr. Joel Joseph S. Marciano, director general, Philippine Space Agency (PhilSA); Acd. Glenn B. Gregorio; Dr. Felino P. Lansigan; Dr. Enrico C. Paringit, executive director, DOST-PCIEERD; Dr. Gay Jane A. Perez, deputy director general, PhilSA

c. Future Earth Philippines (FEP) Program: Scoping Activities in Pampanga and Bulacan
Macabebe, Masantol, Sasmuan, Lubao, and Guagua in Pampanga, Calumpit and Bulakan in Bulacan; 21 June, 29 June, and 05 July 2023
In partnership with DOST Region III, Bulacan and Pampanga Science and Technology Centers
Focal Person: NS Lourdes J. Cruz

The FEP team visited select municipalities in the provinces of Pampanga and Bulacan to conduct field work and consultations with locals regarding the causes of flooding problems in their area. Community members identified various causes of flood and potential solutions. Results of the scoping activities were presented to the National Economic and Development Authority (NEDA) Region III and the Regional Disaster Risk Reduction Management Council (RDRRMC).

d. Future Earth Philippines (FEP) Program: Riparian and Wetland Towns of Pampanga and Bulacan
San Fernando City, Pampanga; 22 August and 04 September 2023

In partnership with DOST Region III, Bulacan and Pampanga Science and Technology Centers
Focal Person: NS Lourdes J. Cruz

The FEP team conducted a symposium for community members of Pampanga and Bulacan to discuss the areas' riparian and wetland ecosystems and explore strategies to address the pertinent flooding problem.

e. Research Upgrading and Performance Evaluation (RUPE)
Cauayan City, Isabela; 14-15 September 2023
In partnership with the Outstanding Young Scientists Foundation, Inc. (OYSI) and DOST Region II

f. Special Concerns Program: Visioning Workshop on the Futures of Philippine STEM Education
National Institute for Science and Mathematics Education Development (NISMED), UP Diliman, Quezon City; 07-09 November 2023
Focal Person: Acd. Jose Maria P. Balmaceda

Speaker and Main Facilitator: Dr. Sheryl Lyn C. Monterola, director, UP Diliman-NISMED

Acknowledging the new K-10 STEM curriculum, the workshop aimed to determine the trends and drivers that influence Philippine STEM education and develop future scenarios to strengthen the STEM ecosystem in the country. Facilitators from UP NISMED led the different sessions of the workshop, from futures thinking to scenario planning. The workshop served as an initial effort to formulate recommendations and develop a 30-year horizon for the futures of Philippine STEM education.

6. Information Forum, Symposium, Webinars, *Kapehan*
    a. Substance Abuse Crisis and the New Emerging Drugs
    Philippine General Hospital (PGH) Complex, UP Manila; 17 February 2023
    In partnership with UP Manila and Asian Center for Drug Policy (ACDP)
    Focal Person: NS Carmencita D. Padilla

    Speakers: Dr. Jose M. David, clinical professor, Albany Medical College; Dr. Leonardo R. Estacio, Jr., professor, college of Arts and Sciences, UP Manila; Dr. Joselito C. Pascual, head, Division of Addiction Medicine, Philippine General Hospital and College of Medicine, UP Manila; Rebecca F. Arambulo, assistant chief, Policy Studies Research and Statistics Division, Dangerous Drugs Board; Dr.

Francisco A. Magno, OYS 2000 and senior fellow, ACDP; Dr. Maria Ruth B. Pineda-Cortel, OYS 2022 and assistant professor, Department of Medical Technology, University of Santo Tomas; *Moderator*: NS Carmencita D. Padilla

The forum aimed to present an overview of the neurobiology of addiction and the emerging drugs being abused in the community. It also aimed to discuss the multidisciplinary response needed to address the threat that new emerging drugs present.

b. Sustainability Research and Innovation (SRI) Congress 2023
UP Diliman and online; 10 July 2023
Focal Person: NS Lourdes J. Cruz

The Future Earth Philippines (FEP) team participated in the SRI Congress 2023, the largest gathering of experts and advocates around the world to discuss matters relating to sustainability. The SRI Congress is an initiative of Future Earth and the Belmont Forum. FEP experts presented the different factors affecting flooding in the Philippines, including InSAR land assessment, mangrove ecosystems, changing river landscapes, and sea-level rise.

