# ANNUAL REPORT

# FISCAL YEAR 2021

DEPARTMENT OF SCIENCE AND TECHNOLOGY

## NATIONAL ACADEMY OF SCIENCE AND TECHNOLOGY

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# National Academy of Science and Technology
# 2021 ANNUAL REPORT

# MANDATE, VISION, and MISSION

## 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).

- To advise the President and the Cabinet on matters related to Science and Technology (Executive Order No. 818).

- To engage in projects and programs designed to recognize outstanding achievements in science and to promote scientific productivity (Executive Order No. 818).

- To embark on programs traditionally and internationally expected of an academy of science (Executive Order No. 818).

- To manage, operate and maintain the Philippine Science Heritage Center (Republic Act 9107).

## VISION

**NAST, as an academy of recognized experts, serves as principal adviser to the nation on science, technology, and innovation contributing to national development**

## MISSION

- To recognize exemplary science and technology achievements among the young and among peers.
- To encourage individual Academy members to continue their own scholarly pursuits thereby making the Academy the principal reservoir of scientific and technological expertise in the nation.
- To provide independent and science-based advice on problems facing the nation and the world.
- To link with like-minded institutions and individuals in promoting scientific achievement in the Philippines and abroad.
- To promote a strong science culture in Philippine society.

# NAST AT A GLANCE

**80**
ACADEMICIANS

**19**
CORRESPONDING MEMBERS

OF WHICH,
**11**
ARE NATIONAL SCIENTISTS.

**30**
NUMBER of policy recommendations and science advisories on various topics published

**45**
NUMBER of activities (webinar, policy forum, information forum, paper presentation, etc.) conducted

**32.44%**
SELECTION RATE
Percentage of scientists/scientific works selected as winners of awards

**100%**
TIMELY PROCESSING
of nominations

# COVID-19-RELATED EFFORTS

**43rd ANNUAL SCIENTIFIC MEETING**
**Theme:** ***COVID-19 Pandemic: Learning from the Past, Coping with the Present, Moving to the Next***
**12-15 July 2021**

Through the ASM, the NAST called for health reforms and improvement to make our health and social systems resilient and responsive to emergent and emerging health crises.

Dr. Anthony Fauci, director of the National Institute of Allergy and Infectious Diseases (NIAID) of the National Institutes of Health (NIH) and chief medical adviser to US President Joe Biden; DOH Secretary Francisco T. Duque III, chair of the Inter-Agency Task Force for the Management of Emerging Infectious Diseases (IATF-EID); and Secretary Carlito G. Galvez Jr., chief Implementer of the National Task Force Against COVID-19 served as keynote speakers for the three-day conference.

Academician (Acd.) Jaime C. Montoya, chair of the 43rd ASM Steering Committee and NAST PHL Health Sciences Division, delivered a brief introduction on the theme and statement of the objectives including the formulation of a publication entitled, "*Paghahanda*", a synthesis of the transdisciplinary discussions of the ASM focused on improving the country's pandemic response and resilience.

Leading experts and key government officials participated in the presentations and discussions of topics such as food, environment, and health; viral evolution, dynamics, and modelling interventions; systems approaches to address present-day hazards; educating for the future; balancing the economy and health; and health systems response and preparedness.

One of the main highlights of the ASM is the presentation of resolutions, which were formulated from the consultations during the Luzon, Visayas, and Mindanao Regional Scientific Meetings (RSMs) held earlier this year. The chair of the 43rd ASM Resolutions Committee, Acd. Jaime C. Montoya, presented the resolutions, with responses delivered by DOH Assistant Secretary Kenneth G. Ronquillo, NEDA Undersecretary Rosemarie G. Edillon, and DOST Secretary Fortunato T. de la Peña.

The 43rd ASM Resolutions centered on calls for policy intervention on five key areas of concern namely: (1) resilient local food system; (2) digital transformation of society; (3) optimized allocation of resources and management of goods and services across LGU boundaries in times of pandemic and other crises; (4) delivery of online education at all levels; and (5) comprehensive health emergency response, development, and preparedness plan for pandemics.

On behalf of the DOH, Assistant Secretary Ronquillo extended the Department's support to the 43rd ASM resolutions and commitment to take an active role in realizing its ultimate goal of building a resilient and responsive health system in the face of public health crisis, especially in the areas of data management, communication, capacity building, policy development, research, and ethics. To respond to the need for real-time data, national health reporting systems such as COVIDKaya, COVID Data Repository System, FASSSTER, and TanodKIRAKontraCOVID, have been established. Targeted health campaigns and advocacies have been launched through the "Bida Solusyon sa COVID-19" to encourage Filipinos to take an active role in combating COVID-19, and alleviate fear and address vaccine hesitancy.

As part of the Task Force T3 (test-trace-treat), the number of licensed COVID-19 testing laboratories has increased from seven to 199 laboratories in 2020. The COVID-19 laboratory biosurveillance network has been established following the continuous updates and improvement on the case detection and reporting

of various variants of COVID-19. Molecular RT-PCR laboratories and GeneXpert laboratories, external quality assurance programs, and the provision of supplies, equipment and consumables, antigen rapid diagnostic testing, among others were also established. The DOH provided funding support and initiated the convening of the Steering Committee for the Conduct of Clinical Trials for Investigational Treatments for COVID-19. This Committee provides oversight on the Department's participation in clinical research being spearheaded by the World Health Organization (WHO). The Single Joint Research Ethics Board (SJREB) is appointed by the Vaccine Experts Panel (VEP) to facilitate the ethics review of all COVID-19 vaccine clinical trials, and to maintain quality and efficiency in the review process.

On behalf of the NEDA, Undersecretary Edillon ensured that the Agency will make use of a combination of policy, programs, projects, and even advocacy activities in order to carry out the Agency's responsibilities identified in the 43rd ASM resolutions. The National Action Plan (NAP) Phase IV is being finalized, and the focus is on recovery and building resilience in the time of pandemic. The Agency has been tasked to lead the formulation of the National Action Plan (NAP) Phase IV, which is being used as the blueprint of the National Task Force Against COVID-19. The goal of NAP Phase IV is to safely reopen the economy. During the pandemic, the problems encountered are the high risk to the consumers' health, and the producers' load demand and liquidity constraints. Therefore, to safely reopen the economy, the objectives of government must be to reduce the risk due to COVID-19, reduce the perception of risk due to COVID-19, reduce the uncertainty due to policy actions, address liquidity constraints of firms and individuals, and empower firms and individuals to thrive under the new normal.

Furthermore, under the NAP Phase IV, the NEDA aims to achieve the enhanced Prevent-Detect-Isolate-Treat-Reintegrate (PDITR) strategies. Enhanced prevention strategies include vigilant border control measures, more aggressive promotion of enforced minimum public health standards, and use of granular lockdowns, which requires timely and disaggregated data. Enhanced detection strategies include the use of technology in enhanced contact tracing and data analytics, which call for enhanced biosurveillance protocols. Enhanced isolation and treatment strategies include the efficient triaging of cases depending on severity, continuous improvements in medical capacity, and a contingency plan to handle a surge in cases. Enhanced recovery strategies include vigorous promotion of COVID-proofing the work and public places, retooling and rescaling of workforce, and digital transformation to ensure business and systems continuity in both public and private sectors. Lastly, enhanced vaccination strategies include an accelerated vaccine roll out aiming for population protection.

On behalf of the DOST, Secretary de la Peña focused on what the Department will continue doing, will expand, and will start in relation to the specific recommendations from the 43rd ASM. On food self-sufficiency programs, the DOST spearheads the Smart Food Value Chain Program, which seeks to provide funding for projects that focus on food production, food processing, logistics supply chain and resource management systems, and smart retailing systems. The program also aims to identify ways to reduce wastages, improve productivity, and ensure a balanced line along the chain. The use of technology needs to be expanded to improve the way fresh food is stored in the *bagsakan* areas, and make sure that there will be no delays in the transit and shipment of the commodities.

In artificial intelligence and data science, particularly for modelling purposes, one of the most beneficial strategies in addressing the pandemic is the use of disease models. The existing programs on artificial intelligence include the training program for 20,000 participants from the government, ICT sector and academe. In the area of virology, vaccines, therapeutics and diagnostics, the Department pushes for the inclusion of the word "vaccines" in the Senate version of the law that will establish the Virology Science and Technology Institute of the Philippines (VIP). Preparations regarding the manpower, facilities, and local and international networks that will be needed for the VIP have already started. The Department recognizes the importance of networking, so it is now working on the whole-of-government and whole-

of-nation approach. Networks on the different DOST programs are established, such as Tuklas Lunas, Food Value Chain, business incubator, and regional networks guided by R&D councils.

## WEBINARS

The NAST initiated in 2020 a webinar series entitled "*COVID-19: Where We Are and Where We Want To Be?*". The webinars aim to help the general public understand some pressing issues related to the COVID-19 pandemic.

1) **Measuring Mental Health and Well-being during the Pandemic** (30 April)
   The webinar presented the work of Academician Allan Benedict I. Bernardo and his group on translating the Depression, Anxiety, and Stress Scales (DASS-21) into Tagalog-based Filipino, Cebuano, Ilocano, Hiligaynon, and Kapampangan. It summarized the processes involved in translating and validating the scale, and presented preliminary screening results using the translated scales. A newly-developed Coronavirus Pandemic Anxiety Scale (CPAS-11), which was validated as a screening tool for pandemic-related anxiety symptoms, was also presented.

   Acd. Bernardo also discussed how these research efforts fit within broader efforts to have more accurate indicators and mapping of common psychological symptoms that will need to be addressed by the country's mental health professionals, efforts to provide valid psychological assessment in a linguistically diverse society, and the usefulness of universal screening for psychological symptoms in organizations.

2) **Viral Evolution** (06 October)
   The online forum aimed to provide a deeper understanding of the underlying principles and mechanisms of viral evolution and substantially contribute to the formulation of implementable actions towards a more competent management and control of viral diseases in humans and animals. Viral evolution is a result of the interaction between virus, host, and the environment, both natural and man-made. Understanding the virus' trajectory, human society can plan its immediate and long-term response with consideration of past and present developments. The webinar was also held in support of the Academy's recommendations on this topic that were put forward through the resolutions of the 2021 Regional Scientific Meetings (RSMs) and the 43rd Annual Scientific Meeting (ASM).

3) **Teaching Laboratory Courses during the Pandemic** (29 November)
   Mentors, professors, and instructors of various education levels shared their practices and experiences in teaching laboratory courses and experiments in different science courses during this time of pandemic.

4) **Long COVID** (01 December)
   The webinar on Long COVID gave an overview of what is currently known about Long-Term COVID or Long COVID, a post-viral illness that may afflict COVID survivors. The multi-systemic signs and symptoms and possible predisposing factors were also discussed. The webinar included a brief discussion of ongoing efforts to study this emerging global public health problem, mitigation strategies, and possible hypotheses on its etiology.

# RECOGNITION OF OUTSTANDING SCIENCE, TECHNOLOGY, AND INNOVATION (STI) ACHIEVEMENTS

The Academy recognizes and provides incentives to Filipino scientists for outstanding achievements in scientific research and development.

## 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 man or woman of science. Nominees should receive 70 percent of the total votes of the total membership of the Academy before being recommended to the President of the country for the honor. The award was created pursuant to Presidential Decree No. 1003-A on 16 December 1976.

## MEMBERSHIP IN THE ACADEMY

Membership in the Academy is by peer recognition and given to resident Filipino scientists who have made exemplary contributions to science and technology and have advanced its cause in the Philippines. To date, there are 80 living Academicians (12 of which are National Scientists).

For 2021, the following scientists were elected:

**ARVIN C. DIESMOS, Ph.D.**
**Biology**
For his outstanding contributions to the systematic biology, ecology, and conservation of Philippine amphibians and reptiles. His research and publications on diverse disciplines including species descriptions, taxonomic revisions, evolutionary biology, biogeography, and natural history have guided national efforts to manage and conserve biodiversity of these economically and ecologically important organisms. He championed herpetological research in the Philippines, making significant contributions that have enriched our knowledge in this field and helped bring the country to the forefront of global herpetological research and biodiversity conservation.

**MANOLO G. MENA, Ph.D.**
**Metallurgy**
For his research on the recovery of metals from non-traditional sources, such as chromium from chromite tailings, copper from chrysocolla, gold from refractory pyrites, nickel and cobalt from laterites, and other recovery processes. For his contribution to the Philippine semiconductor industry, in particular the establishment of the Association of Semiconductor and Electronics Manufacturing Engineers of the Philippines and its National Technical Symposium. And for his contributions to undergraduate and graduate programs of Materials Science and Engineering at UP Diliman.

**CAMILO C. ROA, JR., M.D.**
**Pulmonary Medicine**

For his pioneering and translational research on tuberculosis that explored outpatient Supervised Short-course Chemotherapy, which contributed to the adoption of WHO's Directly Observed Therapy Short course or DOTS strategy in the national program. He strategized the creation of collaborative public-private mix DOTS that brought private and government TB workers together, which became a model for the Stop TB Partnership at the WHO Geneva. To address the lack of ventilators, Dr. Roa invented the Pulmo 1 Ambubagger, a temporary device that can be used in the absence of a ventilator. Dr. Roa successfully combined his scientific knowledge, inventive skills, and transformational leadership to help control the dreaded disease of tuberculosis and created a cadre of young pulmonologists who will help him carry on this mission.

