WOMEN

in Science, Technology, Engineering and Mathematics

Advancing SDGs in Asia

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THE ASSOCIATION OF ACADEMIES AND SOCIETIES OF SCIENCES IN Asia

Women in Science, Technology, Engineering and Mathematics

Advancing SDGs in Asia

About the Book Cover

Cover design by
Dr. Shari Eunice San Pablo

The book cover was created to reflect the (in)visibility, strength, and dignity of women in Science, Technology, Engineering, and Mathematics (STEM). Through layered forms, different textures, shadows, and light, it symbolizes a world where women are often made to remain unseen, yet they continue to shape knowledge, innovation, and social progress.

The cover draws from the idea that this book exists to help women come into view. In a world that often overlooks women's presence and contributions–especially in STEM–the layered forms, muted colors, and veiled figures speak to invisibility, restraint, and the social conditions that obscure women's voices and labor. At the same time, the composition suggests emergence and visibility, with the veiled women appearing at the top. The arrangement of the different layers and textures is intentional, mirroring the tension between being hidden and being seen, between erasure and presence. It suggests movement, transformation, and a gradual claiming of space, echoing the broader mission of advancing gender equity in STEM and creating a world where women are seen, valued, and empowered.

More than a static image, the cover is also an invitation to witness women not as peripheral figures, but as participants in shaping knowledge, society, and the future. It holds space for their stories, their resilience, and their brilliance.

ISBN 978 0 85847 669 1

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The Association of Academies and Societies of Sciences in Asia

Supawan Tantayanon

The Association of Academies and Societies of Sciences in Asia (AASSA) is a leading non-profit international organization established on 1 January 2012 through the merger of the Association of Academies of Sciences in Asia (AASA) and the Federation of Asian Scientific Academies and Societies (FASAS). With more than 30 member academies and scientific societies across Asia and Australasia, AASSA provides a platform for regional collaboration among scientists and technologists to advance sustainable development.

Recognizing the importance of gender equity in science and technology, AASSA established the Special Committee for Women in Science and Engineering (WISE) in 2012. Since its inception, WISE has implemented several key initiatives, including the 2015 AASSA report Women in Science and Technology in Asia and the launch of the STEM Women Asia database in 2021 to promote greater visibility and participation of women in STEM across the region.

Between 2022 and 2024, WISE introduced three flagship programs that continue to expand its impact: the WISE Symposium, the WISE Webinar Series, and the Professor Yoo Hung Kim Women Scientists Award. Building on these initiatives, WISE has developed an edited volume titled "Women in Science, Technology, Engineering and Mathematics (STEM) Advancing SDGs in Asia." This book was officially launched through virtual and in-person events, including panel discussions at the Fourth WISE Symposium held at Seoul, Korea in May 2026.

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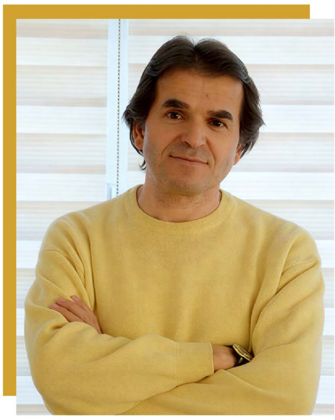
Message

As president of Association of Academies and Societies of Sciences in Asia (AASSA) and chair of the AASSA Women in Science and Engineering (WISE) committee, we are delighted to see publication of this book which celebrates the contributions of women in science, technology, and engineering and mathematics (STEM) who are driving progress toward the United Nations Sustainable Development Goals (SDGs).

The book features inspiring stories of women innovators, researchers, and leaders who have made significant strides in addressing global challenges such as climate change, health, gender equality, and education in the Asian region.

The book honours the multifaceted achievements of women advancing STEM in Asia and their individual stories not only illustrate excellence, impact, diversity, and inspiration but also encourage systemic progress toward the SDGs. It illuminates the vital role of women in STEM as key players in achieving sustainable development and highlights the role of women pioneers in this area. The focus is on five specific SDGs and the role of STEM and the contributions of women to these goals. These women embody both the spirit and the substance of sustainable development leadership, serving as role models and catalysts for change across Asia and beyond.

The book was made possible through an Inter-Academy Partnership (IAP) regional network grant in cooperation with the National Academy of Science and Technology, Philippines (NAST), and was a project of the AASSA Women in Science and Engineering (WISE) committee. The women featured in the book present a diverse and impactful collection of stories that will inspire current and future generations and we congratulate all involved in making this possible.



Ahmet Nuri Yurdusev
President
Association of Academies and Societies of Sciences in Asia (AASSA)

Frances Separovic
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AASSA Women in Science and Engineering (WISE) Committee

Foreword

Across Asia, women in science, technology, engineering, and mathematics (STEM) are advancing innovation while tackling some of the region's most pressing challenges. *Women in Science, Technology, Engineering and Mathematics (STEM) Advancing SDGs in Asia* highlights their achievements and affirms a shared commitment to sustainable and inclusive development.

WISE, one of the four special committees of AASSA, works to strengthen the role and visibility of women in STEM. This volume reflects the understanding that sustainable development is interconnected and people-centered, and that gender equality is both a distinct goal and a critical foundation for progress in health, education, industry, innovation, and climate action.

The first volume centers on five Sustainable Development Goals: SDG 3 (Good Health and Well-being), SDG 4 (Quality Education), SDG 5 (Gender Equality), SDG 9 (Industry, Innovation and Infrastructure), and SDG 13 (Climate Action). Regional Academies and Scientific Societies nominated outstanding women leaders whose work exemplifies professional excellence, meaningful contributions to the SDGs, and measurable societal impact. Their stories illustrate how scientific leadership can foster equitable growth, resilient institutions, and forward-looking solutions across diverse Asian contexts.

We gratefully acknowledge the InterAcademy Partnership (IAP) and the Association of Academies and Societies of Sciences in Asia (AASSA) for their generous financial support. We also thank the participating academies and scientific societies for their collaboration, and the distinguished contributors who generously shared their knowledge, experience, and dedication in these pages.

May this volume encourage future generations and strengthen our collective resolve to advance women's leadership in STEM for a more equitable, resilient, and sustainable Asia.

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Acknowledgements

The Association of Academies and Societies of Science in Asia (AASSA) and its Women in Science and Engineering (WISE) Committee extend their deepest gratitude to the following individuals. Their dedication, expertise, and invaluable contributions were instrumental in bringing this book to fruition.