c. Science Information Forum on Artificial Intelligence (AI) for Teachers
Online; 28 October 2023
In partnership with the Microbiology Consortium of the Philippines (MCP)
Focal Person: Acd. Asuncion K. Raymundo

Speakers: Dr. Prospero C. Naval, professor, Department of Computer Science, UP Diliman; Dr. Elmer-Rico E. Mojica, professor, Dyson College of Arts and Sciences, Pace University, New York, USA; *Moderator*: Acd. Alvin B. Culaba; *Rapporteur*: Dr. Ronnie S. Concepcion II,

OYS 2023 and associate professor, Gokongwei College of Engineering, DLSU

Primarily attended by teachers from the 43 member-institutions of the MCP, the forum aimed to introduce basic AI concepts, share AI teaching modules and other online resources, and propose practicable steps for implementing AI in the classroom.

d. #PilipiNAST Kapehan is a series of dialogue between NAST and the press, media, and science communicators to introduce the programs, activities, awardees, and members of the Academy, as well as timely issues faced by the country.

The first *Kapehan* for the 2023 NAST Awardees was conducted on 04 July 2023 in Quezon City. The guests were the recipients of the Outstanding Young Scientists Award, Environmental Science Award, and Talent Search for Young Scientists Award. Furthermore, new members of the Academy (Academicians and Corresponding Member) were also present in the event.

The second *Kapehan* was conducted on 15 December 2023 in Quezon City. The guests were the winners of the 2023 Magsaysay Future Engineers/Technologists Award and the 2023 National Science and Technology Week Awards.

7. Science Career Orientation

    a. The *Scienteach/Symposium for the Youth* is a series of episodes that showcase varying topics and feature NAST Members and Awardees who are accomplished in their specific fields. It aims to: 1) promote science and technology, 2) bring our scientists closer to the youth, and 3) inspire and encourage the students to pursue a career in science. In partnership with various DOST Regional Offices, the activity was conducted in:

        i. Davao – April 11
        ii. Eastern Visayas – April 25
        iii. CAR – May 20
        iv. Isabela – September 14
        v. Region I – October 18
        vi. Marinduque – October 23
        vii. Iloilo City – November 21

    b. The *Dialogue with NAST Scientist* is a series of episodes that showcase varying topics featuring National Scientists, NAST Members, and awardees who are accomplished in their fields of expertise. It aims to inspire and encourage the researchers and other professionals to conduct more research and to adapt science and technology for development. In partnership with various DOST Regional Offices, the activity was conducted in:

        i. Region I - October 19
        ii. Marinduque - October 24
        iii. Batangas - December 6

8. Future Science Leaders' Forum (FSLF)

    The 2023 FSLF was conducted on 09-10 November 2023 in Alabang, Muntinlupa City.

    It aims to empower young Filipino science leaders, assist them in maximizing their leadership potential in their respective fields, and provide a venue for a leadership network of peers and potential mentors and advisers. It is designed for individuals who are under 40 years old, have a strong aptitude for leadership in their chosen disciplines, and have a track record of exceptional success in those fields. The plenary sessions essentially address various perspectives and best practices from the scientific leaders to build up a progressive Philippines anchored on science.

    A total of 60 young leaders were selected from among the nominees endorsed by the heads of institutions from all over the country.

Distinguished scientists, such as National Scientists and Academicians, were invited as resource speakers to provide their personal perspectives on the various issues. These are National Scientist Carmencita D. Padilla, Chair of the Future Science Leaders' Forum Steering Committee, National Scientist Dolores A. Ramirez, Academician Allan B.I. Bernardo, Academician Raymond Girard R. Tan, Academician Evelyn Mae Tecson-Mendoza. Academician Glenn B. Gregorio, Academician Arvin C. Diesmos, Academician Mahar K. Mangahas, Corresponding Member Francis L. de los Reyes III and Corresponding Member Leodevico L. Ilag.

SCIENTIFIC CAREER SYSTEM

SCS is a system of recruitment, career progression, and recognition that rewards scientists rank in the government service to develop a pool of highly qualified and productive scientific personnel. The system is co-implemented by the Civil Service Commission (CSC) and the DOST, with the CSC Chairperson and DOST Secretary serving as Co-chairs of the Scientific Career Council (SCC).