**CRISTINA J. MONTIEL, Ph.D.**
**Peace/Political Psychology**

For her significant contributions to the field of peace/political psychology through her deep involvement in Philippine liberation movements, during and after martial law. Her direct experiences in collective movements informed her writings and scholarship on peace/political psychology from a Global South perspective. During the country's democratic transition, she brought peace/political psychology to strategic national institutions, leaders, and projects related to social peace in the Philippines. Dr. Montiel's primary contribution to the global field of peace/political psychology lies in her excellent and original scholarship. She is a world-renowned and multi-awarded senior scholar on the psychology of peacebuilding and democratic transitions.

## NAST AWARDS

The NAST Trophy, unveiled in 2014, is a sculptural trophy which shows fluid lines and curves subtly forming the word NAST. The upward movement of the lines shows modernity, great strides in science and excellence. The contours and holes all around symbolize how our outstanding scientists discover and explore the world of science from different perspectives. The trophy was conceptualized and designed by Sajid Imao, a nationally recognized sculptor.

### 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.

**REYNANTE L. ORDONIO, Ph.D. (Agricultural Science)**
**Philippine Rice Research Institute**
In recognition of his significant contributions as plant molecular breeder, specifically to sorghum and rice, using the tool of Genetic Algorithm. A staunch modern biotech advocate, Dr. Ordonio actively leads the Golden Rice with High Iron and Zinc Rice project at PhilRice with the aim of addressing the problem of Vitamin A deficiency, anemia and stunting in the country. He also served as the technical expert under the Department of Agriculture-Biotech and National Committee on Biosafety Philippines that crafted the country's first policy on products of gene editing and other plant breeding innovations.

**MARVIN A. VILLANUEVA, Ph.D. (Veterinary Medicine)**
**Philippine Carabao Center National Headquarters**
In recognition of his exemplary accomplishments in veterinary science. His innovative researches led to the development of technologies for the detection and control of ruminant diseases that are of economic and public health importance. His significant research findings aimed at directly reducing the morbidity and mortality of water buffaloes and other livestock that resulted in improved production efficiency. He selflessly shared his knowledge and best practices with farmers through a variety of media platforms, which resulted in improved livestock production and better control of zoonoses.

**REY DONNE S. PAPA, Ph.D. (Biological Science)**
**University of Santo Tomas**
In recognition of his outstanding contributions to the fields of limnology and freshwater biology in the Philippines and Southeast Asia. His publications, which have dealt with taxonomy and systematic biology, lake ecology, biological invasions, physical limnology, and food web interactions, have greatly expanded knowledge on important yet neglected aquatic ecosystems and resources. His scientific outputs have guided efforts by the national government on the conservation and management of major lakes and other freshwater ecosystems in the Philippines.

**PIERANGELI G. VITAL, Ph.D. (Biology)**
**University of the Philippines Diliman**
In recognition of her research achievements and continued efforts to promote and strengthen the discipline of environmental microbiology, particularly in the study of agricultural produce and irrigation waters. She pioneered the investigation of microbial safety of agricultural products by studying the microbiological quality of fresh produce from Philippine markets, which highlighted the importance of foodborne disease detection and prevention. This directly benefits farmers, food retailers, policy makers, and consumers by ensuring good microbiological quality and safety of fresh produce in the Philippines.

**AARON DON M. AFRICA, Ph.D. (Electronics & Communications Engineering)**
**De La Salle University**
For his outstanding contributions in the field of communications network engineering, expert systems, control systems, network design, and optimization. He has contributed to the optimization of communication systems to make them more functional and adapted to the industry. He successfully created simulation models to replicate different scenarios in network design, and has recently developed these in the field of Biomedical Engineering.

**CHARLLE L. SY, Ph.D. (Industrial and Systems Engineering)**
**De La Salle University**
In recognition of her outstanding contributions in the field of Operations Research (OR), especially in the development and use of systematic methodology for computer-aided decision-making to enhance industrial efficiency and tackle environmental sustainability and socio-economic issues. She developed an algorithmic framework called Target-Oriented Robust Optimization (TORO), which integrates uncertainty at the point of decision-making and guarantees computational tractability so that models can be solved efficiently. Dr. Sy extensively used TORO for the design of engineering systems, including infrastructure and network planning in the fields of energy, production, and water networks.

**JOMAR F. RABAJANTE, D.Sc. (Mathematical Systems Engineering)**
**University of the Philippines Los Baños**
In recognition of his exemplary contributions in the field of applied mathematics, particularly in the mathematical modeling of complex biological and social systems. His mathematical projections and data analytics helped the national and local governments in the fight against COVID-19. His study on gene regulatory networks led to the discovery of candidate biomarkers for diseases, such as cancer. His model of Red Queen dynamics provides new insights for the fields of evolutionary biology, parasite ecology, biomedical parasitology and epidemiology that are essential for better understanding of antibiotic resistance to control diseases. He pioneered the modeling of foraging behavior of native stingless bees to improve crop pollination, which helps farmers develop better farm practices that optimize their yield and minimize pest damage.

**GAY JANE P. PEREZ, Ph.D. (Physics)**
**University of the Philippines Diliman**
In recognition of her innovative contributions in harnessing satellite technology to address critical environmental problems. Her notable works include studies of agricultural drought and large-scale seasonal and interannual variability of vegetation in the Philippines, including changes in forest cover. Dr. Perez is also recognized for her pioneering contributions in the development of the country's first microsatellites by leading the science team in defining the satellites' missions and in generating remote sensing products.

**JASON VINCENT A. CABAÑES, Ph.D. (Communication Studies)**
**De La Salle University**
For his innovative, collaborative, and socially grounded research works that have generated original insights regarding an increasingly digitized Philippines, focusing on media and multiculturalism, digital labor, and digital disinformation. In his globally recognized publications, he has sought to decolonize the field of Media and Communication Sciences by developing theoretical approaches grounded in the realities of the Philippines. Through his writing and speaking, he has raised awareness regarding cross-cultural relations amongst Filipinos and those in the Global South and influenced policies that seek to protect Filipino digital workers and stem the growth of digital disinformation in the Philippines.

**ARNOLD R. SALVACION, Ph.D. (Environmental Science)**
**University of the Philippines Los Banos**
In recognition of his outstanding contributions to the advancement of human ecological research in the country that spans the fields of environment, socio-economics, public health, and food systems. He applied advanced geographic, statistical, and machine learning techniques to study problems, such as child malnutrition, poverty, population growth, environmental degradation, and climate change in the Philippines.

## 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. The finalists presented their research works on 26 June 2020. The winners were:

1st Place: Renier G. Mendoza, Dr.rer.nat. (Mathematics)

2nd Place: Angelo Earvin S. Choi, Ph.D. (Chemical Engineering)

3rd Place: Marvin M. Flores, Ph.D. (Physics)

Special Citations:
Jhud Mikhail O. Aberilla, Ph.D. (Environment and Sustainable Technology)
Nonawin L. Agustin, Ph.D. (Agricultural Sciences)

## Outstanding Books/Monographs Award

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

1. Arriola, J.L. (2019). *Pelikulang Komiks: Toward a Theory of Filipino Film Adaptation*. University of the Philippines Press.

2. Tadem, T.S.E. (2019). *Philippine Politics and the Marcos Technocrats: The Emergence and Evolution of A Power Elite*. Ateneo de Manila University Press.

3. David, L. T., Licuanan, W. R. Y., Dela Cruz, T. L. P., Cariño-Valdez, B. A. B., and Arceo, H. O. (2020). *Matyag: State of Coastal Habitats in the Six Philippine Marine Biogeographic Regions*. UP Marine Science Institute.

4. Alvero, R.G.Y. & Guevara, A.P. (eds.). (2019). *Tuklas Lunas® Protocols for Drug Discovery and Development*. Department of Science

SPECIAL CITATION

Villarin, J.R.T., Algo, J.L.C., Cinco, T.A., Cruz, F.A.T., de Guzman, R.G., Hilario, F.D., Narisma, G.T.T., Ortiz, A.M.D., Siringan, F.P., & Tibig, L.V. (2016). *2016 Philippine Climate Change Assessment: The Physical Basis*. Oscar M. Lopez Center for Climate Change Adaptation and Disaster Risk Management Foundation, Inc. and Climate Change Commission.

Cruz, R.V.O., Aliño, P.M., Cabrera, O.C., David, C.P.C., David, L.T., Lansigan, F.P., Lasco, R.D., Licuanan, W.Y., Lorenzo, F.M.T., Mamauag, S.S., Peñaflor, E.L., Perez, R.T., Pulhin, J.M., Rollon, R.N., Samson, M.S., Siringan, F.P., Tibig, L.V., Uy, N.M., & Villanoy, C.l. (2017). *2017 Philippine Climate Change Assessment: Impacts, Vulnerabilities and Adaptation*. Oscar M. Lopez Center for Climate Change Adaptation and Disaster Risk Management Foundation, Inc.

Buendia, L. V., Lasco, R. D., Biona, J. B. B., Badrina, R. B., Baviera, M. S., De Jesus, A. C., Dela Torre, D. M. G., Demafelis, R. B., Pulhin, F. B., Recabar, S. G., Ruzol, C. D., Tamayo, E. G. T., Tapia, M. A., Tongko-Magadia, B., Sabino, L. L., Sabino, N. G. (2018). *2018 Philippine Climate Change Assessment: Mitigation of Climate Change*. The Oscar M. Lopez Center for Climate Change Adaptation and Disaster Risk Management Foundation, Inc. and Climate Change Commission.

**Outstanding Scientific Papers Award**

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

1. Lantican, D. V., Cortaga, C. Q., Manohar, A. N. C., dela Cueva, F. M., and Sison, M. L. J. (2020). Resistance Gene Analogs of Mango: Insights on Molecular Defenses and Evolutionary Dynamics. *Philippine Journal of Science*, *149* (3-a), 915-934.

2. Sison, M L. J., Cortaga, C. Q., Barcos, A. K. S., Laurel, N. R., Mateo, J. M. C., dela Cueva, F. M. (2020). Resistance Screening and Influence of Fruit Physico-biochemical Properties of Carabao and Other Mango Varieties Against Oriental Fruit Fly, *Bactrocera dorsalis* (Diptera: Tephritidae), in the Philippines. *Philippine Journal of Science, 149*(4), 1175-1187.

3. Apurillo, C. C. S., Cai, L., and dela Cruz, T. E. E. (2019). Diversity and Bioactivities of Mangrove Fungal Endophytes from Leyte and Samar, Philippines. *Philippine Science Letters*, 12(Special Issue): 33-48.

4. Ragudo, G.P., Pureza, B.S., Rimando, D.A., Manrique, M.R., Ortin, T.S., Notarte, K.I., and Albano, P.M. (2020). *RAD51* 135G>C Single Nucleotide Polymorphism and Risk of Breast Cancer in Selected Filipino Cases. *Philippine Journal of Science*, 4(149): 1209-1215.

5. Jardeleza, J. M., Gotangco, C. K., and Guzman, M. A. L. (2019). Simulating National-scale Deforestation in the Philippines Using Land Cover Change Models. *Philippine Journal of Science, 148*(4), 597-608.

6. Egwolf, B. & Austriaco, N. (2020). Mobility-guided Modeling of the COVID-19 Pandemic in Metro Manila. *Philippine Journal of Science, 149*(3a): 857-868.

7. Shi, A.A., Concepcion, F.R., Laguinday, C.M.R., Ong Hian Huy, T.A.T., & Unite, A.A. (2020). An Analysis of the Effects of Foreign Ownership on the Level of Tax Avoidance Across Philippine Publicly Listed Firms. *DLSU Business & Economics Review, 30*(1): 1-14.

8. Bautista, R.A. (2019). Green Behavior and Generation: A Multi-Group Analysis Using Structural Equation Modeling. *Asia-Pacific Social Review, 19* (1): 1-16.

**Geminiano T. de Ocampo Visionary Award for Medical Research**

The award is given in memory and in honor of National Scientist Geminiano T. de Ocampo who excelled in his chosen field of medicine: ophthalmology. NS De Ocampo was a man of many firsts, a Visionary who created and realized the future of medicine in the country through his ground-breaking and pioneering efforts in clinical practice and in research, inspiring other doctors to pursue the same.

**CAMILO C. ROA, JR., MD**
**Pulmonary Medicine**
In recognition of his pioneering and translational research on the normative values of Lung Function Tests among Filipinos that allowed the measurement of the true prevalence of obstructive lung diseases in the country and the confirmation of clinically diagnosed COPD and Asthma in the clinics. Dr. Roa realized that published references in foreign textbooks cannot be appropriately used since lung growth and development is highly influenced by body morphometry, age, gender and race. Furthermore, the lung is highly sensitive to the environmental milieu like altitude and the prevalent level of noxious exposures from air pollution, cigarette smoking and biomass fuel smoke. Thus, with the right reference values, lung function testing provides the valid data that drive lung disease control advocacies and societal developmental planning. Dr. Roa successfully combined his academic experience, scientific knowledge, inventive skills, and transformational leadership to promote the use of the Filipino Lung Function Reference Values and created a cadre of young pulmonologists who will help him carry on this mission.

**NAST Award for Outstanding Research in Tropical Medicine**

The award is intended to recognize outstanding research works that contribute to the advancement of the country's knowledge and practice in Tropical Medicine.

**NELIA P. SALAZAR, Ph.D.**
**Microbiology**
In recognition of her pioneering contribution in the field of tropical medicine and public health. She is known for the discovery of *Capillaria philippinensis* sp.nov., a causative agent of the first reported case of human intestinal capillariasis in a patient with intractable diarrhea in 1963. She also led the establishment of the Department of Parasitology and Medical Entomology, and Malaria Study Group at the Research Institute for Tropical Medicine (RITM). She spearheaded the isolation and identification of Cryptosporidium organisms in the first reported AIDS patient in the Philippines, which resulted in the inclusion of this organism in the differential diagnosis of parasite-related diarrhea in immunocompromised patients and children less than 5 years old. She also conducted original studies on malaria, dengue, parasite-related diarrhea, soil-transmitted helminthiases and studies on herbal scabicides, and herbal antihelminthics.