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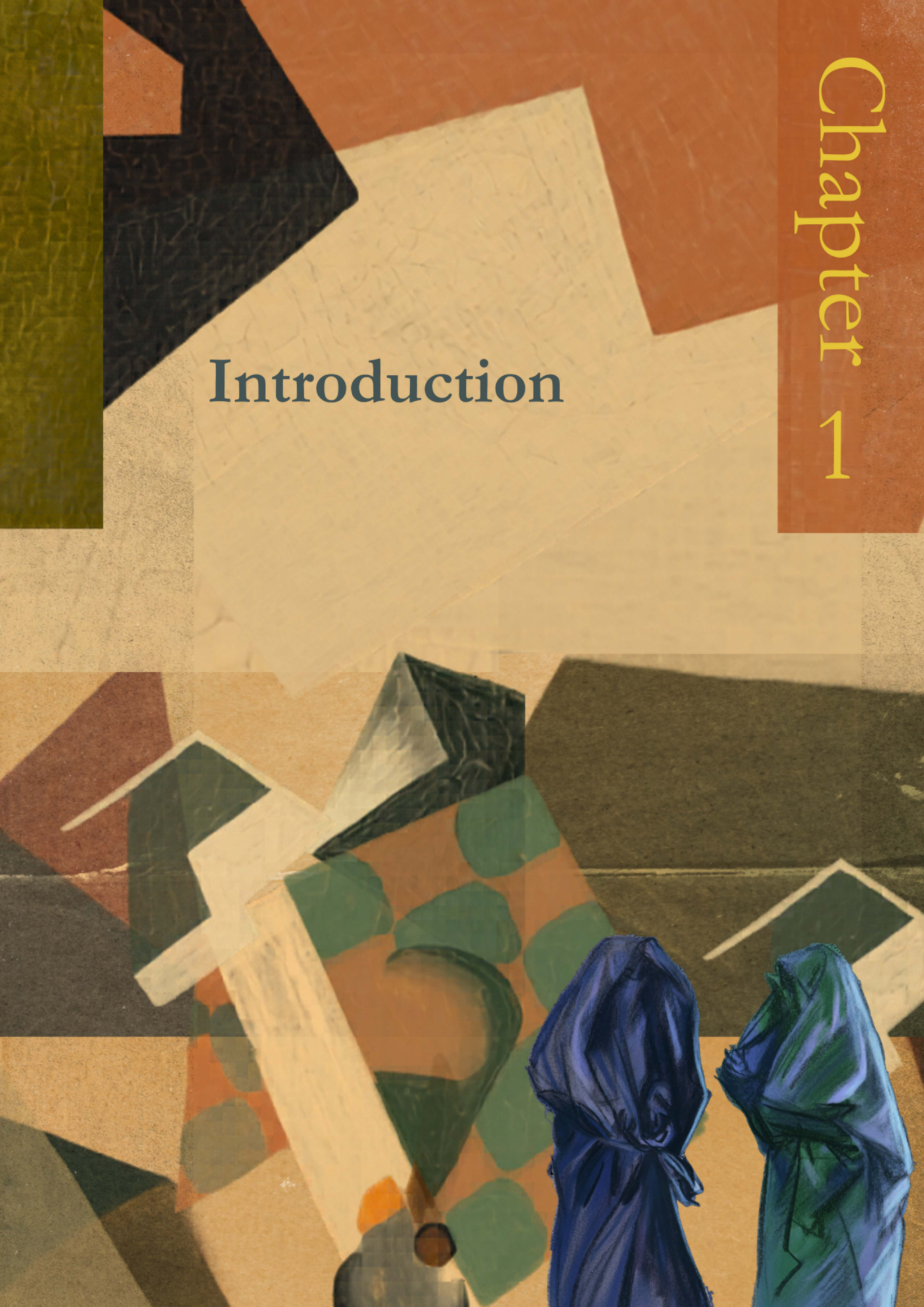
Chapter 1

Introduction



Introduction

Overview of the SDGs and the Role of STEM in Achieving Them

The Importance of Women's Contributions, Especially in Asian Countries

SO YOUNG SOHN

In 2015, the United Nations adopted the **2030 Agenda for Sustainable Development**, a global framework consisting of **17 Sustainable Development Goals (SDGs)** aimed at addressing pressing economic, social, and environmental challenges. These goals provide a shared blueprint for peace and prosperity for people and the planet, emphasizing inclusivity, sustainability, and innovation. Achieving the SDGs requires coordinated efforts across governments, private sectors, academia, and civil society. Central to this effort is the application of **Science, Technology, Engineering, and Mathematics (STEM)**, which drives innovation, evidence-based policymaking, and technological solutions to complex global problems. Equally critical is the inclusion of **women**, whose contributions to STEM fields remain underutilized, particularly in **Asian countries**, where gender disparities persist despite rapid economic and technological growth.

Overview of the Sustainable Development Goals (SDGs)

The **17 SDGs** address interconnected challenges that span poverty eradication, health, education, gender equality, economic growth, climate action, and environmental protection. Key goals include **Good Health and Well-being (SDG 3), Quality Education (SDG 4), Gender Equality (SDG 5), Industry, Innovation, and Infrastructure (SDG 9), and Climate Action (SDG 13).**

Unlike earlier development agendas, the SDGs are universal, applying to both developed and developing nations, and are designed to be **integrated**, recognizing that progress in one area influences outcomes in others. For example, improving access to quality education enhances economic growth, reduces inequalities, and promotes better health outcomes. This interconnected nature underscores the need for interdisciplinary approaches, where STEM plays a foundational role.

The Role of STEM in Achieving the SDGs

STEM disciplines are critical enablers of sustainable development. They provide the tools, methodologies, and innovations necessary to address complex challenges that the SDGs seek to resolve.

STEM in Health and Well-being

Healthcare innovations rooted in STEM are essential for achieving **SDG 3 (Good Health and Well-being).** Biomedical research, digital health technologies, artificial intelligence, and data analytics improve disease prevention, diagnosis, and treatment. Telemedicine, for instance, has expanded healthcare access in remote and underserved regions across Asia, particularly in countries with large rural populations. Public health data modeling also supports informed decision-making during health crises, as seen during the COVID-19 pandemic.

STEM and Education

STEM education underpins SDG 4 (Quality Education) by equipping individuals with critical thinking, problem-solving, and digital skills. As economies become increasingly knowledge-based, STEM literacy is essential for workforce readiness and lifelong learning. Integrating STEM into educational systems helps bridge skill gaps and promotes innovation, particularly in fast-growing Asian economies.