The 2023 Newly Conferred and Upgraded Career Scientists with the Scientific Career Council (SCC) and Special Technical Committee (STC) Member (from left): Ms. Joy Ann P. Santos, Dr. Manuel Jose C. Regalado, Dr. Fe M. Dela Cueva, Dr. Rene C. Santiago, Dr. Andres M. Tuates, Jr., Dr. Danilda D. Hufana-Duran, Dr. Rodelio G. Idago, Dr. Ma. Cecilia R. Antolin, Dr. Jordan F. Madrid, Dr. Alvie A. Astronomo, Dr. Juanito P. Jimenez, Jr., Ms. Jazelyn M. Salvador, Ms. Melissa P. Montecalvo, Dr. Rodney H. Perez, Ms. Luningning E. Samarita-Domingo, Dr. Renato U. Solidum, Jr. Atty. Karlo A. B. Nograles, and Dr. Leslie Michelle M. Dalmacio (Photo by DA-PHilMech)

Eleven (11) newly-conferred and three (3) newly-upgraded Career Scientists took their oath on 13 September 2023 in Quezon City. They were sworn in by the Scientific Career Council (SCC) co-chairs: CSC Chairperson Atty. Karlo A. B. Nograles and DOST Secretary Renato U. Solidum, Jr..

Dr. Jordan F. Madrid, Career Scientist II from the DOST-Philippine Nuclear Research Institute (PNRI). He has been actively engaged in research in the fields of radiation processing, radiation chemistry, and polymer science. Dr. Madrid's research interests are a combination of basic studies and practical applications aimed at improving the quality of life through the safe, effective, and innovative use of radiation science and technology. He pioneered the establishment of radiation grafting technology in the Philippines, a unique technique in the development of functional polymeric materials for different applications. He has harnessed the advantages of radiation technology and Philippine resources in the development of natural fibers-based functional composite polymeric materials for various applications.

Dr. Ma. Cecilia R. Antolin, Career Scientist I from the Philippine Center for Postharvest Development and Mechanization (PHilMech) of the Department of Agriculture (DA). Her notable projects with considerable impact are the Pilot Testing of Soybean Production-Processing Technologies in Accelerating the Development of the Local Soybean Industry in

the Philippines and the Pilot Testing of PHilMech Developed Mechanical Row Onion Seeder. The adoption of soybean production-processing technologies and systems by cooperators and adopters such as KKK Enterprise in Paco Manila, Don C Enterprise in San Jose City, Golden Beans and Grains Cooperative in Cabanatuan City, Ajjee Food Products in Guimba and others, has demonstrated the viability of these enterprises. Meanwhile the pilot testing of mechanical row onion seeder developed by PHilMech reduced labor requirements and increased the yield of onion farmers and other cooperators in Pangasinan, Nueva Ecija and Tarlac. Through the successful adoption of these technologies, the stakeholders have experienced positive outcomes in their agricultural practices and income.

Dr. Alvie J. Asuncion-Astronomo, Career Scientist I from DOST-PNRI, is a physicist who specializes in neutron and reactor topics. She is the project leader and lead core designer of the recently commissioned Philippine Research Reactor 1 (PRR-1) Subcritical Assembly for Training, Education, and Research (SATER), which is currently the only operational nuclear facility in the country. She has been designated as the Philippine representative to the Technical Working Group on Small and Medium-Sized Modular Reactors (TWG-SMR) of the International Atomic Energy Agency (IAEA). Dr. Astronomo is also the lead designer of the Multi-shell Neutron Spectrometry System (MuNS), which has been deployed in medical accelerator facilities to assess neutron fields as reference for improving radiation protection measures. She is likewise actively involved in nuclear manpower development through nuclear training, education, and public awareness. This includes designing, implementing, and evaluating nuclear training and education courses offered by PNRI jointly with partner Universities. She is now focusing on the optimized utilization of the PRR-1 SATER facility and on mentoring younger researchers with the aim of building nuclear expertise in the Philippines.

Dr. Rodelio G. Idago, Career Scientist I from DA-PHilMech. His multidisciplinary background in engineering, economics, and environmental science, coupled with a Systems approach, enabled him to craft science-based and practical solutions in the realm of mechanization and postharvest techniques. One of his groundbreaking contributions is the mechanical onion seeder, a tractor-hitched drill-type device designed to open furrows, meter seed delivery, cover seeds, and firm the seed bed. This innovation addressed the inefficiencies of manual broadcasting, reducing labor costs, optimizing seed utilization, and enhancing average onion plant yield through consistent and optimal spacing. Recognizing the challenges faced by smallholder farmers during off-seasons, Dr. Idago developed a practical, low-cost non-refrigerated storage solution for onions, lasting 3 to 4 months, safeguarding their livelihood amidst changing climates.