**43rd ASM Best Scientific Posters**

After the screening done by the Scientific Posters Committee, there were 99 abstracts accepted for presentation: 13 for agricultural sciences, 7 for biological sciences, 22 for chemical, mathematical and physical sciences, 35 for engineering sciences, 8 for health/medical sciences, and 14 for social sciences. The following were selected as Best Scientific Posters:

*Agricultural Sciences*

ANGELO C GUIAM, CARL VINCENT D. GAPASIN, REIGNER D. GUTIERREZ, REYMARK P. MATALOG, MELVIN D. EBUENGA
"Development of SPIDTECH for Digital Identification and Remote Monitoring of Insect Pests and Plant Diseases of Major Crops in the Philippines"

MARK LEONARD S. SILARAS, EUGENE ABRIA, STEPHANIE FAITH RAVELO, JASON OCAMPO, MA LUNINGNING AMPARADO, MARIETTA ALBINA, AND LENI YAP-DEJETO
"Profiling of Phytoplankton and Harmful Microalgae in Eastern Visayas, Philippines"

*Biological Sciences*

ELDRIN DLR. ARGUELLES AND ARSENIA B. SAPIN
"Chemical Composition and In vitro Study of Antioxidant and Antibacterial Activities of Sargassum cristaefolium C. Agardh (Sargassaceae, Ochrophyta)"

*Mathematical and Physical Sciences*

JAYRAH BENA E. RIÑON, VICTORIA MAY P. MENDOZA, RENIER G. MENDOZA, AURELIO A. DELOS REYES V, VICENTE Y. BELIZARIO JR.
"A Mathematical Model and Optimal Control of Schistosomiasis in Agusan del Sur, Philippines"

NICK AARON A. RAYMUNDO, JENNIFER B. RICOHERMOSO, ROGELIO G. DIZON
"Coconut Fiber-Derived Multi-Layered Graphene for Thin Film Applications"

*Engineering Sciences and Technology*

JOEMER A. ADORNA JR, RUBY LYNN G. VENTURA, FIDEL REY P. NAYVE JR AND JEY-R S. VENTURA
"Synthesis of Polyhydroxybutyrate/Starch/Triethyl Citrate Filaments for 3D Printing Applications"

*Health Sciences*

MAE LEE T. TUMANENG, AGNES L. CASTILLO
"Modulation of Oxidative Stress and biological markers of Osteoarthritis by the Philippine Endemic Plant A. Elegans (C. Presl) K. Schum Leaf Extracts"

*Social Sciences*

ALCEL B. ATANACIO, ROSALY V. MANAOIS, RIZA G. ABILGOS-RAMOS
"Low Glycemic Index Rice and Rice-Based Products: Consumer Awareness, Knowledge, and Behavior"

# DEPARTMENT OF SCIENCE AND TECHNOLOGY (DOST) INSTITUTIONAL AWARDS

**National Science and Technology Week (NSTW) Awards**

The National Science and Technology Week (NSTW) is the 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 are the Gregorio Y. Zara Medal for outstanding technology commercialization, Eduardo A. Quisumbing Medal for outstanding basic research and development (R&D), Julian A. Banzon Medal for outstanding applied R&D, and Dioscoro L. Umali Medal for outstanding science administrator.

**Outstanding Technology Commercialization Award (Gregorio Y. Zara Medal)**

Francis Aldrine A. Uy, Ph.D. (Civil Engineering) - USHER Technologies
Mapúa University

**Outstanding Research and Development Award**

**Eduardo A. Quisumbing Medal for Basic Research**

Mary Beth B. Maningas and David Angelo V. Guanzon
University of Santo Tomas

**Julian A. Banzon Medal for Applied Research**

Arsenia B. Sapin, Dr. Rodney H. Perez, Fides Marciana Z. Tambalo, Arra Gaylon, and Maria Katrina N. Alaon
UPLB National Institutes of Molecular Biology and Biotechnology

**Outstanding Science Administrator Award (Dioscoro L. Umali Medal)**

Shirley C. Agrupis, Ph.D. (Agricultural Sciences)
Mariano Marcos State University

**DOST Intellectual Property Awards: International Publication Award and Utility Model Registration Award**

The DOST IPA aims to: (1) give incentives to DOST researchers and technology developers to encourage them to publish in international refereed journals; (2) register their developed technologies; and (3) boost the publication, patent and utility models output of DOST and its agencies. The award also supports the goal of DOST to institute measures to improve the performance of its Research and Development Institutes (RDIs) and monitor and evaluate their R&D results.

The NAST held a virtual awarding ceremony for the DOST IPA on 06 December 2021.

A total of 107 scientific publications received the International Publication Award (IPA), an increase of 8% from last year's number of recipients. The DOST-PNRI received the most number of publications award with 48, followed by DOST-FNRI and DOST-ITDI, 21, DOST-ASTI, 6, DOST-PAGASA, 5, DOST-PHIVOLCS and DOST-PTRI, 2, and DOST-SEI and DOST Region II, 1. Each awardee received a certificate of recognition and cash incentive, while the DOST-PNRI received a cash incentive of ₱50,000.00.

For the Granted Patent and Utility Model Registration Award, a total of 45 utility models were awarded, an increase of 144% from last year's number of recipients. The DOST-FNRI received the most number of award with 28, followed by DOST-ITDI, 12, DOST-FPRDI and DOST-MIRDC, 2, and DOST-PTRI, 1. will be awarded the Utility Model Registration Award, which came from the FNRI, FPRDI, ITDI, PTRI, and Metals Industry Research and Development Council (MIRDC). Each awardee received a certificate of recognition and cash incentive, while the DOST-FNRI received a cash incentive of ₱50,000.00.

**Magsaysay Future Engineers/Technologists (MFET) Award**

The Magsaysay Future Engineers/Technologists (MFET) 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.

For 2021, from among six (6) finalists, the recipients were:

First Place:

a. Darius Joseph R. Diamante, De La Salle University (DLSU) – "Analyzing the Black Nazarene Procession in Manila City"; and
b. Anne Gille P. Balmadrid, University of the Philippines Los Baños (UPLB) – "Prediction of Paddy Rice (Oryza sativa L.) Seed Quality Parameters Using Visible and Near-Infrared (VIS-NIR) Spectroscopy".

Third Place:

Chester Kenneth A. Andra, Mapua University – "Increased performance and antifouling of mixed-matrix membranes of cellulose acetate with hydrophilic nanoparticles of polydopamine-sulfobetaine methacrylate for oil-water separation".

All the winners received plaques of recognition and cash incentives.

## SCIENTIFIC CAREER SYSTEM

**Implemented by the Civil Service Commission and DOST**

The Scientific Career System (SCS) is a system of recruitment, career progression, recognition and reward of scientists in government service as means of developing a pool of highly qualified and productive scientific personnel. The newly-conferred and -upgraded scientists were the following:

Seven (7) scientists were newly-conferred under the SCS:

1. Dr. Gigi B. Calica, Career Scientist I from DA-Philippine Center for Postharvest Development and Mechanization (PhilMech)
2. Dr. Custer C. Deocaris, Career Scientist I from DOST-Philippine Nuclear Research Institute (PNRI)
3. Dr. Ester B. Flores, Career Scientist I from the DA-Philippine Carabao Center (PCC)
4. Dr. Lerma C. Ocampo, Career Scientist I from DA-PCC
5. Dr. Jessie O. Samaniego, Career Scientist I from DOST-PNRI
6. Dr. Vallerie Ann I. Samson, Career Scientist I from DOST-PNRI
7. Dr. Marcelino Q. Villafuerte II, Career Scientist I from DOST-Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA)

On the other hand, five (5) scientists were upgraded.

1. Dr. Dionisio G. Alvindia, Career Scientist IV from DA-PhilMech
2. Dr. Edwin C. Atabay, Career Scientist II from DA-PCC
3. Dr. Eufrocina P. Atabay, Career Scientist II from DA-PCC
4. Dr. Claro N. Mingala, Career Scientist IV from DA-PCC
5. Dr. Roel R. Suralta, Career Scientist III from DA-PhilRice

The newly-conferred and upgraded scientists took their oaths on 22 September 2021 via a virtual oath-taking ceremony led by CSC and SCC Chairperson Alicia dela Rosa-Bala.

# PROVISION OF BENEFITS FOR THE NATIONAL SCIENTISTS AND ACADEMICIANS

Aside from the recognition awards, the Academy also provides incentives, benefits, and privileges to Academicians and National Scientists.

Research Fellowship Grant
₱3,060,000.00

Publication Assistance
0

Monthly Gratuity
₱30,704,000.00

Travel Assistance
0

Medical Reimbursement
₱5,465,000.00

*For National Scientists only*

Monthly Gratuity
₱7,064,000.00

Death/Burial Assistance
₱619,000.00

Table 1. NAST members with Research Fellowship Grants for 2021

| RESEARCH FELLOW | DURATION | TITLE |
|---|---|---|
| Rhodora V. Azanza | January 1-31, 2021 | Science – Anchored Management of Philippine Marine Living Resources towards a Sustainable Philippine Blue Economy |
| Jose B. Cruz Jr. | January 1-31, 2021 | Shifting Philippine Transportation Energy Demand from Fossils to Electricity: Substantial Contributions to Sustainability Improvement |
| Edward H.M. Wang | January 1-31, 2021 | Addressing the Problem of Unplanned Excisions of Soft Tissue Sarcomas of the Extremities |
| Rody G. Sy | January - February 28, 2021 | Predictors of hypertension among Filipinos from the LIFECARE Philippine cohort |
| Mudjekeewis D. Santos | January to May 31, 2021 | Philippine Fisheries - Phase II |
| Filemon A. Uriarte Jr. | January to May 31, 2021 | The Pasig River Conundrum |

| | | |
|---|---|---|
| Ceferino P. Maala | January to June 30, 2021 | Researches on the Philippine Water Buffalo (Carabao) (*Bubalus bubalis* L.) - Phase II |
| Jaime C. Montoya | January to July 31, 2021 | Molecular Characterization of Drug Susceptible and Multi-Drug Resistant Mycobacterium tuberculosis among Filipino Patients derived from the National Tuberculosis Prevalence Survey Philippines 2016 |
| Antonio Miguel L. Dans | January to August 31, 2021 | Acceptability, Feasibility and Impact of UpToDate (UTD) use on Health Care Worker Knowledge from the Philippine Primary Care Studies |
| Eufemio T. Rasco Jr. | January to October 31, 2021 | Preparation of NAST Publications into a user-friendly online format (Kindle) |
| Reynaldo B. Vea | January - November 30, 2021 | A Lifelong Learning Framework for S&T in the Philippines |
| Edward H.M. Wang | April 1 to December 2021 | Establishment of the Prevalence of Soft Tissue Sarcoma at the University of the Philippines Manila - Philippine General Hospital |
| Allan Benedict I. Bernardo | May 1 to December 2021 | Exploring Predictors of Filipino Students' Cognitive Proficiencies in PISA 2018: The Roles of Non-Cognitive (Metacognitive, Motivational, School-focused Attitudes), Dispositional, and Linguistic Factors |
| Evelyn Mae Tecson-Mendoza | July 1 to December 2021 | Completion of NAST PHL Transaction Issue No. 2 from 2016 to 2020 |
| Fabian M. Dayrit | July 1 to December 2021 | Single-Use Plastic: Strategies and Policy Recommendations |
| Jose B. Cruz Jr. | August 1 to December 2021 | A Pivotal Restructuring of Modeling the Control of COVID-19 During and After Massive Vaccinations for the Next Few Years |
| Cristina J. Montiel | September 1 to December 30, 2021 | Two Versions of Community Vulnerability during a Pandemic: Comparing Facebook Posts of Metro Manila Mayors and their Followers |
| Eufemio T. Rasco Jr. | November 30 to December 31, 2021 | Preparation of NAST Publications into a user-friendly online format (Kindle) |
| Antonio Miguel L. Dans | November 1 to December 31, 2021 | Accessibility of Telemedicine Services in Urban, Rural, and Remote Settings |
| Rhodora V. Azanza | December 1 -31, 2021 | Hazards and Risks from Toxic Algal Blooms and Fish kills in major Aquaculture and Fisheries Sites in the Philippines in 2021 and Beyond |

| | | |
|---|---|---|
| Benito M. Pacheco | December 1 -31, 2021 | Futures of Disaster Risk Management |
| Reynaldo B. Vea | December 1 -31, 2021 | Digital Transformation and the Unbounding of the University |

# FORMULATION OF STI POLICY RESOLUTIONS

The NAST was able to craft 30 policy resolutions/recommendations, and science advisories on various topics.