STEM for Environmental Sustainability and Climate Action

Addressing environmental challenges and climate change relies heavily on STEM solutions. Renewable energy technologies, climate modeling, sustainable materials, and waste management systems are key to achieving SDG 7 (Affordable and Clean Energy), SDG 12 (Responsible Consumption and Production), and SDG 13 (Climate Action). Asia, as both a major contributor to global emissions and one of the regions most vulnerable to climate impacts, stands to benefit significantly from STEM-led sustainability initiatives.

Gender Equality and STEM: A Critical Link

Gender equality (SDG 5) is both a standalone goal and a cross-cutting requirement for achieving all SDGs. Despite progress in education and workforce participation, women remain underrepresented in STEM fields globally. This gender gap limits innovation, reduces economic potential, and undermines inclusive development.

Women bring diverse perspectives, experiences, and problem-solving approaches that enhance scientific research and technological innovation. Studies consistently show that diverse teams perform better, generate more creative solutions, and are more effective at addressing complex challenges. Therefore, excluding women from STEM not only violates principles of equity but also weakens efforts to achieve sustainable development.

Importance of Women's Contributions to STEM in Asian Countries

Asia is characterized by vast diversity in culture, economic development, and social norms. While some Asian countries have made notable progress in women's education, significant barriers remain in translating educational attainment into STEM careers and leadership roles.

Educational Participation and the Gender Gap

In many Asian countries, women's enrollment in higher education has increased substantially, including in STEM-related fields. However, participation often declines at advanced levels and in professional settings, a phenomenon known as the "leaky pipeline." Cultural expectations, limited mentorship, gender bias, and work-life balance challenges contribute to women leaving STEM careers.

Addressing these barriers is critical for maximizing human capital. Asia's large population means that even small increases in women's STEM participation can yield significant gains in innovation, productivity, and sustainable development.

Women in STEM and Economic Growth

Women's participation in STEM supports SDG 8 (Decent Work and Economic Growth) by expanding the skilled labor force and promoting inclusive economic development. In technology-driven Asian economies, such as those in East and Southeast Asia, women in STEM contribute to research and development, entrepreneurship, and digital transformation. Their involvement enhances competitiveness and helps ensure that technological progress benefits broader segments of society.

Women's Leadership and Community Impact

Women scientists, engineers, and technologists often play vital roles in addressing community-level challenges. In areas such as public health, environmental management, and education, women's STEM expertise can lead to more inclusive and socially responsive solutions. For example, women engineers working on clean water and sanitation projects often consider the specific needs of women and children, directly supporting **SDG 6 (Clean Water and Sanitation).**

Women, STEM, and Sustainable Development in Asia

In the context of climate change and environmental degradation, women in STEM are increasingly involved in developing renewable energy technologies, sustainable agriculture practices, and disaster risk reduction strategies. Given Asia's vulnerability to natural disasters, women's leadership in STEM-driven resilience planning is particularly important for achieving long-term sustainability.

Challenges and the Way Forward

Despite the clear benefits, women in Asia face persistent challenges in STEM, including gender stereotypes, unequal access to resources, wage gaps, and limited representation in decision-making roles. Overcoming these challenges requires coordinated action at multiple levels.

Governments must implement gender-responsive policies that promote equal access to STEM education and careers. Educational institutions should foster inclusive learning environments, provide mentorship opportunities, and address implicit biases. The private sector can support women in STEM through equitable hiring practices, flexible work arrangements, and leadership development programs. International cooperation and regional partnerships can also play a role in sharing best practices and scaling successful initiatives.