Dr. Juanito P. Jimenez, Jr., Career Scientist I from the DOST-Forest Products Research and Development Institute (FPRDI). He specializes in wood and non-wood products research. He conducted research on drying and thermal modification treatment of wood and bamboo, bio-based composite panels like plywood, particleboard, engineered bamboo, and natural fiber-reinforced thermoplastics. His achievements include leading 16 FPRDI-funded projects and five externally funded research on bamboo, industrial tree plantation species, and agro-forest waste. Presently, he is involved in two externally funded research on bamboo fuel pellets and vetiver roots bio-composites. He has published 26 scientific papers in reputable local and international journals and holds eight Utility Models. His works have earned him recognition, including the 2013 Outstanding Young Scientist Award in forest utilization awarded by the Forest and Natural Resources Research Society of the Philippines, Inc. (FORESPI).

Melissa P. Montecalvo, Career Scientist I from the National Crop Protection Center (NCPC) of the University of the Philippines Los Baños (UPLB). She led a project that validated and disseminated effective management strategies against key pest concerns affecting major crops. Her research on 'Carabao' mango detected endophytic colonization of a postharvest fungal pathogen and identified potential postharvest treatments. She also explores microbial biological control agents and pioneers' studies on entomopathogenic fungi against important insect pests. Collaboration with crop protection experts developed effective and sustainable strategies that suppressed diseases and extended marketable life of 'Carabao' mango. Joint efforts also produced valuable information for disease monitoring and management strategies, including pest and disease profiles across climate types and relevant information on sugarcane leaf scald. She was further involved in the promotion of carrageenan plant growth promoter, benefiting rice and corn farmers in various regions.

Dr. Rodney H. Perez, Career Scientist I from the UPLB-National Institute for Molecular Biology and Biotechnology (BIOTECH). His research work is focused on the elucidation of the biosynthetic mechanism, mode of action, and the application of antimicrobial peptides, known as bacteriocins, from lactic acid bacteria. His research interest also includes probiotics, prebiotics, and nutraceuticals. Dr. Perez is a well-recognized researcher here and abroad. In 2021, he became the first Filipino to be given the award Young Asian Biotechnologist Prize by the Society for Biotechnology, Japan (SBJ). In 2020, he was one of the recipients of the Outstanding Young Scientist by NAST-Philippines. In 2017, he was a recipient of the renowned and highly competitive JSPS International Postdoctoral Fellowship.

Ms. Jazelyn M. Salvador, Career Scientist I from Natural Sciences Research Institute (NSRI) of the University of the Philippines Diliman (UPD), is actively involved in population and forensic genetics research and development in the Philippines. She is engaged in the comprehensive survey of Filipino genomic variation for forensics, history, health, and medicine applications. Her research also includes the validation of forensic DNA typing procedures and the expansion of the Philippine reference genetic databases, which are presently used to assess the weight of forensic DNA evidence in Filipino-related cases. She is also one of the UP-DNA analysts who handle forensic casework such as paternity, kinship, sexual assaults, and identification of abandoned remains. In 2009, Ms. Salvador was awarded the UP Diliman Gawad Chancellor for Research, Extension, and Professional Staff (Research Category) for her research accomplishments and involvement in extension work.

Dr. Rene C. Santiago, Career Scientist I from the DA-Bureau of Animal Industry (BAI), is a veterinarian who specializes in native animal production and breeding. he led the development of the "Itik Pinas", a signature Philippine egg-type duck with high egg production, predictable performance, and consistent egg quality for balut and salted egg. Since the development of Itik Pinas in 2016, it has been used by local farmers in Luzon, Visayas, and Mindanao with over 2 million heads of female ducklings sold and distributed all throughout the country. He is also designated as the Head of the BAI-Farm Operations Group which is composed of six Research and Development Centers for livestock, poultry, and feed resources situated in Nueva Ecija, Quezon, Palawan, Masbate, Bukidnon and Zamboanga ducklings sold and distributed all throughout the country. He is also actively involved in developing and further advancing native animal production in the Philippines through the conduct of lectures and training, distribution of native animals, technical assistance and extension, and other various socio-economic development efforts.