## RESOLUTIONS FROM THE 43rd ANNUAL SCIENTIFIC MEETING (ASM)

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

43rd ANNUAL SCIENTIFIC MEETING
Theme: **"COVID-19 Pandemic: Learning from the Past, Coping with the Present, Moving to the Next"**
July 12-15, 2021

### RESOLUTIONS

WHEREAS, the outbreak of a new type of coronavirus, SARS-CoV-2, that causes the COVID-19 respiratory disease, was declared a global pandemic by the World Health Organization (WHO) on 11 March 2020;

WHEREAS, the global pandemic has affected all sectors and aspects of society, aggravated existing societal gaps and problems, and hampered national development;

WHEREAS, there is a need to build resilience against biological and environmental threats, and ensure that the food system is dedicated to improving the health and nutrition of consumers;

WHEREAS, a balanced approach to conservation and sustainable use of natural resources should be adopted because of its significant impact on the food system, biodiversity, natural products development, and prevention of transmission of zoonotic diseases;

WHEREAS, developing and modelling interventions that are supported by an adequate information infrastructure can provide important insights in the crafting of public health policy, and assessing the impact of biological and environmental hazards and threats;

WHEREAS, state-of-the-art laboratories in virology are indispensable in detecting the emergence of viral variants through genomic surveillance to guide the development of public health protocols and policies;

WHEREAS, the pandemic calls for a digital transformation of society, the adoption and development of information and communication technologies and practices that promote efficiency, continuity of work, and public safety;

WHEREAS, the pandemic has amplified the need to enhance the resilience of our educational system to ensure the continuity of learning using digital and other flexible learning approaches;

WHEREAS, there is urgency in accelerating economic recovery to avoid deeper economic scarring that further erodes the potential for long-term growth and development;

WHEREAS, there is a need to adopt a whole-of-government and whole-of-society approach on health issues and problems brought about by the pandemic in order to enhance an inter- and multi-disciplinary approach involving all sectors to promptly respond to the crisis, implement reforms and programs, instill preparedness, and promote national recovery and resilience;

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

** Lead Agency/ies*

## I. FOOD, ENVIRONMENT AND HEALTH

1. Department of Social Welfare and Development (DSWD)*, Department of Education (DepEd), Commission on Higher Education (CHED), Department of Health (DOH), Department of National Defense (DND), and Philippine National Police (PNP)
   Promote consumption of locally-produced plant-based healthy food, including functional foods to reduce environmental footprint, boost the local economy, and improve natural body defenses against infection through the use of a science-based diet, such as the planetary health diet:
   a. As guide for disaster relief and feeding programs;
   b. And food systems as the overarching guide in school feeding programs and curricular revisions; and
   c. As guide in formulating menus for camp canteens, hospitals, and combat food rations of the DND and PNP;

2. Department of Agriculture (DA)* and Department of Transportation (DOTr)
   Improve access to affordable and nutritious food, and establish a resilient local food system by providing facilities for storage, processing, packing, and logistics to service population centers, with emphasis on nutritious but highly perishable food products such as fish and other seafoods, fruits, and vegetables:
   a. Establish food terminals and/or agribusiness corridors;
   b. Improve farm to market roads, sea ports and airports to facilitate movement of food; and
   c. Harmonize policies and regulations on the marketing and movement of truckers and transporters of food commodities;

3. State Universities and Colleges (SUCs)*, DA*, Local Government Units (LGUs), Department of Environment and Natural Resources (DENR), and Land Bank of the Philippines
   Promote farm and aquaculture diversification using locally adapted and preferred foods such as root and tuber crops as alternative staple and seaweeds to support local farmers, healthy diets, and stewardship of the environment:
   a. Establish diversified demonstration farms and aquaculture projects;
   b. Prioritize diversified farms in credit programs; and
   c. Establish research programs to support farm and aquaculture diversification;

## II. VIRAL EVOLUTION AND MODELLING INTERVENTIONS

1. Department of Science and Technology (DOST)*, CHED, and Higher Education Institutions (HEIs)
   Implement modeling interventions, curricular and research programs.
   a. Expand efforts on the advancement and mainstreaming of data analytics and quantitative modeling through recruitment, training, mentoring, scholarships, research funds, and establishment of ethical standards;
   b. Develop curricular programs on viral evolution, strengthen training and mentorship, and provide research funds to advance virology, wildlife ecology, and conservation; and
   c. Integrate the study of infectious diseases and health system resilience research into the agenda of existing network of research centers and graduate programs;

2. Department of Information and Communications Technology (DICT)*, DOH, and National Privacy Commission (NPC)
   Use of the information advisory portals and COVID-19-related software:
   a. Strengthen the different pandemic and disaster information advisory portals to efficiently and effectively collect and disseminate relevant, reliable, accurate, and easily understood information (*e.g.* death, infection rate, record of vaccination, *etc.*) from the local or LGU-level; and

b. Convert COVID-19 related software applications to open source systems to foster public evaluation and scrutiny especially in terms of privacy and security;

3. DOH*, DOST, and DENR
   Strengthen the biosurveillance system to calibrate public health protocols and policies.
   a. Support a comprehensive genomic biosurveillance system covering all parts of the country to include detection of variants of concern, emerging variants of SARS-CoV-2 and real-time virus tracking and analysis;
   b. Support the participation of the Philippines in the World Health Organization (WHO) Global SARS-CoV-2 laboratory network that works on the surveillance, research on variants of concern, and evaluation of impacts on diagnostics, therapeutics, and vaccines; and
   c. Expand the Philippines Inter-Agency Committee on Zoonoses (PhilCZ) to include the DOST for zoonotic virus documentation and surveillance to strengthen national and transnational boundary cooperation within the Southeast Asian region to prevent illegal wildlife trade and monitor zoonotic viruses.

## III. DIGITAL ECOSYSTEMS AND STANDARDS TO ADDRESS PANDEMICS AND OTHER HAZARDS

1. National Economic and Development Authority (NEDA)*, Department of Trade and Industry (DTI), DICT, DOST, Department of Interior and Local Government (DILG), and LGUs
   Develop digitalized support systems for:
   a. Optimized allocation of resources and management of goods and services across LGU boundaries in times of pandemic and other crises;
   b. Real-time monitoring of pandemic-related data; and
   c. Adaptive response or feedback system-driven interventions to the COVID-19 pandemic to optimize limited resources;

2. Civil Service Commission (CSC)*, Department of Budget and Management (DBM), Department of Labor and Employment (DOLE), and DOST
   Push for the creation of plantilla items related to IT and other technology services to ensure continuity of government service during pandemics and other disasters and develop standardized tool/s to record, track, and monitor outputs of personnel in alternative work arrangements (AWAs), such as work-from-home (WFH).

3. Department of Public Works and Highways (DPWH)*, DOTr*, Department of Human Settlements and Urban Development (DHSUD), and DOST
   Strengthen support for green spaces and smart communities/regional planning.
   a. Update the regulations and standards for buildings, to include climate change adaptive design and construction methods, tools and materials, following an All-Hazards Approach in disaster risk reduction and management; and
   b. Build and rebuild transportation systems to encourage distancing and to provide adequate ventilation.

## IV. EDUCATION AND HUMAN RESOURCE DEVELOPMENT

1. DepEd*, CHED*, Technical Education and Skills Development Authority (TESDA)*, DOST, DICT, DBM, and the Legislature
   Accelerate innovation in education at all levels from Basic, Higher, and Voc-Tech.
   a. Strengthen ICT for the delivery of online education at all levels.
      i. Develop a nationwide ICT infrastructure, which includes geographically isolated and disadvantaged areas; and
      ii. Provide the needed devices for both faculty and students;

b. Enable the delivery of online education at all levels.
    i. Develop flexible online strategies, including blended learning, open-source materials, and video conferencing;
    ii. Remove legislative restrictions on education strategies, such as the spiral approach and allow schools to implement discipline-based programs that enable deeper and more focused student learning of scientific principles;
    iii. Decongest the curriculum and allow schools to select topics that promote depth of understanding and critical thinking;
    iv. Develop alternative systems for student counselling, emotional and mental health, student activities, and physical education; and
    v. Support faculty development to strengthen capability and effectiveness to teach online;

c. Ensure continued skills development in experimental and laboratory courses in science, agriculture, health, and engineering programs, thesis and dissertation work; and

d. Strengthen vocational and technical education to meet the increasing technological needs of a competitive workforce.

2. DBM*
Prioritize the allocation of funds for the acquisition of ICT facilities as well as operating costs needed for digital learning for both public and private schools;

## V. BALANCING THE ECONOMY AND HEALTH

1. DOH*, DILG, DBM, DOST, and NEDA
Strengthen the test-trace-treat systems and ramp up vaccination:
    a. Enhance the fairness or inclusiveness of access to tests, treatments, and vaccination across population groups and locations;
    b. Improve coordination between LGUs and relevant national government agencies in contact tracing, data reporting, and containment policies and guidelines;
    c. Provide fiscal and technical assistance to LGUs lacking capacity for contact-tracing and outbreak containment; and
    d. Develop and implement incentive schemes and communication strategies to address vaccine hesitancy.

2. NEDA*, DBM, Department of Finance (DOF), DTI, DOLE, DSWD, DILG, DICT, and DOST
Contain further economic scarring by rapidly implementing government assistance to the poor, most vulnerable groups, and high-contact industries:
    a. Strengthen the governance of economic aid, effectively making such aid well-targeted, transparent, fair, efficiently administered, and time-bound;
    b. Bridge the digital divide between the haves and the have-nots, expanding access to online schooling and work-from-home arrangements; and
    c. Ramp up retraining and reallocation programs to help address pandemic-induced jobs-skills mismatch;

3. NEDA-Philippine Statistics Authority (PSA)* and DBM
Fast track the rollout of the digital National Identification System to facilitate the implementation of social programs, such as the efficient transfer of amelioration funds to recipients

## VI. HEALTH SYSTEMS RESPONSE AND PREPAREDNESS

1. DOH*, Office of Civil Defense (OCD), DILG*, and LGUs
Design and provide capacity building programs for LGUs in the formulation of a comprehensive health emergency response, development, and preparedness plan for pandemics;

2. DSWD* and Inter-Agency Task Force for the Management of Emerging Infectious Diseases (IATF-EID)
   Institutionalize social protection systems (*e.g.* access to health care, sickness benefits, unemployment insurance *etc.*) for immediate and expeditious social assistance (*e.g.* cash transfer) as part of crisis response;

3. Office of the President*, DBM, and DOF
   Fast track the passage of the bill creating the Virology and Vaccine Institute of the Philippines and Centers for Disease Control and Prevention, and allocating funds for their establishment and operations;

4. DOH*, DICT, Presidential Communication Operation Office-Philippine Information Agency (PCOO-PIA), DILG, and LGUs
   Enhance health communications and referral system.
   a. Improve COVID-19 referral system and install communication infrastructure where people can easily access needed information, even at the barangay-level;
   b. Implement targeted public health information campaigns and promote active community participation; and
   c. Develop effective and socially sensitive communication strategies that build on Filipino culture and values to improve and sustain compliance and safety protocol, address vaccine hesitancy, and provide correct and accurate health information in the different media platforms.

5. DOH*
   Revisit and re-assess the devolved set-up of the health care delivery system building on its strengths and continually addressing gaps that have been made prominent by the COVID19 pandemic to make the health system better prepared for future pandemics and achieve Universal Health Care;

## VII. INFORMATION AND COMMUNICATIONS TECHNOLOGY

NEDA*, DICT, Philippine Competition Commission (PCC), and NPC

1. Accelerate improvement of the internet quality and make it equitable; *i.e.*, more affordable for everyone. Ensure that everyone has access to the internet during the pandemic.
   a. Ensure that government agencies, especially critical institutions in the fight against pandemics, have access to reliable and secure networks (cybersecurity). Government agencies must be considered as reliable areas for information access and transfer.
   b. Ensure that educational institutions (HEIs, research units) have access to reliable and secure networks. Teachers and Scientists must be able to rapidly get, communicate, and disseminate information.

2. Make public data open, freely available, and downloadable in user-friendly and digestible format, making them ready for analysis for health, food security, education, research and development, and data-driven policy.

3. Create plantilla items for Chief Information Officer of data-rich and critical government agencies. Create a department or committee of experts in data privacy and AI ethics who will serve as guardians; this will be composed of academics, ethicists, human rights lawyers, anthropologists, technologists, and industry experts to minimize abuse or misuse of data and AI algorithms especially during the pandemic.

**PAGTANAW 2050**

PAGTANAW 2050 is the first inter- and trans-disciplinal project on Philippine-focused STI foresight and strategic plans to harness science and technology as tools towards innovations in products, processes, and organizations to attain a preferred and united future considering our natural endowments as an archipelagic and maritime nation. As announced in September 2021, the development of the STI Foresight is also one of the DOST's Big 21 in 2021 or the 21 responsive and high-impact programs of the agency for the year.According to the European Foresight Platform, foresight is the application of "systematic, participatory, future intelligence gathering, and vision-building processes to inform present-day decisions and mobilize joint actions." In Filipino, foresight was aptly translated as "pagtanaw" which means "to look ahead" or "to watch from a high vantage point.

The foresight document was handed over to the DOST on 22 November 2021.

**STATEMENT ON THE RECLAMATION PROJECT IN FRONT OF DUMAGUETE**
This was forwarded to the Department of Environment and Natural Resources (DENR) and DOST on 15 October 2021.

**STATEMENT ON GENETICALLY MODIFIED ORGANISMS (GMOs)**
This was forwarded to the League of Municipalities and League of Cities on 06 December 2021.

**POSITION ON THE ANIMAL BIOTECHNOLOGY ACT**
This was forwarded to House of Representatives Committee on Science and Technology on 16 August 2021

**POSITION ON GENOMICS AND FORENSIC SCIENCE**
This was forwarded to the House of Representatives Committee on Science and Technology on 01 October 2021.

**SCIENCE ADVISORY ON AFRICAN SWINE FEVER**
This was forwarded to the Department of Agriculture, League of Municipalities, and League of Cities on 06 December 2021.