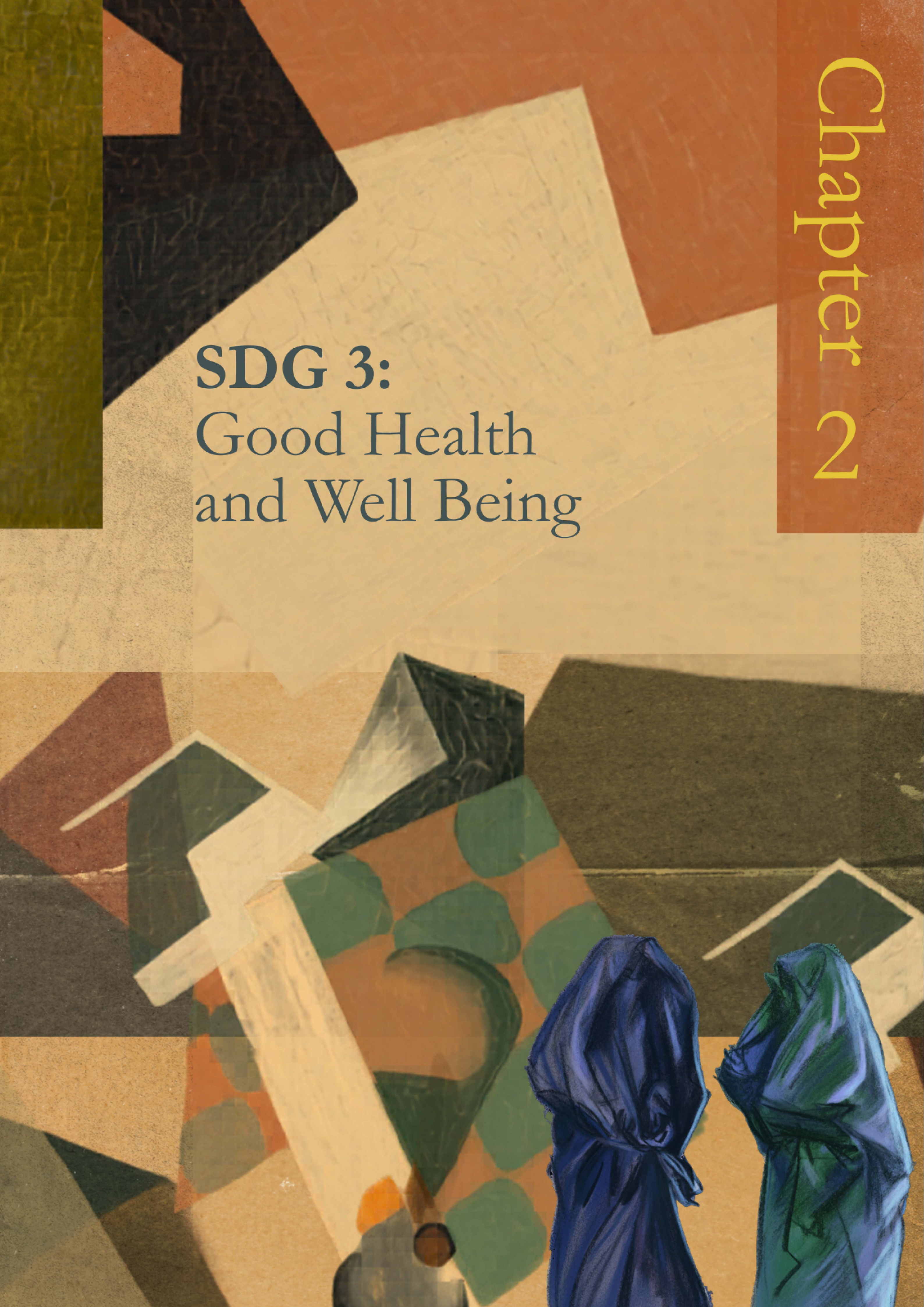
Conclusions

The Sustainable Development Goals represent an ambitious and necessary agenda for creating a more equitable, prosperous, and sustainable world. STEM disciplines are central to achieving these goals, providing the knowledge, tools, and innovations required to address complex global challenges. Equally important is the inclusion of women, whose contributions to STEM enhance innovation, economic growth, and social progress.

In Asian countries, where rapid development coincides with persistent gender disparities, empowering women in STEM is both a moral imperative and a strategic necessity. By investing in women's education, careers, and leadership in STEM fields, Asia can unlock vast potential and accelerate progress toward the SDGs. Ultimately, sustainable development cannot be achieved without fully harnessing the talents and perspectives of women, making gender equality in STEM a cornerstone of the global development agenda.

Chapter 2

SDG 3: Good Health and Well Being



Dr. Justine Clark

TELETHON KIDS INSTITUTE

Advancing Equity in Cancer Care

Aboriginal people are about 14 per cent more likely to be diagnosed with cancer compared with non-Aboriginal people, and also about 20 per cent less likely to survive after diagnosis, [1]Dr. Justine Clark noted during her acceptance of the 2024 Aboriginal and Torres Strait Islander Scientist Award. With this gap, she underscores the urgent need for more inclusive and equitable approaches to cancer research and care.

As an Adnyamathanha woman and an early-career cancer researcher in Indigenous genomics, Dr. Clark is motivated to improve equitable health outcomes in Australia, particularly for Aboriginal and Torres Strait Islander peoples, and she does this through work in precision oncology. Through her research, she brings together scientific innovation and social responsibility, with a strong focus on reducing longstanding disparities in cancer care.

A young doctor and scholar

Dr. Clark completed a Bachelor of Psychological Science, followed by Honours in Health and Medical Science, at the University of Adelaide. She later earned her PhD in Medicine in 2023 at the University of Adelaide and the South Australian Health and Medical Research Institute (SAHMRI), where she conducted research in the Myeloma Research Laboratory under the supervision of Prof. Andrew Zannettino, Dr. Duncan Hewett, and Dr. Bill Panagopoulos.

Her training in cancer cell and molecular biology provided a strong foundation for her work in precision oncology and Indigenous genomics. Precision oncology aims to tailor cancer treatment according to an individual's genetic, biological, and social context.

Grounded in Addressing Inequities

Dr. Clark's research is grounded in addressing persistent inequities in cancer outcomes experienced by Aboriginal and Torres Strait Islander peoples, as these disparities remain significant in Australia. As such, her work responds to this gap by integrating advanced molecular and genomic technologies with principles of cultural responsibility and inclusion.

Rather than treating science as separate from community, Dr. Clark emphasizes research approaches that are respectful, relevant, and beneficial to Indigenous peoples. A crucial part of her work involves strengthening Aboriginal participation in cancer research through strategies that support meaningful engagement and shared decision-making. Through the development of Indigenous-led, data-informed approaches to cancer research, she seeks to improve early detection, treatment response, and survival outcomes for Aboriginal patients. Her approach combines biomedical innovation with Indigenous data sovereignty, community partnership, and equitable benefit-sharing, challenging conventional research models that have historically excluded marginalized groups.

A major example of this work is her leadership in national consultations with Cancer Australia in 2024. Dr. Clark engaged 37 Aboriginal and Torres Strait Islander stakeholders across Sydney, Melbourne, Darwin, Perth, and Adelaide. Through qualitative analysis and direct engagement, her findings significantly informed the development of the National Framework for Genomics in Cancer Control. Notably, 15 of 29 actions within the framework were derived from her consultation work, highlighting the importance of embedding Indigenous perspectives in national policy and practice.

After her PhD, Dr. Clark joined The Kids Research Institute (formerly Telethon Kids) as a Post-Doctoral Research Fellow in Indigenous Genomics. In this role, she has led a national research program focused on cancer genomics among Indigenous Australians. She was also a Project Manager for Cancer Australia's National Framework for Genomics in Cancer Control in 2024.

Equity and Equality

Dr. Clark's career also reflects broader issues of representation in STEM. As an Aboriginal woman working in a highly technical and underrepresented field, she has navigated gender and racial barriers while establishing a strong and impactful research profile. Her achievements are supported by competitive grants and scholarships that recognize both scientific excellence and community impact.