Ms. Joy Ann P. Santos, Career Scientist I from the UPD-NSRI. is an inventor who played a key role in developing the "Detection of Pathogens" utility model, which features an isothermal technology capable of detecting various infectious diseases, including dengue, TB, Schistosomiasis, Leptospirosis, and typhoid fever. She primarily focuses on molecular diagnostics for a wide range of infectious diseases, specializing in the detection of enteric viruses in samples from both environmental and human samples. Her research endeavors also focus on the advancement of nucleic acid-based technologies, such as loop-mediated isothermal assays and recombinase polymerase amplification. Additionally, she is working on the development of paper-based platforms like lateral-flow assays and vertical flow microarrays, specifically for detecting human adenovirus, norovirus, rotavirus, poliovirus, hepatitis A and B, and astrovirus.

Dr. Andres M. Tuates, Jr., Career Scientist I from DA-PHilMech. He is the principal investigator in developing Cacao Postharvest, Mechanization and Waste Utilization. The project has developed and optimized the production of tablea and the conversion of waste and by-products from cacao into wine, vinegar, soft drinks, ethanol, pectin, cellulose acetate, and fuel briquettes. Various equipment used in the processing was developed, including a stainless fermentary box, pods splitter, roaster, dehuller, refiner and briquetting machine. He is also the principal investigator of PHilMech Biodegradable Fruit Bag, Rice Parboiling and Computer Vision System. He is the PHilMech Focal Person on Cacao Postharvest and Mechanization. He is always tapped as a subject matter specialist during training on mechanization and postharvest technologies with specific topics related to cacao postharvest mechanization and by-product utilization, cashew processing, corn mechanization, briquetting, and others. He is actively involved in professional organizations. He is the current Philippine Society of Agricultural and Biosystems Engineers (PSABE) Immediate Past President, Chair of the Technical and Poster Committee and editor-in-chief of the PSABE Journal and Connect.

Dr. Fe M. Dela Cueva, Career Scientist II from the UPLB-Institute of Plant Breeding, is an esteemed researcher in the field of plant pathology. With a resolute commitment to safeguard crop health, her research on the development of molecular tools for pathogen detection, elucidation of pathogen diversity, and identification of sources of resistance against plant diseases, Dr. Dela Cueva has left an indelible mark on the scientific community and implementation of national guidelines and policies. As the current Director of the Institute of Plant Breeding at the University of the Philippines Los Baños and a distinguished recipient of prestigious title of Scientist II, Dr. Dela Cueva's unwavering dedication to research and fostering the next generation of scientific leaders continues to shape the future of plant pathology and drive agricultural innovation to new heights.

Dr. Danilda D. Hufana-Duran, Career Scientist II from DA-Philippine Carabao Center (PCC). Her research on water buffalo in vitro embryo production and cryopreservation have resulted to births of live, healthy genetically superior buffaloes and made a significant contribution in the advancement of embryo transfer activities in the Philippines and abroad. She was invited to serve as trainer on reproductive biotechnologies in India and Ecuador and lead the team that produced and internationally transported frozen embryos from India for embryo transfer in the country. Now she is researching on how to address and solve the problems of inactive and non-performing water buffalo bulls by enhancing their reproductive performance using physiological interventions and pioneering the research on the production of Wagyu crossbreds in the country for an improved breeding program.

Dr. Manuel Jose C. Regalado, Career Scientist II from the DA-Philippine Rice Research Institute (PhilRice), led DOST-PCAARRD-funded research and developed a combined conduction, convection, and far infrared radiation dryer for paddy rice that is being currently tested at a farmers' cooperative in Butuan City. He and his engineering research team also developed crude bioethanol and hydrous bioethanol distillation systems, which were adopted by a farmer in Infanta, Quezon. He also led his team in developing the multi-crop, reduced-till planter, which was registered as a utility model and currently being tested by a farmers' association in San Felipe, Zambales. Moreover, he actively participated in the development of a riding-type boat tiller, which is now being commercialized by ACT, an Isabela-based farm machinery manufacturer. Since 2017, he co-led a DA Bureau of Agricultural Research-funded project, "WateRice," which developed the AutoMon PH, an automated monitoring system for measuring paddy field water level to improve irrigation.