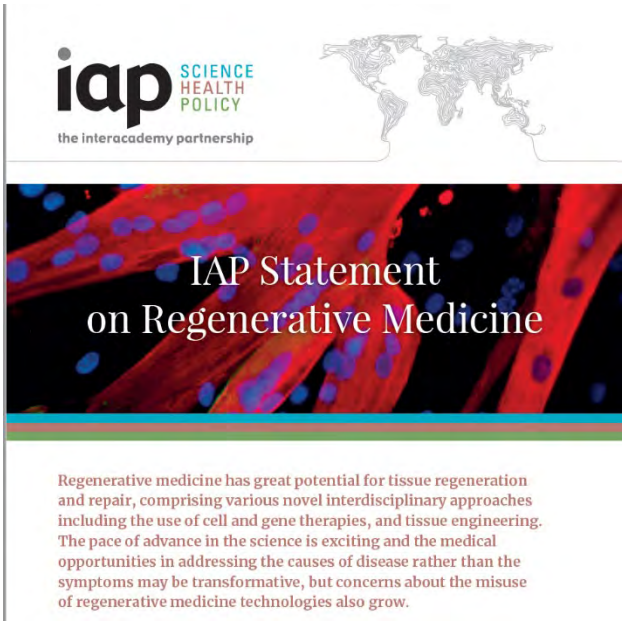
# MAXIMIZATION OF INTERNATIONAL SCIENTIFIC LINKAGES

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, for a, seminars, workshops, and similar scientific activities; and (4) publish and exchange scientific literature.

***Linkage with the InterAcademy Partnership (IAP)***

As a member academy of the IAP, the NAST endorsed three (3) IAP Statements:

1. Protection of Marine Environments;
2. Regenerative Medicine; and
3. Climate Change and Biodiversity




**2nd ASEAN Foresight Alliance Workshop**
**07-09 July 2021**

Acd. Rhodora V. Azanza, President, NAST Philippines welcomed the participants from the different ASEAN Member States. She emphasized that as ASEAN keeps up with the challenges brought by the Fourth Industrial Revolution, there is a need to learn from their effects and welcome the benefits of the science and technology in our work, lives, and congruence as member nations of the ASEAN community. In order to be prepared for what lies ahead, they should be agile and must anticipate the opportunities and threats that may arise through a common sustainable future. She mentioned that the event is very timely as NAST is finalizing the PAGTANAW 2050, a foresight project consisting also of strategic plans and roadmaps for the use of Philippine-focused science, technology, and innovation (STI) as vital inputs to policy development and serves as key influence to attaining the Filipino people's aspirations.

Professor Emerita Mazlan Othman, Chair, Board of Advisor of ASEAN Foresight Alliance, Academy of Sciences Malaysia, reiterated the objectives of the ASEAN Foresight Alliance such as introducing the foresight methodology as a tool to design ASEAN strategic planning and facilitate the ASEAN members in using evidence-based future planning and developing their individual national policies, strategies, and action plans. She also added that the Alliance wants to become a platform that connects all future planning into a big picture of ASEAN shared vision. Aside from the interesting topics, she shared that she was looking forward to the discussions of participants on selected key drivers on the breakout group sessions. Prof. Othman also emphasized that ASEAN should leverage on these activities and mitigate the risks brought by the changes in our environment.

Department of Science and Technology Philippines Secretary Fortunato T. de la Peña introduced that NAST Philippines has been mandated as the country's highest recognition body for the outstanding achievements related to science and technology in the country, engages in projects and programs designed to promote scientific productivity and science culture in the Philippines, and facilitate

collaboration and communication with international science academies. He mentioned the time he was invited by the Malaysian Ministry of Science, Technology and Innovation during the turnover of the Malaysian Foresight to their Prime Minister. He shared that he was very impressed by the way that the Ministry did their Foresight work involving all sectors of the Academy of Sciences Malaysia and turning their vision into the said Foresight document. He mentioned that when he returned to the country, he discussed with NAST Philippines to produce a similar project. He then announced that the NAST Philippines is currently printing the PAGTANAW 2050, which includes a compendium of STI megatrends, global and national goals, and transdisciplinary and interdisciplinary operational areas. Sec. de la Peña also congratulated the organizers and mentioned that the effort of putting up an ASEAN Foresight Alliance is a breakthrough for an ASEAN vision. He emphasized that he is one with the Alliance in hoping that the Workshop will provide new insights and learnings using the futures thinking and approach to achieve a common vision for the ASEAN community.

Mr. Rushdi Abdul Rahim, Senior Vice President, Malaysian Industry-Government Group for High Technology (MiGHT), provided the 2019 AFA Workshop Recap and the scene setting. In his talk, he emphasized that in the new normal, four skills should be improved namely futures literacy, systems thinking, anticipation, and strategic foresight. He mentioned that we should greatly pursue our desired scenarios but we should always be ready with the unintended consequences. Mr. Rahim also introduced the trends that will define post pandemic futures namely infection control (practice of hygiene, sanitation, and testing that continues past the crisis), remote work and commerce (not bound to geographical location to conduct business and commerce), improve resiliency (increase local self-reliance and rethinking supply chain), better agility (policies, practices, and processes that enable flexibility and adaptability), and macroeconomics impact (impacts of different scenarios on macroeconomic outcomes).

Mr. Rahim mentioned that the new normal will be depending on the following drivers of change: Health (pandemic containment), Economic (economic recovery), and Society (societal behavior). He also discussed the KISAH Futures, meant to tap into the young people's imagination as to what are their concerns, aspirations, and how they foresee Malaysia going to be post COVID 19. Among the common themes from KISAH Futures include social cohesion, community well-being, future of work, urban design, shared aspirations, and shared fears.

Dr. Rezal Khairi Ahmad, Chief Executive Officer, NanoMalaysia Berhad discussed the "Future Energy by 2050." He presented that the Future of Energy is now with Hydrogen. Hydrogen is a main alternative source of energy as it is safe, clean, and versatile. He also discussed the potentials, supply and demand, and the challenges in harnessing hydrogen energy. Dr. Ahmad also emphasized the need for the establishment of infrastructures and linkages for the emerging hydrogen energy among ASEAN countries for a collective utilization of the hydrogen energy especially the green hydrogen.

Acd. Guillermo Q. Tabios III, Member, NAST Philippines discussed the "Digital Ecosystem for Water Resources Systems." Acd. Tabios introduced the digital ecosystem, digital transformation, digitalization, and digitization for environment/water resources systems. Digital Ecosystem is defined as a complex distributed network or interconnected socio-technological system with adaptive properties of self-organization and scalability. A digital ecosystem will require a well-designed infrastructure to facilitate data exchange, processing, and visualization. He reiterated that a major requirement of the digital ecosystem is digital transformation. He also discussed the distinction among digital transformation, digitalization, and digitization such as follows:

- Digital transformation is a strategic change strategy for institutions, organizations, and communities that is expected to produce significant improvements in performance towards achieving their goals.
- Digitalization is the use of digital technologies and digitized data to result in deeper, core change on how work gets done, and how people engage and interact.
- Digitization is conversion from analog to digital which is an internal optimization of processes (e.g., work automation, paper minimization) and results in cost reduction.

He emphasized the big role of the digital ecosystem for sustainable water resources development by linking science to public policy and management decisions through the decision support systems (DSS). He also shared the applications of the digital ecosystem particularly in real-time flood forecasting and reservoir operations and integrated coastal management. Acd. Tabios also presented the use of emerging and disruptive technologies like artificial intelligence, virtual reality, quantum computing, big data analytics, etc. and their use in the management of water resources, sustainable agriculture and aquaculture, and with disaster risk reduction and climate change adaptation. Lastly, he shared that it is critical that digital transformation should be prioritized for the digital ecosystem to flourish and be applicable in the real world.

Mr. Lee Inn Beng, Director, Government Strategy and Engagement, Clarivate Analytics discussed the topic entitled, "ICT-Enabled, Data Driven Foresight Planning." He started by discussing how men and machines can work together in solving future problems by utilizing innovative foresight planning. He emphasized, however, that in order to achieve foresight planning innovation, collective efforts among stakeholders, data, and experts are greatly needed.

He also introduced the role of Clarivate in foresight planning by bridging the desired output of researchers and their targeted audience. He also presented how we should set priorities targeting high potential opportunities and global competitiveness; how to influence the research value chain; how to identify new research frontiers; and how we can adapt to the evolving direction of scientific fields. Mr. Lee shared where people can get funding and who to collaborate with. Lastly, he emphasized the importance of university and industry partnership in coming up with new knowledge and innovative research.

Dr. Liz Alexander, International Futures Consultant and Author, through her talk answered the question: What is Future Thinking? She shared that there is a misconception on futurists as they are thought of having a divination ability. Dr. Alexander emphasized that futures thinking is more of a shift from WHAT to think to HOW to think. futures thinking involves attention, imagination, and realization; not learning how to be prophetic but learning how to pay attention. She said that *who* and *what* we pay attention to is as important as paying attention.

Dr. Alexander also stressed that future science technology is inspired by imagination. Dr. Alexander added that people should pay more attention to history as it can potentially change the outcome (realization). Moreover, she emphasized that a future, in which stakeholders cannot see themselves, their constituents, or their children and grandchildren living, will always be just a theoretical empty future.

Dr. Marie Aubrey J. Villaceran, Deputy Director, UP Center for Women's and Gender Studies, discussed the role of Women in post-pandemic science, technology, engineering, and mathematics (STEM). Dr. Villaceran mentioned that the Philippines ranks 2$^{nd}$ in Asia in terms of gender equality, according to the 2020 World Economic Global Gap Report. There are progressive laws and policies supporting women such as Magna Carta for Women. However, despite these laws and policy support, gender inequality persists in STEM. Dr. Villaceran emphasized that societal and family biases against females perpetuate the gender inequality in the STEM field.

STEM education should be gender-responsive. Dr. Villaceran stated that women and girls should be encouraged to participate in programs promoting digital literacy, reskilling, upskilling, and lifelong learning for women and girls. There is a need to engage the community, including men and boys, in valuing the capacities, abilities, and contributions of women and in creating safe and welcoming spaces. Lastly, Dr. Villaceran mentioned that instead of discussing the "new normal," why not talk about "better normal," where women are more engaged and have more participation.

Prof. Fredolin Tangang, Chairperson, Department of Earth Sciences and Environment, Universiti Kebangsaan Malaysia and Coordinated Regional Downscaling Experiment (CORDEX) Southeast Asia Coordinator discussed the topic entitled, "Climate Change in Southeast Asia: Research Priorities in Enabling Adaptation." Prof. Tangang discussed the Intergovernmental Panel on Climate Change (IPCC) key scientific findings on climate change such as:

- For limiting warming under 1.5°C, annual emission should be around 25 – 30 GtCO2e by 2030 i.e., ~ 50% reduction of the current emission in just < 10 years period
- Under the Paris Agreement, by 2030, estimated world annual emission is between 52 – 58 GtCO2e; not sufficient to limit warming at 1.5°C.

Prof. Tangang emphasized that Southeast Asia is well exposed and highly vulnerable to climate-related hazards and disasters. According to CORDEX-SEA MODELS, the first climate projections in Southeast Asia that were based on high-resolution, multi-model regional climate downscaling, show the following:

- Generally, the projected increases of mean temperature are uniform throughout Southeast Asia
- Rainfall is projected to increase over some parts of mainland Southeast Asia but decrease over Indonesia
- Dryness/drought condition is projected to increase over Vietnam, Malaysia, and especially Indonesia and to become annual event in future warmer periods
- With extreme El Nino projected to become more frequent, extreme conditions are expected to be much worse than in current climate

Prof. Tangang also emphasized that many sectors could be impacted if the world fails to mitigate climate change. Level of exposure and vulnerability and risk of impacts are expected to increase if adaptation measures are not implemented. The National Adaptation Plan (NAP) must be based on a sound and robust scientific basis.

Prof. Abhimanyu Veerakumarasivam, Co-Chair, ASEAN Young Scientists Network (ASEAN YSN), discussed the topic "Future of Healthcare by Design: Trends, Technologies and Trust." He mentioned that in the context of Covid-19, signs and warnings have been seen. One good thing that came out of the pandemic is that science has been integrated in the language of the policy makers. As per Prof. Veerakumarasivam, another pandemic is the presence of the non-communicable diseases, whose prevalence is high. Obesity is another problem, with Brunei and Malaysia as having the greatest concern.

Part of his presentation includes health and technology. Among the technologies he mentioned are the *Internet of Medical Things (IOMT)*, an amalgamation of medical devices and applications that can connect to healthcare information technology systems using networking technologies; *Artificial Intelligence,* the use of machine learning algorithms and software to mimic human cognition in the analysis, presentation, and comprehension of complex medical and health care data; and *Quantum Computing* to diagnose and treat complex medical conditions with great efficacy.

Prof. Veerakumarasivam mentioned trends such as *Telehealth,* the provision of healthcare remotely using telecommunications technology; *Precision Medicine,* which involves the customization of healthcare with

medical decisions, treatments, or products being tailored to a subgroup of patients instead of a one drug fits all model; and *caring for aging populations* as ageing populations across the globe are intensifying the pressures on health systems and are demanding new directions in the delivery of healthcare. He also mentioned that there seems to be a crisis of trust as vaccine hesitancy remains a great hurdle.

Acd. Rodel Lasco, Member, NAST Philippines discussed, "Climate Change and ASEAN Common Vision." Acd. Lasco stated that the ASEAN region is one of the most climatically at-risk regions, from 2000-2019, in the world. Greenhouses are the chief causes of climate change. He also included that ASEAN mentions climate change as a significant regional challenge. He said that a resilient community with enhanced capacity and capability to adapt and respond to social and economic vulnerabilities, disasters, climate change as well as emerging threats and challenges are within the ASEAN Socio-Cultural Community.