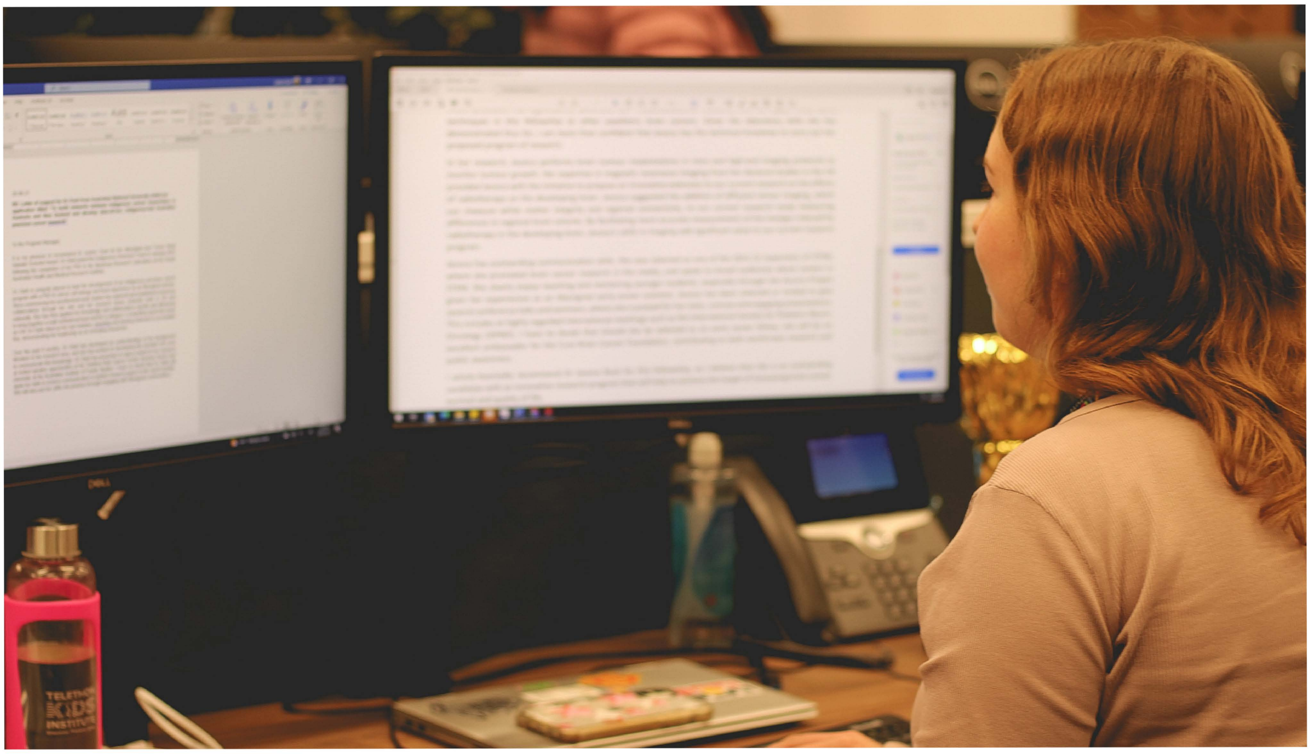
Her research excellence has been recognized through several awards and funding opportunities. She received the University of Adelaide Indigenous Research Scholarship (2019–2022) and the Julia Konig Bequest Award for Indigenous Students. Her early work was also acknowledged through a Poster Award at the 2022 New Directions in Leukaemia Research Meeting.

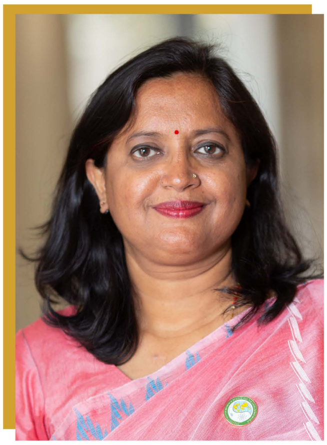
In 2024, Dr. Clark received the prestigious Aboriginal and Torres Strait Islander Scientist Award from the Australian Academy of Science, supporting her efforts to strengthen networks among Indigenous cancer researchers across Australia and New Zealand. In the same year, she secured a Medical Research Future Fund Early to Mid-Career Researcher Grant to conduct the first comprehensive study of blood cancers in Indigenous Australians. More recently, she was awarded a National Health and Medical Research Council Investigator Grant (Emerging Leadership 1), further supporting her work in Indigenous-led precision cancer research.

Outside her laboratory work, she continues to be involved in scientific committees, advisory groups, and conferences focused on Indigenous health, genomics, and cancer research. These include roles within the Australian Alliance of Indigenous Genomics (ALIGN), the Children's Cancer Institute, the Victorian Comprehensive Cancer Centre (VCCC) Alliance, the Human Genetics Society of Australasia (HGSA), and the South Australian Comprehensive Cancer Network (SACCaN), where she supports initiatives on research governance, community benefit-sharing, education, and Indigenous engagement in health and genomics.

Dr. Clark is also actively engaged in mentoring, teaching, and capacity-building within the scientific community. She contributes to undergraduate teaching and supervision and continues to support early-career researchers in developing their skills and careers. She also plays an active role in fostering inclusion within her research team by mentoring and employing women and gender-diverse scientists. Through mentorship, training, and professional opportunities, she supports pathways for women to succeed in scientific research.

Dr. Clark's work clearly demonstrates how scientific research can address structural inequalities by advancing biomedical knowledge. As an emerging leader in her field, Dr Justine Clark is helping to reshape cancer research toward more equitable, inclusive, and community-centered approaches, advancing both health outcomes and social equity.





Dr. Tista Pasai Joshi

NEPAL ACADEMY OF SCIENCE AND TECHNOLOGY

Science for Water, Health, and Communities

Access to safe water remains one of the most pressing environmental and public health challenges in many developing countries. In Nepal, rapid urbanization, industrial activity, and natural geological conditions have contributed to growing concerns about water contamination and environmental degradation. Addressing these issues requires scientific innovation, environmental monitoring, and long-term strategies for sustainable water management.

Dr. Tista Prasai Joshi has devoted more than two decades to studying water quality and environmental health in Nepal. As a Senior Scientific Officer at the Nepal Academy of Science and Technology (NAST), her research focuses on water purification technologies, sanitation, and environmental monitoring. Her work addresses the removal of harmful contaminants from water systems while also examining emerging environmental pollutants that threaten ecosystems and human health.

Through these efforts, Dr. Joshi contributes to Sustainable Development Goal 3 (Good Health and Well-Being) by advancing research that supports safer water systems and improved environmental health.

Early Interdisciplinary Science

Dr. Joshi's scientific journey reflects an interdisciplinary approach to environmental challenges. She earned her Bachelor of Science in Microbiology from Tribhuvan University in 1999, followed by a Master of Science in Environmental Microbiology in 2001. Recognizing that environmental problems also involve social and cultural dimensions, she later completed a Master of Arts in Anthropology in 2005.

This combination of training in the natural and social sciences enabled her to examine environmental issues from multiple perspectives. It allowed her to explore both the biological processes involved in environmental change and the ways communities interact with their surrounding ecosystems.

In 2017, Dr. Joshi completed her Ph.D. in Environmental Engineering at the University of the Chinese Academy of Sciences (UCAS). During her doctoral studies she received the UCAS Excellent International Student Award, recognizing the quality of her research. Her doctoral work strengthened her expertise in environmental engineering and water treatment technologies.