The 2023 Newly Conferred and Upgraded Career Scientists with the Scientific Career Council (SCC), Special Technical Committee (STC) Member and Agency Heads (from left): Acd. Cristina J. Montiel, Atty. Jane C. Bacayo, Dr. Lilian C. Garcia, Dr. Leo D.P. Cubillan, Dr. Ricardo F. Orge, Dr. Minerva Fatimae H. Ventolero, Dr. Evelyn C. Ame, Dr. Jaime A. Manalo IV, Dr. Ulysses M. Montojo, Atty. Karlo A. B. Nograles, Acd. Mudjekeewis D. Santos, Dr. Renato U. Solidum, Jr., Acd. Jaime C. Montoya, Dr. Leslie Michelle M. Dalmacio, Dr. Diana L. Ignacio, Acd. Fabian M. Dayrit, and Ms. Luningning E. Samarita- Domingo (Photo by DOST-STII)

A second oath-taking ceremony was conducted on 11 December 2023 at PICC, Pasay City for four (40 newly-conferred and two (2) newly-upgraded Career Scientists. The activity was done simultaneously with the investiture ceremony of Acd. Mudjekeewis D. Santos, conferring upon him the title of Career Scientist V. They were sworn in by CSC Chairperson Atty. Karlo A. B. Nograles and DOST Secretary Renato U. Solidum, Jr.

Dr. Evelyn C. Ame, Career Scientist I from the DA-Bureau of Fisheries and Aquatic Resources Regional Office No. 2 (BFAR R02), has actively contributed to and promoted research in aquaculture and fisheries resource management. Dr. Ame pioneered the conservation and protection of two vital endemic species in Region 2: the Ludong (known as the President's fish), the most expensive fish in the country, and the catadromous Angullid Eel. Her leadership encompassed various research aspects, including species identification, niche assessment, reproductive biology, stock assessment, climate vulnerability, and socioeconomic impacts. These findings served as the foundation for a comprehensive management plan and

the formulation of ordinances. The resulting strong, science-based policies effectively deter the overexploitation of these resources.

Dr. Jaime A. Manalo IV, Career Scientist II from DA-PhilRice, has contributed to youth and agriculture scholarship. Specifically, his work gravitate around youth outmigration from agricultural communities, youth and information and communications technology for development, and strategies on youth engagement in agriculture. His publications in these areas are cited in important policy documents as well as in publications both here and abroad.

Aside from youth and agriculture, Dr. Manalo has also contributed in the areas of climate change adaptation and communication. He has identified strategies to effectively communicate climate change to farmers and helped in understanding climate change adaptation in the rice sector. He also leads socio-technical inquiries to understand innovation systems surrounding technologies developed for rice farmers. His work in this area provides inputs in developing impact pathways for technologies in the rice sector.

Dr. Ulysses M. Montojo, Career Scientist I from DA-NFRDI, has research involvement on marine biotoxins, fisheries, aquaculture farm nutrient loading, seafood quality and safety, health risk assessments, and fish handling. His work identified contaminants like Ciguatera and heavy metals in fish, assessing associated health risks and shaping policy recommendations. His pioneering study on fisheries postharvest losses in the Philippines aligned with national development plans and UN Sustainable Development Goal 12.3. Establishing baseline data, he formulated policies to reduce losses and convert processing wastes into valuable resources. Notably, he contributed to the Codex Standard, enhancing trade opportunities for Philippine canned Sardinella lemuru. Additionally, his leadership in the Philippine Salt Industry study influenced the approved "Philippine Salt Industry Development Act," providing crucial scientific insights for legislation.

Dr. Mineva Fatimae H. Ventoler, Career Scientist I from DA-NFRDI, has been actively engaged in the application of genetics in fisheries research. Her research work has led to significant contributions in metagenomics, species identification, traceability, and conservation leading to various publications and awards. She currently leads the Genetic and Breeding Section and is involved in projects engaged in verifying aquaculture technologies, the promotion of science-based aquaculture technologies and practices for the benefit of fish farmers, and on stock assessment of lakes focused on use of genetic information for species identification.

Dr. Ricardo F. Orge, Career Scientist III from DA-PhilRice, worked on developing engineering technologies tailored to increase farmers' income within the realm of rice-based agriculture. He aims to equip farmers with robust solutions to confront the diverse challenges stemming from climate change and rice trade liberalization. Among his notable inventions is the continuous-type rice hull carbonizer which processes rice hull and other agricultural wastes into carbon-rich biochar and recovers the generated heat for various income-generating applications. Together with his team, he also developed the capillary irrigation system, a do-it-yourself type and low-cost variant of the drip irrigation system, to help smallholder farmers cope up with extreme drought conditions, and the Kwebo, an easy-to-build and typhoon-resistant multi-purpose structure to help protect farmers' investments from strong typhoons.