Acd. Lasco also discussed the terms of adapting, building climate resilience, and action steps to be taken as a community of nations. He mentioned that we need to (1) build livelihoods, have (2) timely access to right information, (3) build collective action, (4) conserve and rehabilitate natural ecosystems, and (5) do pro-active adaptation. He emphasized that the ASEAN can also collaborate with the mitigation of climate change. He said that mitigation is all about reducing greenhouse gas emissions and reducing the greenhouse gas in our atmosphere. He included a list of what ASEAN can do to reduce GHG in the atmosphere: (1) reduce the consumption of fuel, paper, and water, (2) eat wisely, (3) reduce waste generation, and (4) restore and maintain forests. He focused on the areas of collaboration. He said that we can collaborate in terms of negotiations, the negotiations under the UNFCC or the UN Framework Convention on Climate Change. Acd. Lasco said that we can call upon parties to the UNFCC to promote and enhance the science on interlinkages between climate change, land and ocean, and strengthen existing efforts addressing linkages of those issues. He also added that we can also collaborate (1) in adaptation and resilience building, (2) in technology transfer, and (3) in scientific investigation. At the end of his talk, Acd. Lasco emphasized climate change as a key component of the ASEAN vision and many member countries are vulnerable to climate related risk but emphasized that collaboration will enhance climate resilience in the region.

Ms. Seema Parkash, Deputy Head of Centre for Strategic Futures, Strategy Group, Prime Minister's Office of Singapore, discussed the topic "Singapore's COVID-19 Foresight Journey." She mentioned that given the COVID-19 pandemic, there is a need to build foresight and futures thinking in influencing policy. She mentioned that her firm used horizon scanning by asking government officials about key trends as well as experts. She said that COVID-19 has produced massive shifts in the following operating environment: (1) changing global order, (2) economic uncertainty, (3) innovation in adversity, (4) changing society, and 4) changing governance. As per. Ms. Parkash, this requires challenging assumptions, prioritizing action, and generating new lines of inquiry and signposts.

In changing global order, she noted that COVID-19 accelerated existing trends or changed their directions: rivalries deepened, emerging markets were hit hard, and international institutions were under question. She also said that in economic uncertainty, reshaping supply chains move toward *precautionism* – toward self-reliance in some goods, digitalization will accelerate (create new winners and losers), "gig" employment – short term work, massive accumulation of debt. In innovation in adversity, Ms. Parkash said that online will not fully replace offline – there will be new types of processes (contactless), new technologies (drones in agriculture) to adopt, there will be division between knowledge workers from others, and cyber hygiene and cybersecurity. She also added that changing society will deepen socioeconomic inequalities and create new ones. On mental health, some populations will be more vulnerable than others (psychological trauma from health workers, and recovered COVID-19 patients).

Ms. Parkash also mentioned that changing governance will reshape relationships between governments, business, and citizens. It will necessitate quick action, relax regulatory vigilance (privacy, vaccine approval), lead to new policy ideas (universal income), trust in government (depending on performance), generate financial support, and dampen the effect on bottom-up social innovation.

Lastly, Dr. Rowena Cristina Guevara, ASEAN COSTI Chairman cum National COSTI Chairman-Philippines and Vice Minister/Undersecretary of the DOST Philippines, discussed the topic "ASEAN Science, Technology, and Innovation (STI) Cooperation on a Common Future." She started her discussion by explaining the mandate of the ASEAN Committee on Science, Technology and Innovation (COSTI), which is to promote active collaboration and provide assistance on matters of common interest in the economic, social, cultural, technical, scientific, and administrative fields that provide assistance to ASEAN members. She also noted that the ASEAN Plan of Action on Science, Technology and Innovation (APASTI) (2016-2025) has appropriate guidelines for the formulation of projects to strengthen STI capabilities within ASEAN, ranging from biotech to infrastructure. She said that the STI cooperation in ASEAN focuses on nine program areas: biotechnology, food science and technology, marine science and technology, materials science and technology, meteorology and geophysics, microelectronics and information technology, space technology and applications, sustainable energy research, and STI infrastructure and resources development.

She mentioned that within ASEAN, there is cross sectoral and cross pillar cooperation, which reflects supplementation rather than competition. Beyond the region, COSTI also cooperates with ASEAN Dialogue partners in identified areas such as STEM, ICT, Innovative start-ups, digital technologies, and disruptive technologies. Dr. Guevara also explained the 2017 ASEAN Declaration on Innovation, a document symbolizing the commitment of the 10 ASEAN Member States towards strengthening the impact of STI towards the people empowerment, inclusive growth, and strengthening of the ASEAN community. She also added that the declaration was crafted to (1) recognize the ongoing efforts in the implementation of the asset economic community for an easy blueprint 2025, (2) promote the involvement of specific elements in the ASEAN community such as the industry, the private sector in STI undertakings, especially in research and technology development and commercialization of technologies, and (3) provide emphasis that the STI cooperation in ASEAN remains relevant and supportive to the directives of the ASEAN leaders and STI ministers in ASEAN remains globally competitive and is on the move up to the technology ladder and focus on enhancing the region's capability for technological innovation.

She also mentioned that it is better to negotiate COSTI's relations with ASEAN governments and ASEAN's dialogue partners (through the annual COSTI meeting). An ASEAN Innovation Roadmap 2019-2025 under Thailand's ASEAN Chairmanship is the newest guiding framework for STI cooperation. She said that the roadmap was crafted to provide the framework and platform to implement the declaration, and it is intended to act as guide to introduce the collective future that we want to create. Finally, Dr. Guevara noted that the ASEAN plays a vital role in the international fora and advancing Asia's common interests. She said that they envision ASEAN to having an intensified relationship with its dialogue partners and other regional organizations, based on equal partnership and mutual respect.

# MANAGEMENT OF THE PHILIPPINE SCIENCE HERITAGE CENTER (PSHC)

The Philippine Science Heritage Center (PSHC), under the management of the National Academy of Science and Technology, was established in 1998 to honor Filipino scientists and their contributions to the world of science. Republic Act 9107 of 2001, or the Philippine Science Heritage Center Act, mandated the NAST PHL 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. It was envisioned to be the lasting tribute to numerous Filipino scientists and technologists who have unselfishly devoted their lives for the betterment of the country.

# ACTIVITIES

The NAST conducted 45 activities in the form of webinars, policy fora, information fora, paper presentations, etc. on various topics.

**Digital Transformation and Digital Ecosystems**
**11 January 2021**

To officially launch the webinar series on Digital Transformation and Digital Ecosystems with the theme "Building Digital Enterprise Ecosystems and Platforms to fast-track Philippine Digital Transformation", the Engineering Sciences and Technology Division (ESTD) conducted a webinar on 11 January 2021 via Zoom and Facebook Live.

The webinar focused on four main objectives: 1) explain the concept of Digital Transformation (DT); 2) discuss the benefits, risks, and other implications of DT in the socio-economic and cultural context of the Philippines; 3) discuss how DT can affect and be utilized in sectors such as shelter and transportation, environmental systems, energy, manufacturing and industry, education; and 4) explain Digital Enterprise Ecosystems (DEE) and the Digital Platforms (DP) upon which such DEEs operate.

Among the major recommendations that arouse from the discussions are to recognize that the need for digital value is greater now than their barriers in the past; support and improve the quality for the IT infrastructure in the Philippines; provide trainings for technology adaptation and digital transformation; increase interaction, dynamicity, and global dynamic business networks; utilize digital transformation towards sustainable ecosystems; and innovate new ways in adapting to digital transformation and ecosystems to mitigate learning losses.

**Commercially-caught Freshwater Fishes in the Philippines: Status, Issues, and Recommendations**
**15 January 2021**

With the decreasing catch in marine municipal fisheries in the Philippines, the increasing production trend of inland municipal fisheries (those fish, mollusks, and crustaceans in our inland waters such as lakes, rivers, swamps, and reservoirs) contributed to the fish food requirement of the growing population in the Philippines.

The webinar assessed the status of commercially-caught freshwater fishes in the Philippines; identified the main issues threatening the sustainability of the major commercially-caught freshwater fishes; and recommended appropriate actions and/or measures for the conservation of commercially-caught freshwater fishes. It was emphasized that overfishing, water pollution, invasive fishes, and environmental degradation were the major issues threatening the sustainability of commercially-caught freshwater fish species in the country.

To address the issues the identified issues, the following recommendations were raised: banning illegal fishing activities, providing alternative livelihood to fishermen, captive breeding and assisted colonization of freshwater fish species, increasing the capability of local government units (LGUs) and other concerned stakeholders on species identification, disease detection, risk assessment, monitoring, and awareness campaign, and more importantly, encouraging LGUs to implement relevant provision on freshwater fisheries conservation under NIPAS Act RA7586 of 1992 amended as E-NIPAS RA 11038 of 2018 and

National Wetlands Action Plan (NWAP) for the Philippines to promote and implement strategies for the conservation and wise use of its wetlands, incorporating urgent concerns such as biodiversity conservation and climate change mitigation and adaptation.

**Addressing the Challenges of Climate Change on Food and Nutrition Security and Health**
**21 May 2021**

The webinar series aims to (1) determine the vulnerability of the Philippine development as climate change risks interact with other stressors like the COVID-19 pandemic; (2) identify key strategies to "build back better" from the ruins of the COVID-19 pandemic while simultaneously addressing the impacts of climate variability and extreme events; (3) harness the potentials of science, technology and innovations (STI) to put the Philippines into the pathways of climate-resilient and sustainable development considering the multiple stressors we face under the new normal; and (4) recommend measures to strengthen policies and governance systems to realize a climate-resilient and sustainable development in the Philippines. The webinar was attended by 503 participants in Zoom and has reached 840 engagements and 1,700 views from Facebook live.

Dr. Gundran emphasized that the Philippines has consistently ranked in the top 5 in terms of the frequency of natural disasters and that projected changes in climate patterns affect every aspect of human life. The impact of future changes in climate extremes will fall disproportionately on the poor and vulnerable. He enumerated the effects of climate change in health such as water and foodborne diseases, respiratory diseases, heat-related illnesses, and the effects on mental health. Dr. Gundran reiterated his action points for the citizens including reducing greenhouse gases by planting trees and maintaining a low-carbon footprint lifestyle, preventing the transmission of diseases by adhering to good hygiene practices, and lastly, improving household sanitation and a proper waste management system.

Dr. Cabral reacted to Dr. Gundran's presentation. She pointed out that climate change is a public health emergency because of its direct effect on human health and its threat to the stability of healthcare systems. She added that diseases resulting from water, soil, and air pollution are the leading causes of death and disability in the world. She highlighted that air pollution is the major environmental risk to health contributing to an estimate of over 2 million deaths in the Western Pacific region and over 7 million globally. Dr. Cabral stated that vulnerability to climate change is unevenly distributed among individuals. While climate change affects human health, human activities, particularly health practices, are major drivers of climate change and the loss of the ecosystem's integrity. Dr. Cabral appeals to health leaders to develop a more global vision of our environmental health. She concluded with the statement "the planet is our patient too" – the health sector must bond together to address the climate crisis and protect the people.

Acd. Gregorio presented the effect of climate change on food security. He emphasized that climate change excludes no one and this directly affects food security and therefore, everyone must participate in addressing climate change. For the call to action, Acd. Gregorio proposed a transformation in the agricultural food system by starting to rethink what is food security. Climate change and the COVID-19 pandemic highlight the importance of how food security is defined and serve as a basis on how actions should be designed to achieve transformation in the food systems. Sowing seeds of curiosity is also an important activity, especially for the youth. Acd. Gregorio added that there is a need to support the linkage between the academe, the students, the faculty and universities to the industries, the government and the people to operationalize the interconnectivity between the nodes of the value chain. His key points include (1) contend with climate change in our food systems, (2) transform rice farms to be more climate change resilient, and (3) treat agriculture as business and industry and transform farmers to become "trans-farmers".

Dr. Estuar delivered her reaction for Acd. Gregorio's talk. Dr. Estuar stressed the need for urgency in addressing food security by thinking and planning. She reiterated how climate change can impact food security and mentioned food waste as one of the challenges. Inclusivity, accessibility, and interconnectivity are key factors in transforming the current food system. Outsmarting climate change requires thinking and looking at food systems composed of several systems from production to consumption. Dr. Estuar emphasized the need to rethink farming and engage the youth.

Dr. Amarra presented about how environmental stressors and climate change influence nutrition primarily through changes in the gut microbiota and how nutrition can be used to mitigate the stress inflicted by the environment and climate change. She presented research findings wherein warming temperatures promoted gut dysbiosis among tadpoles and mediated through biotic community interactions resulting in stunted tadpole growth. In a study involving livestock, results showed that changes in ecosystems due to climate change can cause an increase in transmission of pathogens and changes in the human microbial ecosystem. According to Dr. Amarra, an unhealthy diet contributes to gut dysbiosis. The high intake of dietary sugar causes an increase in *Proteobacteria* while simultaneously decreasing the amount of *Bacteroidetes,* which promotes intestinal inflammation and compromised epithelial integrity. Consumption of red meat and preservatives cause a reduction in butyrate metabolism in colonocytes and is significantly associated with greater risk for diabetes, high cholesterol, low HDL, and high TG. Artificial sweeteners are also recognized as environmental contaminants. Dr. Amarra suggested increasing the intake of non-digestible carbohydrates from fruits and vegetables, reducing the intake of sugar, artificial sweeteners, sugar-sweetened foods and processed foods, and making natural and minimally processed foods the basis of everyone's diet.

Dr. Zamora cited that many studies have been done to help manage patients with altered gut microbes. Dr. Zamora also mentioned the association of climate change with COVID-19 as disturbances in the gut microbiota, which exacerbates the severity of the cytokine storm. She highlighted action points that will help citizens understand the impacts of climate change and ended her reaction by encouraging people to do something to reverse these effects.