Research that Improves Water Safety

A central focus of Dr. Joshi's research is the development of technologies that remove harmful contaminants from drinking water. In many regions of Nepal, groundwater and surface water contain arsenic and heavy metals that pose significant risks to human health.

Her research investigates adsorbent materials capable of capturing and removing these contaminants. She has studied compounds such as ferric manganese binary oxide (FMBO), manganese dioxide (MnO_2), and ferric oxide (FeOOH), which show strong potential for removing toxic substances from contaminated water.

Recognizing the need for accessible and affordable technologies, Dr. Joshi has explored natural adsorbents from agricultural by-products such as rice and coconut husks. These materials offer sustainable, low-cost alternatives for water purification, especially in rural communities lacking conventional treatment systems.

Through this work, she contributes to improving water safety and reducing health risks associated with contaminated drinking water.

Tracking Environmental Threats

Beyond water purification technologies, Dr. Joshi's research also investigates emerging environmental contaminants. Among these are microplastics and antimicrobial resistance (AMR), both of which have become growing global environmental concerns.

Her studies examine the presence and distribution of these pollutants in urban lakes, rivers, and groundwater systems. By generating baseline data on pollution levels, her research helps scientists and policymakers better understand environmental risks and develop strategies to protect ecosystems and public health.

Such work is particularly important in countries like Nepal, where scientific data on emerging pollutants remains limited. Through environmental monitoring, Dr. Joshi contributes to expanding scientific knowledge about environmental health challenges in rapidly changing environments.

Scientific Recognition and Leadership

Dr. Joshi's contributions to environmental research have received national and international recognition. She was awarded the TWAS–Samira Omar Innovation for Sustainability Award in 2024 and the OWSD–Elsevier Foundation Award in Biological Sciences in 2019. She also received the UNESCO–OWSD Early Career Fellowship from 2019 to 2022, which supports women scientists conducting research in developing countries.

In 2017 she received the Nepal Vidya Bhushan "Ka," one of the country's highest academic honors, presented by the President of Nepal in recognition of outstanding scholarly achievement. Within her institution, she has also received Best Performing Employee awards from the Nepal Academy of Science and Technology in 2018, 2021, and 2024.

Mentoring Scientists and Supporting Women in STEM

Alongside her research, Dr. Joshi plays an important role in mentoring young scientists. She has supervised undergraduate, master's, and doctoral students from fields including microbiology, environmental science, chemistry, zoology, and biotechnology. Many of her mentees are women pursuing careers in scientific research.

Currently, Dr. Joshi serves as a regional member of the Organization for Women in Science for the Developing World Asia and the Pacific Region, Chair of the OWSD-Nepal Chapter, and founding member of the Women Scientists Forum Nepal. Through these initiatives, she supports mentorship, professional development, and leadership opportunities for women scientists

Science and Community Engagement

Dr. Joshi believes that scientific solutions must also involve community awareness and participation. In addition to her academic work, she contributes to science communication through articles written in her native language, helping to improve public understanding of environmental issues. She has also participated in environmental awareness programs in rural and mountainous communities.

In an interview with the Nepali media platform Online Khabar, she emphasized the importance of grassroots education:

In any aspect, education or water preservation, Nepal's grassroots levels are detached; we need to Wake them aware and educate them, hold discussions so that they can turn their problems into solutions.

Her perspective reflects a broader belief that environmental sustainability depends not only on scientific discoveries but also on informed and engaged communities.

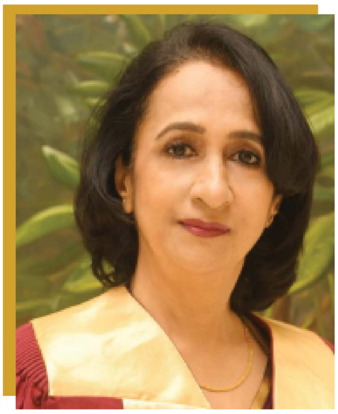
Science for Sustainable Futures

Today, Dr. Tista Prasai Joshi is recognized as one of Nepal's leading scientists working on water quality and environmental health. Her career integrates laboratory research, teaching, policy engagement, and community outreach in addressing environmental challenges.

By developing water purification technologies, monitoring emerging contaminants, mentoring future scientists, and promoting environmental awareness, she contributes to improving environmental health conditions in Nepal.

Her work demonstrates how scientific research can directly support SDG 3: Good Health and Well-being, particularly by strengthening the connection between environmental protection and human health.

Through sustained research and public engagement, Dr. Joshi continues to advance scientific solutions that support safer water systems and healthier communities.



Dr. Nadira Karunaweera

FACULTY OF MEDICINE, UNIVERSITY OF COLOMBO

Science Against Invisible Enemies

In tropical regions of the world, some of the most persistent health threats are also the least visible. Diseases such as malaria and leishmaniasis rarely dominate global headlines, yet they continue to affect millions of people across Asia, Africa, and Latin America. Their persistence is shaped not only by biology but also by environmental conditions, poverty, and gaps in public health systems.

In Sri Lanka, Dr. Nadira Karunaweera has spent more than three decades studying these diseases and strengthening the systems designed to control them. A medical parasitologist and Chair and Senior Professor of the Department of Parasitology at the Faculty of Medicine, University of Colombo, Dr. Karunaweera's work connects laboratory science, public health practice, and policy.

For her, the urgency of this work is clear. "Vector-borne diseases, including malaria and leishmaniasis, remain endemic in most Asian countries where environmental factors remain conducive for the development and spread of insect vectors,"[2] she explains. Addressing them requires not only scientific knowledge but also coordinated health systems capable of monitoring and responding to outbreaks. Her work directly contributes to Sustainable Development Goal 3: Good Health and Well-being, which emphasizes the prevention and control of infectious diseases.

Beginnings in Medicine and Research

Dr. Karunaweera began her scientific journey through medicine. She earned her Bachelor of Medicine and Bachelor of Surgery (MBBS) from the University of Colombo in 1986 and later completed a PhD focusing on clinical disease and immunity in human malaria. Her early research placed her within the specialized field of medical parasitology, which studies the complex interactions between parasites, human hosts, and environmental conditions.

Although her work has taken her to international research institutions—including roles as an Honorary Visiting Fellow at the Harvard T.H. Chan School of Public Health and visiting professorships abroad—her research has remained deeply connected to the public health realities of Sri Lanka. Working within a developing-country context shaped her scientific approach. Researchers often face limited resources and institutional constraints, yet these conditions also encourage creativity and collaboration.