Acd. Santos is a Fishery Scientist and Marine Biologist widely recognized for his work on utilizing genetics, resource assessment and policy studies to support fisheries management

and aquaculture for food security, biodiversity conservation and climate change adaptation. He is a NAST Academician and is a part-time faculty member of the Graduate School of the University of Santo Tomas.

He has authored and co-authored over 100 scientific articles, book chapters and books, is currently the Editor-in-Chief of the Scopus-indexed The Philippine Journal of Fisheries and an Editor of the international journal Fisheries Science. He has mentored a number of B.S., M.S. and Ph.D. thesis students, lead and collaborated several national and international research projects, and a recipient of numerous awards including the prestigious Presidential Lingkod Bayan award in 2014 given by the Civil Service Commission and the Office of the President of the Philippines.

In recognition of his significant contribution to the advancement of fisheries science and management in the country, a marine fish has been named after him in 2015 (Chelidoperca santosi), by two of the world's leading fish taxonomists in the world, Dr. Jeffrey Williams and Dr. Kent Carpenter. In the same year, an Islet in Zamboanga City was named in his honor, "Mudjie Wise Key Islet," by the people of Barangay Dita, Zamboanga City (Resolution No. 035, Series of 2015). By 2017, he was officially recognized by the City of Zamboanga as one of the prime movers of the sardine fishing closure in the Peninsula that not only benefited the city but the entire country as well (Resolution No. 1199, Series of 2017). As such, he is sometimes called "Mr. Fisheries Research" or the "Fisherfolk's Scientist."

IN MEMORIAM

Dr. Angel C. Alcala
National Scientist, 2014
Academician, 2004

Dr. Angel C. Alcala is a marine biologist, herpetologist, research advocate, civil servant, and most importantly an acclaimed scientist. He was recognized for his outstanding scientific contributions to the systematics, ecology, and diversity of amphibians and reptiles and marine biodiversity, reef fishes, and conservation of marine protected areas. His research and advocacy for marine no-take zones resulted in a national policy and program that established no-take marine protective areas resulted in over a thousand such marine no-takes in the country and becomes a model of coastal resource management and conservation that many countries have adopted.

Dr. Alcala was born in Negros Occidental on March 1, 1929. He grew up in a family of ten siblings of which, he is the eldest. His family resided in Caliling, a coastal village in Cauayan of Negros Occidental famous for its immaculate beach where Dr. Alcala's connection to marine life began. He planned to take medical studies after completing a pre-medical course at Silliman University. However, due to financial constraints, he chose to stay at Silliman University and finished a degree in Biology.

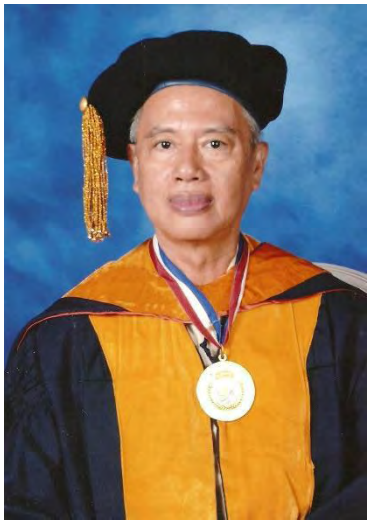
He obtained his Bachelor of Science in Biology *(magna cum laude)* from Silliman University in 1951, his Master of Arts, and his Doctor of Philosophy in Biological Sciences from Stanford University in 1960 and 1966, respectively. He also received honorary doctorates from Xavier University and the University of Southeastern Philippines.

Dr. Alcala started as an Instructor in Biology at Silliman University to various high-ranking positions, including Dean of the College of Arts and Sciences, Director of the Marine Laboratory, and eventually President of the University from 1991 – 1992. He founded the Silliman Marine Laboratory which has been active in research on marine protected areas, fisheries and marine biodiversity, mariculture and conservation of Philippine plant and animal species. His marine science publications consist of about 80 papers on coral reef fish, marine reserves, and the long-term effects of protection on marine biodiversities such as corals and top predatory fish. Most of these papers have been published in refereed, international journals and books.