*Figure 7. Top [L to R]: Ms. Karen Davila (moderator), Academician Glenn B. Gregorio, and Dr. Carlos Primero D. Gundran Bottom [L to R]: Dr. Maria Sofia V. Amarra, Dr. Ma. Regina Justina E. Estuar, and Dr. Geraldine T. Zamora during the open forum*

Various topics were raised during the open forum such as the issue on the need for proper hospital waste management, modernization of farming and how to transform farmers, the impact of climate change on mental health, challenges in the implementation of environmental laws and regulations and the lack of education and awareness of the people.

**National Substance Use Science Policy and Information Forum Substance Use in the Philippines: Governance, Research, and Practice**
**15 June 2021**

The national forum aims to present existing evidence on health-centered effective strategies and interventions while employing human rights-based approaches and facilitate the inputs of various scientific disciplines in creating a five-year research agenda. Evidence-based policy recommendations for national and local policymakers will also be presented during the forum.

After the launch of the country's "war on drugs" in 2016, there have been calls for reform to address critical institutional gaps and harmonize policies. Various groups and stakeholders have also begun acting independently and implemented their own programs and/or conducted research. Likewise, new modalities of community-based rehabilitation programs were also implemented throughout the country. As a result of these multiple streams of independent activities, the ecosystem responding to the substance use problem has become fragmented.

Substance use is a complicated issue that can be viewed under the lens of public order and public health perspective with the latter focusing on the needs of Persons Who Use Drugs (PWUDs). Furthermore, the drug recovery journey from prevention, identification, treatment, management, and, finally, aftercare and reintegration require coordination from multiple government agencies and civil society organizations and other sectors. Policy development should also take account of the development of clinical dependence among some PWUDs, the motivations for drug use, and the effects of drug use within a community.

Prior to the main conference, five pre-conference webinars were organized by the ACDP, a consortium of universities, professional organizations, and NGOs which advocate for an evidence- and science-based approach to drug treatment, rehabilitation, and drug policy. Teams of experts from various ACDP partner institutions and organizations facilitated the conduct of survey and review of literature and policy implications, identification of research gaps, and preparation of policy briefs.

Highlights and recommendations on the five topic areas – (1) key issues on substance use in the Philippines, (2) public health dimension of substance use, (3) support systems for PWUDs, (4) the bio-psychological and socio-anthropological perspectives of substance use, and (5) public health policy and interventions will be presented in the virtual conference. A harmonized research agenda and policy framework on substance use is also envisioned to be achieved at the end of the national forum.

At the helm of organizing the conference are Academician Carmencita D. Padilla, NAST focal person on substance use and Chancellor of UP Manila; Dr. Armando Crisostomo, UP Manila Vice-Chancellor for Research; and Dr. Elmer Soriano, Civika Asian Development Academy Managing Director. Dr. Crisostomo, also the conference chair, and Dr. Soriano are the co-convenors of the ACDP. Meanwhile, Mr. Olivier Lermet of the United Nations Office on Drugs and Crime (UNODC) will give the forum's keynote address.

Expected to attend the conference are more than 2000 participants representing the academe (faculty and students), public health advocates, health researchers, national government agencies, non-government

organizations, professional organizations, and, significantly, national and local policymakers who may be guided and advised on crafting legislation and policy that is science- and evidence- based.

The national forum on substance use is also held in observance of the International Day Against Drug Abuse and Illicit Trafficking (IDADAIT) on June 26, which aims to raise awareness and strengthen action and cooperation to achieve the goal of an international society free of drug abuse. With the theme "Share Facts on Drugs. Save Lives.," IDADAIT 2021 stresses the importance of awareness and factual information on drugs and their dangers, and the value of evidence-based prevention, treatment, and care.

**Colloquium on Direct Impacts of Seabed Quarrying and Ore Mining**
**8 November 2021**

Experts in science, fisherfolk, and civil society groups demand accountability from the concerned national and local governments and called on the Senate for investigation as massive seabed quarrying projects continue to threaten coastal and marine habitats including fisheries resources nationwide.

"Seabed quarrying requires scraping of the seabed for filling materials needed for dump-and-fill also known as reclamation projects. The science is clear that seabed quarrying and ore mining cause massive damages and losses in fishing grounds that serve as sources of livelihood for subsistence fisherfolk, not to mention the irreversible destruction these will cause on the fragile marine ecosystems that we are trying to safeguard and restore in order to be resilient against climate change. The government should immediately stop these projects before it is too late," said Atty. Gloria Estenzo Ramos, Oceana Vice President.

Executive Order (EO) 130 that was signed by President Rodrigo Duterte in April 2021, lifted the ban on mineral agreements in the country.

Seabed quarrying and ore mining activities are underway in Limay in Bataan, Cavite, Tayabas Bay, Lingayen Gulf, and Cagayan while land-reclamation or dump-and-fill projects, are also in the pipeline for Sogod Bay, Cancabato Bay, and La Union.

In Limay, Bataan, PANGISDA Pilipinas leader Pablo Rosales lamented the degradation the activity is causing on the marine environment on which they rely heavily for income. "*Itong pag-istorbong ginagawa sa ilalim ng dagat kung saan nakatira ang mga isda at iba pang lamang-dagat ay nakakaapekto sa kabuhayan naming mga mangingisda. Dito sa Bataan kung saan ginagawa ang mapaminsalang seabed quarry, pinangangambahan namin ang magiging dagok nito sa aming ikinabubuhay. Sana naman isipin rin ng gobyerno kaming mga mangingisdang naghahatid ng pagkain sa mga komunidad.*"

(The destruction caused by seabed quarrying affects not only marine life but also the livelihood of fisherfolk. Those of us based in Bataan fear the impact of the planned seabed quarrying project in the area. We call on the government to care for our fisherfolk who bring food to coastal communities.)

Rosales is referring to the seabed quarrying project of Cargon Mining Corporation whose project description revealed that to hasten the verification of offshore mineral resources, the company secured an authority to explore ahead of the Government Seabed Quarry Permit (GSQP). By doing so, it sidestepped conducting a full-blown environmental impact assessment (EIA), an ecological profile of the proposed mining area, and prior consultation with local government units (LGUs), non-government organizations, people's organizations, and the affected communities before conducting exploration of the site, as so required by various national laws.

"The government gave approval to these seabed quarrying projects despite the acknowledged biological effects like losses of marine resources, and will result in domestic wastewater, and solid waste and hazardous wastes. These run against Philippine laws which aim for food security, protecting the rights of small-scale fishers and coastal communities, and establishment of the country's science-based Fisheries Management Area (FMA) system," said Ramos.

In the case of seabed quarrying projects in Manila Bay, Oceana pointed out how these go against a landmark 2008 Supreme Court mandamus ruling which directed concerned government agencies to clean up, rehabilitate, and preserve the bay pursuant to their respective mandates. The Department of Environment and Natural Resources (DENR) is one of the mandated agencies tasked to implement this and restore Manila Bay waters to Class SB which would render it safe for recreational activities and fisheries.

A 2018 study on the impacts of seabed mineral extraction revealed that seafloor habitats will not recover for decades following disturbance, causing more chronic impacts to the marine environment.

Coral reefs, seagrass beds and soft bottom ecosystems have been identified as those most vulnerable to these projects. One of the major impacts of substrate extraction is the change in the seabed morphology which causes the loss of endemic organisms found in the seafloor substrate. The use of hydraulic dredgers trigger water pollution and causes the unintentional removal or burying of marine organisms found on the seabed.

Meanwhile, another study in 2018 discussed how deep-sea mining can cause nutrification, sedimentation and siltation that can smother coral reefs and filter-feeding organisms. It also has a negative impact on megafauna like whales, dolphins, and sea turtles as well as on photosynthetic organisms like phytoplankton.

The Philippine Mining Act is clear that offshore government mineral reservations do not allow any mineral agreement applications, including large-scale financial of technical agreements (FTAAs) as these are critical to preserve minerals for critical industries and for scientific, cultural, or ecological value. This cannot be supplanted by Executive Order No. 153 (1999) which authorizes the government to utilize offshore areas not covered by approved mining permits/contracts, including areas covered by pending mining applications, as borrow areas for dredged fill materials for existing and future government reclamation projects.

Meanwhile, the Fisheries Code as amended by RA 10654 prohibits activities that damage coral reefs; cause aquatic pollution; obstruct the navigation or flow in any stream, river, lake, or bay; or obstruct defined migration paths. Aside from the national agencies such as the Bureau of Fisheries and Aquatic Resources (BFAR), local government units (LGUs) are also tasked with the protection of fisheries and aquatic resources, specifically for municipal waters.

On Monday, November 8, Oceana and the National Academy of Science and Technology, Philippines (NAST PHL) are convening the *National Colloquium on Direct Impacts of Seabed Quarrying and Ore Mining* following the reported influx of new mining projects in coastal and marine areas.

Representatives of fisherfolk and communities affected by seabed quarrying projects in Limay, Bataan; Lingayen Gulf in Pangasinan; and Tayabas Bay in Quezon will speak in the science colloquium on November 8. The other speakers are Academician Rhodora Azanza, NAST PHL; Academician Fernando Siringan of the University of the Philippines Marine Science Institute; Dr. Rico Ancog, Dean of the University of the Philippines Los Baños School of Environmental Science and Management; and Atty. Liza Osorio, Oceana's Legal and Policy Director. (*Press Release from OCEANA)*

**Coastal and Marine Spatial Planning**
**8-12 November 2021**

The National Academy of Science and Technology, Philippines (NAST PHL) and Department of Environment and Natural Resources - Biodiversity Management Bureau (DENR-BMB) organized a five-day training-workshop on Coastal and Marine Spatial Planning (CMSP). The training is divided into two parts. The first part is a two-day lecture series on the concepts on CMSP and a three-day workshop for participants of Central Luzon, National Capital Region, and CALABARZON on CMSP.

The first day started with a discussion on "Why do we need CMSP in the Philippines?" discussed by Mr. John Erick Avelino of DENR-BMB to provide rationale and context of the training-workshop. Resource speakers then followed to discuss concepts on CMSP necessary for the training-workshop. Dr. Bill D. Dennison of the University of Maryland tackled "Planning and Managing Coasts and Marine Spaces, National Scientist Lourdes J. Cruz talked about "Future Earth Philippines and Present Concerns in CMSP" followed by the President of NAST PHL, Acd. Rhodora V. Azanza, who discussed the "Blue Economy Platform: UNESCO Global CMSP". On ecosystems management, Acd. Marie Antonette Juinio-Meñez gave a lecture on "Ecosystem Management: Large Marine Ecosystems (LMEs)/Highlands to Oceans". To complement the topic on ecosystems management, Dr. Laura T. David of UP Marine Science Institute (UP MSI) delivered a talk on "Climate Change Impacts on Marine Environments". The first day ended with a discussion on "Manila Bay Reclamation Plan" by Atty. Joseph John Literal of Philippine Reclamation Authority.

For the second day, the topics revolved around international and local case studies of CMSP and Manila Bay. Dr. Vanessa Vargas-Nguyen of the University of Maryland started day two with a discussion on "Stakeholders Engagement in CMSP". Then, Dr. Bill D. Dennison discussed a CMSP case study from USA followed by Mr. Luis A. Awitan of Provincial Government Environment and Natural Resources Office (PGENRO), Batangas presentation on "Balayan Bay's Integrated Coastal and Marine Spatial Use Plan (ICMSUP)". Ms. Criselda Castor of DENR-BMB also discussed "Marine Protected Areas in the Philippines". For topics on Manila Bay, Engr. Joyce Marie M. Yu of DENR - Manila Bay Coordinating Office (DENR-MBCO) tackled the "Manila Bay Rehabilitation Plan Briefer". To further give a deeper understanding of Manila Bay, Acd. Cesar L. Villanoy and Dr. Gil S. Jacinto of UP MSI discussed Manila Bay Physical and Chemical Oceanography respectively. Acd. Mudjekeewis D. Santos also tackled Manila Bay Fisheries and Aquaculture followed by Dr. Rene R. Rollon of UP Institute of Environmental Science and Meteorology who delivered a talk on Manila Bay Mangroves and Seagrasses. The second day ended with a discussion on "Manila Bay Sustainable Development Master Plan" by Asec. Roderick Planta of National Economic and Development Authority.

The second-part of the CMSP training-workshop was the three-day workshop proper attended by participants from Central Luzon, National Capital Region, CALABARZON, and other relevant stakeholders. The facilitators for the workshop were Dr. Bill D. Dennison, Dr. Vanessa Vargas-Nguyen, Ms. Kelly Dobroski of University of Maryland, and Dr. Charissa M. Ferrera of UP MSI.

To kick-off the first day of the workshop, the values and threats of Manila Bay were identified followed by determining stakeholders based on level of interest and influence. Then, a breakout session into three different regions followed to map out the current values and threats on Manila Bay as well as to map out the stakeholders. Maps and priorities were compared during the presentation of output after the breakout session. A homework on Theory of Change for Manila Bay was handed to the participants in preparation for the next day's workshop.

For the second day of the workshop, Dr. Bill D. Dennison discussed stakeholder mapping, report cards on Chesapeake Bay, Mississippi River, Chico River and other rivers, and theory of change. A breakout

session per region followed to determine the priorities, short-term and long-term goals for Manila Bay. The participants also discussed their regional vision for Manila Bay. To wrap-up the second day of the workshop, Dr. Bill D. Dennison provided a synthesis of regional vision and developed a holistic vision.