Dr. Karunaweera acknowledges these challenges candidly, describing how scientists must navigate "a zillion numbers of hurdles and frustrations." At the same time, such obstacles cultivate resilience and encourage solutions tailored to local realities.

When Research Changes Policy

One of the most significant chapters of her career centers on leishmaniasis, a parasitic disease transmitted through the bite of infected sandflies. When she began studying the disease, it had not yet been fully recognized as a major public health concern in Sri Lanka.

Through systematic epidemiological studies, Dr. Karunaweera and her research team documented how the disease was spreading across several regions of the country. Their findings provided critical evidence about infection patterns and transmission routes.

"Our research program on leishmaniasis has had a major impact on health policy decisions," she explains. The research contributed to a key milestone in 2008 when Sri Lanka's Ministry of Health officially declared leishmaniasis a notifiable disease.

This policy meant that all diagnosed cases had to be formally reported to national health authorities. According to Dr. Karunaweera, the reporting system ensured "more accurate information on case numbers and its spread within Sri Lanka," allowing health officials to improve disease surveillance, treatment, and prevention strategies.

Building Institutions for Public Health

Recognizing that research alone cannot control neglected diseases, Dr. Karunaweera helped establish Sri Lanka's first Center for Training, Research and Diagnosis of Leishmaniasis. The center became a national hub for research, clinical diagnosis, and professional training.

Health workers, laboratory technicians, and clinicians could now receive specialized training in identifying and managing the disease. The center also organized awareness programs, workshops, and outreach initiatives to ensure that knowledge about leishmaniasis reached both health professionals and the wider public.

Dr. Karunaweera often emphasizes that these diseases remain neglected partly because of the social environments in which they occur. "Neglected tropical diseases are named as such due to their strong association with poverty," she notes. Communities most affected by them often lack the resources and visibility needed to attract sustained policy attention.

Innovation from Everyday Knowledge

Scientific innovation does not always require advanced technology. Sometimes it begins with simple observations drawn from everyday life.

While working on parasite cultures in tropical laboratory conditions, Dr. Karunaweera's team faced the challenge of maintaining stable temperatures for parasite growth. Standard laboratory incubators were often expensive and energy-intensive.

Inspired by a common household object—the clay pot traditionally used in Sri Lanka to cool drinking water—the team developed a clay-based device that uses evaporative cooling to maintain suitable temperatures for parasite cultures.

This low-cost solution provided laboratories with an affordable and environmentally friendly alternative for maintaining parasite samples. It also demonstrated how local knowledge and traditional practices can inform scientific innovation.

Inspiring women and the next generation

Beyond research, Dr. Karunaweera has played an important role in supporting women in science. She led the establishment of the Sri Lanka National Chapter of the Organization for Women in Science for the Developing World (OWSD) and served as its founding president.

The organization supports mentorship, networking, and professional development opportunities for women researchers. Through these initiatives, Dr. Karunaweera has helped create pathways for women scientists to pursue leadership roles in research and academia.

Her message to young scientists reflects her commitment to community-centered science, "the self-satisfaction accrued through the contributions rendered toward a needy and neglected disease in one's own community or region will make what you do more meaningful."

Today, Dr. Nadira Karunaweera is recognized as one of the leading scientists in tropical disease research. Through sustained work in epidemiology, immunology, and public health, she has strengthened disease surveillance systems, trained health professionals, and helped shape national health policy.

She demonstrates how science can directly support public health and social well-being. By focusing on diseases that disproportionately affect vulnerable communities, she has transformed research into meaningful action, showing that the fight against invisible enemies requires both scientific knowledge and long-term commitment.

Dr. Aliya Naheed

INTERNATIONAL CENTRE FOR DIARRHEAL DISEASE RESEARCH, BANGLADESH

Data, Innovation, and the Future of Public Health in Bangladesh

Over the past several decades, Bangladesh has made major improvements in health outcomes. However, the country continues to face complex public health challenges. Infectious diseases remain a concern, while Non-Communicable Diseases (NCD), such as hypertension, diabetes, and cardiovascular diseases, are rapidly increasing. Addressing these evolving threats requires stronger disease surveillance, improved diagnostic technologies, and health policies based on scientific evidence.

Dr. Aliya Naheed has devoted her career to advancing these efforts. A physician-scientist and public health researcher at the International Centre for Diarrhoeal Disease Research, Bangladesh (icddr,b), she works at the intersection of medicine, epidemiology, digital health innovation, and health systems research. Her work focuses on infectious diseases, chronic illnesses, and mental health while developing technological tools that strengthen healthcare delivery in both urban and rural communities.

Through these efforts, her research contributes to Sustainable Development Goal 3 (Good Health and Well-Being) by improving disease prevention, diagnosis, and health system resilience.

From Clinical Medicine to Public Health

Dr. Naheed began her career as a physician at a time when few women in Bangladesh pursued public health research. In the 1990s, choosing epidemiology and health systems research after medical training was uncommon, yet she recognized that improving population health required addressing broader systemic challenges beyond individual patient care.

Her early work focused on infectious diseases affecting children, particularly pneumococcal infections and Haemophilus influenzae type B, both major causes of childhood illness and mortality. The evidence generated through her epidemiological studies contributed to the introduction of vaccines targeting these diseases, strengthening global prevention efforts.

Dr. Naheed has also contributed to genetic research, including genome-wide association studies (GWAS) identifying genetic markers linked to complex cardiovascular diseases. More recently, she established a research infrastructure in Bangladesh, one of the countries with the highest diabetes prevalence, to better understand the genetic, molecular, and metabolic features of diabetes. This work supports improved diagnostic accuracy, tailored therapeutic strategies, and more effective public health interventions in Bangladesh and other LMICs.

Her work demonstrates how epidemiological research can translate scientific evidence into practical health interventions, strengthen policy, and improve healthcare outcomes.

Strengthening Disease Surveillance and Diagnostics

One of Dr. Naheed's key contributions has been the development of disease surveillance systems in Bangladesh. She established the country's first nationwide surveillance network for Shigella dysenteriae type 1, a bacterium responsible for severe dysentery outbreaks.

Data generated from this surveillance system contributed to revisions in World Health Organization treatment guidelines, improving global responses to dysentery outbreaks.