In 1992, former President Fidel V. Ramos appointed him as Secretary of the Department of Environment and Natural Resources where he initiated DENR's program on marine conservation. He was also designated as the first Chairman of the Commission on Higher Education (CHED) from 1995 to 1999, where he served with probity, integrity, and transparency. In addition, he promoted faculty capacity building and research projects to encourage research programs in colleges and universities.

Many of the remarkable awards NS Alcala received are the Likas Yaman Award by the Ministry of Environment and Natural Resources in 1979, Ilaw ng Karunungan Award for Biological Sciences by the Philippine Fulbrighters' Association in 1983, The Outstanding Biologist for Region VIII by the National Science and Technology Authority in 1985, Ramon Magsaysay Award for Public Service in 1992, Outstanding Men and Women of Science by the Department of Science and Technology in 2009 and Gregorio Y. Zara medal for Basic Science by the Philippine Association for the Advancement of Science, Inc. (PhilAAS) in 2011, among others.

In 2004, National Scientist Angel Chua Alcala was elected to the National Academy of Science and Technology, Philippines (NAST PHL) as an Academician and was conferred the Order of National Scientist by the virtue of Malacañang Proclamation No. 783 signed by President Benigno S. Aquino III on June 6, 2014, the highest recognition given to a Filipino man or woman of science in the Philippines who has made outstanding contributions in one of the different fields of science and technology.



Dr. Salcedo L. Eduardo
Academician, 1993

Dr. Salcedo L. Eduardo, member of Biological Sciences Division of the National Academy of Science and Technology, Philippines (NAST PHL), passed away on October 8, 2023. He is 76 years old.

Dr. Eduardo is well-known in the fields of veterinary medicine and parasitology. He is recognized for his remarkable research on livestock parasites, with a focus on the fundamentals of helminthology. His work made a substantial contribution to the implementation of sound conservation, agricultural management, and public health initiatives.

Dr. Eduardo was a national pioneer in the study of helminth zoonoses and parasites of wild birds. He founded and named three new genera and more than thirty new species, as well as new nomenclatural combinations and status corrections on a variety of parasites of both wild and domesticated animals. Furthermore, he has contributed to our understanding of the taxonomy, morphology, and impact of trematodes of the family Paramphistomidae.

Dr. Eduardo rose from an Instructor at the College of Veterinary Medicine (CVM), University of the Philippines Los Baños to various high-ranking positions, including Director of Research from 1993 to 1997 and Dean of CVM from 1998 to 2004. He was also the editor-in-chief of the Philippine Journal of Veterinary Medicine from 2011 to 2013 and the editor of the Philippine Veterinary Drug Index in 1983.

He has been involved in a number of professional organizations serving as President of the Philippine Veterinary Medical Association from 1987 to 1988, as well as a member of the World Association for the Advancement of Veterinary Parasitology, the British Society of Parasitology, the Veterinary Practitioners' Association, and the National Research Council of the Philippines.

He obtained his Doctor of Veterinary Medicine (*magna cum laude)* from Araneta University Foundation in 1968, his Master of Science from the University of the Philippines (UP) in 1973, and his Doctor of Philosophy from the University of London in 1981. He pursued postgraduate research in parasitology from the Institute of Parasitology, School of Veterinary Medicine, Hannover, Germany in 1974. He was appointed UP Professor Emeritus upon his retirement in 2012.

Many of the remarkable awards Acd. Eduardo received are the Outstanding Young Scientist by the NAST PHL in 1980, the Don Andres Soriano Animal Science Research Award by the Philippine Society of Animal Science (PSAS) in 1981, Most Outstanding Veterinarian in Research by the Veterinary Practitioners' Association of the Philippines (VPAP) in 1985, the Roche Philippines Distinguished Animal Scientist by the PSAS in 1987, the Outstanding Veterinarian in Education by the Philippine Veterinary Medical Association (PVMA) in 1991, the Gregorio Y. Zara Award for Basic Research by the Philippine Association for the Advancement of Science (PhilAAS), the Distinguished Achievement Award by the Honor Society of Phi Kappa Phi Diamond Jubilee Celebration in 2009, and the Achievement Award in Veterinary Medicine by the National Research Council of the Philippines (NRCP), among others.

In 1993, Dr. Salcedo L. Eduardo was elected to the National Academy of Science and Technology, Philippines (NAST PHL) as an Academician. Dr. Eduardo was a man of science, a leader, and a role model for other scientists of his time.