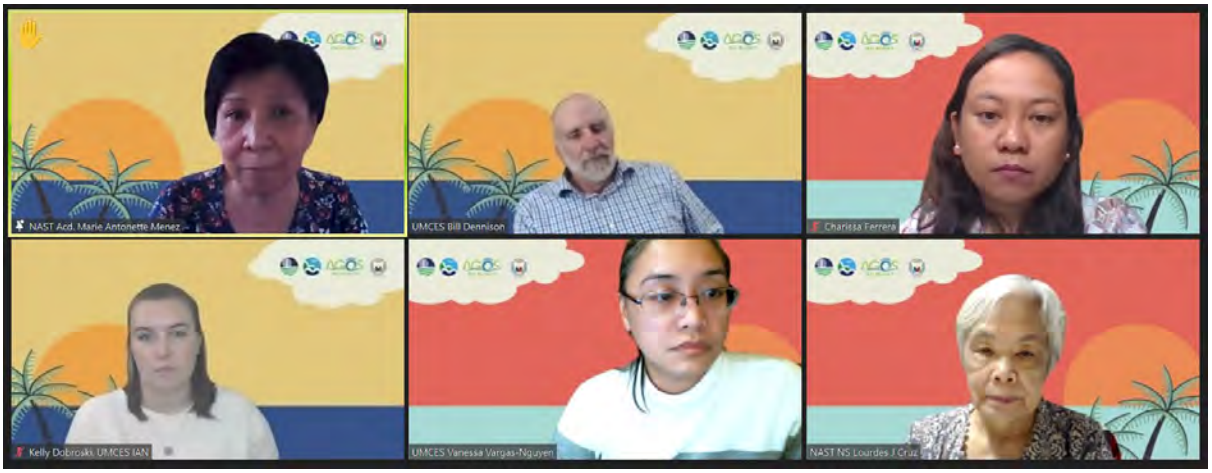



*Figure X. NAST Members providing feedback on the CMSP Training-workshop (Top row L-R) Acd. Marie Antonette Juinio-Meñez, Dr. Bill D. Dennison, Dr. Charissa M. Ferrera, (Bottom row L-R) Ms. Kelly Dobroski, Dr. Vargas, Nguyen, and NS Lourdes J. Cruz.*

The last day of the workshop started with a recap by NAST Facilitators. Then, the facilitators presented the Final Workshop Output to which the resource speakers gave feedback and comments. Mr. Grick Cordero of DENR-BMB gave the final instructions and ways forward for CMSP. Ms. Nilda S. Balin of DENR-BMB discussed the draft Executive Order on the Manila Bay CMSP Technical Working Group. To show appreciation for the resource speakers and facilitators, certificates were awarded for sharing their expertise and time for the training-workshop. To formally close the event, Ms. Armida P. Andres of DENR-BMB delivered the closing remarks.

**Science Policy and Information Forum on Understanding Risk Factor for Cardiovascular Disease**
**02 December 2021**

The Science Policy and Information Forum on Understanding Risk Factors for Cardiovascular Disease aimed to (1) present updated information on Cardiovascular Disease (CVD) epidemiology, modifiable risk factors, simple prevention strategies, and current population-level interventions; (2) review the role of salt on hypertension, fats on heart disease, and excessive caloric intake on diabetes; and (3) provide recommendations to address policy gaps on CVD prevention and improve the implementation of current interventions.

Acd. Rody Sy tackled the epidemiology of cardiovascular diseases in the Philippines and Southeast Asia. He noted that cardiovascular disease remains the leading cause of mortality in the country while there is an upward trend in the prevalence of diabetes, obesity, and hypercholesterolemia in contrast to the decreasing trend observed in other Southeast Asian nations.

*Figure X. Panelists for the SPIF on Understanding Risk Factors for Cardiovascular Disease. First Row (L to R): Acd. Camilo Roa, Jr. (moderator), Dr. Cecilia Jimeno, and Dr. Lourdes Ella Santos. Second Row (L to R): Dr. Debora Ignacia Ona, Dr. Marivic Samson (representing Dr. Azucena Dayanghirang),and Dr. Alfonso Miguel Regala. Third Row: Dr. Imelda Angeles-Agdeppa and Acd. Rody Sy*

Dr. Ona discussed the role of high salt intake in elevated blood pressure, which is also a leading risk factor for death and disability. She noted that hypertension is not only prevalent, but also has a large impact on health resources. She recommended that there is a need for interventions such as population-based salt reduction programs to reduce salt intake in our country, since they have been shown to be effective in reducing blood pressures which have high impact in clinical outcomes. Some also recommended measuring and monitoring salt intake among Filipinos, re-formulating identified processed foods that contribute to salt intake, and implementing multi-sectoral national strategies.

Dr. Santos then reviewed the impact of dietary and lifestyle modifications on various components of cholesterol for cardiovascular risk reduction. These include achieving target levels for cholesterol and the underlying mechanisms for interventions to influence atherosclerosis. Simple lifestyle modification can improve our cholesterol profile, such as reducing intake of sweets and trans-fat, increasing intake of good cholesterol such as fatty fish, exercise, and smoking cessation to reduce triglycerides, increase HDL, and reduce LDL cholesterol. At present, DOH has a national policy on Trans-Fat Elimination and a program called "Pinggang Pinoy" to address these issues. By presenting practical options for healthier choices, it aims to help in policy making for dyslipidemia management for adult Filipinos.

Dr. Jimeno touched on Type 2 diabetes mellitus which is prevalent in our country as documented in the National Nutrition Survey, but prevalence of pre-diabetes is much more, which opens a window of opportunity for us to prevent diabetes. Dr. Jimeno emphasized that approaches should be multimodal, such as recognizing that obesity is a disease and weight loss is an effective intervention; increasing information campaigns in schools and media programs; working with the food industry to develop healthier food; and involvement of the urban design and transport sector in healthy community planning to encourage physical activity.

Dr. Regala presented government initiatives to encourage healthier behavior, specifically for physical activities and healthier diet which is included in the seven priority areas identified. Settings where interventions can be confined-in will focus on health communities, schools, and the healthy workplaces. An all-in-one guide, packaged as Playbooks have been developed for implementation of the minimum public standards and promote physical, mental, and emotional wellbeing of Filipinos at the

community level, even at the LGUs. For nutrition, the "Karinderya para sa Healthy Pilipinas" has been formulated to champion nutrition at the community level.

In discussing the policy perspective of the forum, Assistant Secretary Dayanghirang of the National Nutrition Council enumerated current policies which include the inclusion of sugar-sweetened beverages in the TRAIN Law, the Mandatory Nutrition Labeling of Prepackaged Food products, the DepEd Order which mandates that school canteens should encourage healthy eating and prohibiting unhealthy food, the National Policy on the elimination of industrially-produced Trans-Fatty Acids, and the PPAN Overweight and Obesity and Prevention Program. Dr. Dayanghirang recommended that population-based strategies must also be strengthened, since taxation alone may not be enough, but should be complemented by information campaigns at the community level.

Finally, Dr. Agdeppa discussed risk factors for cardiovascular diseases from a research perspective. In a summary from the 2018-2019 ENNS, she mentioned that risk factors in the country include obesity, high blood pressure and sugars, smoking & alcohol consumption, and physical inactivity. Dr. Agdeppa mentioned that the research areas to be explored include food environment surveys, analysis of trans-fat content of foods, glycemic index of different rice varieties, and nutrient profiling. She ended by recommending strengthening the implementation of health & nutrition programs from the national to the local level and intensifying promotion of good nutrition using nutritional materials developed by the different implementing agencies.

**Presentation of Research Results and Papers**

The *Presentation of Research Results* provide the NAST Awardees with the opportunity to discuss their most recent findings and receive feedback from colleagues with similar research interest and allow researchers in other disciplines, decision-makers, and relevant stakeholders to become aware of the innovative research being generated in particular subfields of science. Paper presentations were also conducted as part of the selection process of the NAST Environmental Science Award, NAST Talent Search for Young Scientists, Magsaysay Future Engineers/Technologists (MFET) Award, and NSTW Award: Outstanding Research and Development Award.

**Science Information Forum or Virtual *Kapehan***

The Science Information Forum is conducted with members of the media and science communicators as audience. During the pandemic, its online version was launched as *virtual kapehan*.

**Speakers Bureau, *Salinlahi* Symposium, Dialogue with the NAST Scientists, Meet Your Scientist, and Symposium for the Youth/Scienteach**

The NAST conducts five (5) activities that brings science closer to the public:

1) *Speakers Bureau* - aims to provide speakers on science-related issues to provincial centers and academic institutions;
2) *Salinlahi Symposium* - brings science to areas not usually reached by science symposia;
3) *Dialogue with the NAST Scientists* - aims to inspire and encourage researchers, government employees, and other professionals to conduct more research, and adapt science and technology for development;
4) *Meet Your Scientist* - aims to promote science among the youth, and inspire and encourage them to pursue careers in science; and
5) *Symposium for the Youth* - aims to inspire and encourage high school students to pursue a career in science. During the pandemic, its virtual version called *Scienteach* was launched.

The NAST conducted the following:

| ACTIVITY | DATE |
|---|---|
| ScienTeach: A Virtual Symposium for the Youth (Catanduanes) | 08 Mar |
| Salinlahi Symposium Series in Region III | 18 Feb |
| Meet Your Scientist in World Wildlife Day | 03 Mar |
| Meet Your Scientist in National Women's Day | 25 Mar |
| Meet Your Scientists: Socializing with Our Social Scientists | 25 May |
| 1st #PilipiNAST Virtual Kapehan | 29 Jun |
| ScienTeach: A Virtual Symposium for the Youth (Catanduanes) | 12 Apr |
| Meet Your Scientist: Exploring the Philippine Space Science Programs | 30 Sept |
| NAST - DOST I Virtual Speakers Bureau | 23 Sept |
| Region 12's Virtual Speakers Bureau: Webinar on Innovation Efforts in Combating the Spread of COVID-19 | 27 Sept |
| Meet Your Scientist: Rocking with Earth Science | 25 Nov |
| Salinlahi Symposium Series in Bislig City | 24 Nov |
| ScienTeach: A Virtual Symposium for the Youth (Isabela) | 5 Oct |
| ScienTeach: A Virtual Symposium for the Youth (Region I) | 18 Oct |
| ScienTeach: A Virtual Symposium for the Youth (Region VIII) | 26 Nov |

**Gender and Diversity Program**

The NAST conducted a webinar on Sexual Orientation and Gender Identity: Understanding Coping Mechanisms by the Filipino Youth on 17 February 2021.

Sexual orientation and gender identity are different things, but they reflect "gender norm transgression and share an intertwined social and political history". The umbrella term for this sector is LGBT, an acronym for lesbian, gay, bisexual and transgender. The "LGB" refers to sexual orientation. The "T", on the other hand, is for transgender which is a general term for those whose gender identity or gender expression is not the same as what they were assigned at birth. The term LGBTQ+ (Q for queer or questioning and Plus) is also used to cover further gender expressions outside traditional norms. There is no available local data on the LGBT sector but it is the general perception that this is a growing population in Philippine society. Philippine institutions have also recently become more aware and more accepting of the rights of the LGBT community.

Beginning in 2008, select provinces, cities and municipalities have begun to pass ordinances for non-discrimination based on sexual orientation and gender identity. While there has been a gradual increase in the global academic literature on the topic, there have not been a sufficiently proportionate number of studies on the management of this sector, for instance regarding health care delivery issues. As a result, members of the LGBT community still suffer discrimination in various areas, including home, school, workplace, including clinics, and the social environment, in general. It therefore becomes important to understand the coping strategies this sector adopts; in order that policy-makers, employers and the community can be made aware of the opportunities and resources available to minimize LGBT discrimination. This will also pave the way for much-needed policy support not only to increase inclusion in developmental programs but also to foster diversity in the workplace.

# IN MEMORIAM

## NATIONAL SCIENTIST RAMON C. BARBA, 82

Dr. Ramon C. Barba, the scientist behind the year-round availability of fresh mangoes, died on October 10, 2021 at the age of 82.

Dr. Barba was known for his distinguished achievements in the field of plant physiology, focusing on induction of flowering of mango and on micropropagation of important crop species that have earned him national and international accolades. He pioneered the induction of flowering and fruiting of mango resulting in the availability of abundant fresh mangoes all year-round. He developed the plant growth enhancer, using potassium nitrate, which was locally and internationally patented. He also worked on the micropropagation of sugarcane and bananas. This significant breakthrough in flower induction and micropropagation has been adopted by other countries producing fruit trees.

National Scientist Barba and his team at the Institute of Plant Breeding (IPB) at the University of the Philippines (UP) Los Baños developed the tissue culture protocol for banana in order to produce large quantities of planting materials that are robust and disease-free, allowing for annual replanting, which brought major shift in banana production system, now a standard practice in large farms not only in the Philippines but also in other countries in Asia, Africa, and Latin America. Together with his research team, they developed micropropagation of several crops made a rapid, enormous impact to farmers and major shift in the production system of more than 40 important species of ornamental, fruit, and plantation crops, aquarium plants, and forest trees including cassava, white potato, rattan, bamboo, ramie, derris, garlic, and shallot.

Through the innovative methodologies of NS Barba, he garnered several awards such as The Outstanding Young Men (TOYM) of the Philippines for Agriculture by the Philippine Jaycees (1974), Rizal Pro Patria Presidential Award for Tissue Culture (1980), the Most Distinguished Alumni Award, University of the Philippines (2004), and the SEARCA-Dioscoro L. Umali Achievement Award in Agricultural Development (2011), among others.

In 2004, Dr. Ramon C. Barba was elected to the National Academy of Science and Technology, Philippines as 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 significant contributions in one of the different fields of science and technology.

A necrological service for NS Barba was held on 16 October at the Department of Science and Technology Plaza. Interment followed at the Libingan ng mga Bayani in Fort Bonifacio, Taguig City on the same day at 12:00 noon.