In addition to strengthening surveillance systems, she has contributed to innovations in diagnostic technologies. Her research supported the development and validation of rapid diagnostic tools for cholera, shigella, and typhoid, enabling faster outbreak detection and response, particularly in resource-limited settings with limited laboratory capacity. One of her projects helped develop a rapid cholera test kit designed for community use, improving early detection and outbreak response.

Digital Health and System Innovation

In recent years, Dr. Naheed has expanded her research to include digital health technologies and data-driven health systems. Recognizing the rising burden of chronic diseases, she led the development of a digital health platform, which integrates mobile health tools with community-based hypertension management.

The platform builds on the Control of Blood Pressure and Risk Attenuation (COBRA-BPS) program, which introduced a primary care model for hypertension management across Bangladesh, Pakistan, and Sri Lanka.

Her team also developed Bangladesh's first digital registry for pediatric NCDs using the OpenMRS platform, along with a monthly reporting system integrated into the national DHIS2 health data system. These digital tools enable healthcare providers to track patient data, monitor disease trends, and improve coordination among healthcare facilities.

Such systems play an increasingly important role in strengthening health services and ensuring that care reaches vulnerable populations.

Addressing the Rise of Non-Communicable Diseases

Non-communicable diseases now account for more than half of Bangladesh's annual mortality and approximately 61 percent of the country's total disease burden. Dr. Naheed's research highlights the growing urgency of addressing these conditions.

In 2021, she led a nationwide study examining the health status of older adults in Bangladesh. The study surveyed 2,795 individuals aged 60 and above and found that four out of five were living with at least one chronic condition, including hypertension, diabetes, depression, or dementia.

The research also revealed disparities in healthcare access, particularly among women and economically disadvantaged populations. These findings underscored the importance of strengthening primary healthcare systems and expanding support for aging populations.

Dr. Naheed continues to advocate for prevention and early detection as central strategies, pushing for stronger primary care systems, expanded screening programs, and health promotion initiatives to address the rising burden of chronic disease and support healthy aging in Bangladesh.

Scientific Leadership and Mentorship

Dr. Naheed's contributions to public health research have been widely recognized. In 2024 she was elected Fellow of The World Academy of Sciences (TWAS), and in 2022 she became a Fellow of the Bangladesh Academy of Sciences. She also received the BAS Sultan Ahmed Choudhury Gold Medal in Science and Technology in 2021.

She also has received several awards for her health innovations for improving health of the poor that include, Rotary International Award, Nandos Women Leadership Award, Columbus Foundation Fellowship, BMJ Award South Asia, and Grand Challenge Canada's Stars in Global Health.

Beyond research, she has played an important role in building scientific capacity. She founded the Clinical Research Platform Bangladesh, a collaborative initiative that has trained more than 200 clinicians in research methods, protocol development, and scientific writing. She also established the Women Scientists and Researchers Forum at icddr,b to support women scientists through mentorship, leadership training, and career development opportunities.

Science for Health Systems and Equity

Dr. Aliya Naheed's career demonstrates how research, technology, and policy can work together to strengthen public health systems.

Through her work in epidemiology, digital health innovation, and research training, Dr. Naheed has helped improve disease surveillance, diagnostics, and healthcare delivery in Bangladesh. She also pioneered a standardized digital healthcare model in South Asia that integrates multisectoral interventions to reduce salinity in drinking water sources and lower cardiovascular disease risks among climate-vulnerable coastal communities in Bangladesh. Her work continues to shape national health programs while advancing international collaborations focused on disease prevention and health system resilience.

Dr. Carmencita D. Padilla

NATIONAL ACADEMY OF SCIENCE AND TECHNOLOGY PHILIPPINES

Building a National System to Save Newborn Lives

For more than three decades, Dr. Carmencita D. Padilla has played a central role in improving newborn health in the Philippines. What began as a small research initiative in the 1990s has grown into a nationwide newborn screening program implemented in thousands of hospitals and birthing centers across the country. Through her work in genetics, public health, and policy, Dr. Padilla demonstrated how scientific research can shape national health systems and prevent life-threatening conditions in infants.

Newborn screening is widely recognized as one of the most effective strategies for detecting treatable diseases shortly after birth. By identifying metabolic and genetic conditions early, treatment can begin immediately, preventing severe complications, lifelong disability, or death. Dr. Padilla has emphasized that newborn screening is an essential public health intervention that allows early detection of conditions that may otherwise remain invisible until serious symptoms appear, "newborn screening is recognized worldwide as an essential public health program for early detection of conditions that cause death or mental and physical disabilities."[3]

Through her efforts, this approach became integrated into the Philippine health system, contributing to Sustainable Development Goal 3 (Good Health and Well-Being).

Building the Foundations of Genetics in the Philippines

Dr. Padilla began her career in medicine after earning her Doctor of Medicine degree from the University of the Philippines College of Medicine. She completed her residency in pediatrics at the Philippine General Hospital and later pursued specialization in clinical genetics at the Royal Alexandra Hospital for Children in Sydney, Australia. Recognizing that health programs also require supportive policy frameworks, she later completed a Master of Arts in Health Policy Studies at UP Manila.

When Dr. Padilla returned to the Philippines in the late 1980s, the field of medical genetics was still developing in the country. Clinical services were limited, and laboratory facilities were scarce. Rather than viewing these limitations as barriers, she worked to establish the foundations of the field.

In 1991, she organized the country's first clinical and laboratory-based genetic services at the Philippine General Hospital. These services later expanded into the Institute of Human Genetics at the National Institutes of Health, which now provides diagnostic services, research support, and clinical expertise to physicians across the Philippines.

Dr. Padilla also emphasized the importance of training future specialists. She helped establish the Clinical Genetics Fellowship Program in 2000 and later the Master of Science in Genetic Counseling program in 2011. These programs created opportunities for Filipino physicians and health professionals to pursue advanced training locally and helped develop a growing community of specialists in genetic medicine.

From Pilot Study to National Program

Dr. Padilla is best known for introducing newborn screening in the Philippines. In 1996, she led a pilot research project involving 24 hospitals that screened newborns for several metabolic and genetic conditions using a small blood sample collected from the infant's heel. The study showed that early diagnosis could significantly reduce severe health outcomes when treatment began soon after birth.

Transforming research into policy required sustained advocacy. Dr. Padilla and a coalition of health professionals worked to promote newborn screening as a national health priority. Their efforts led to the passage of Republic Act 9288, the Newborn Screening Act of 2004, which integrated screening into the country's national health system and designated the Department of Health as the lead implementing agency.

The findings of the pilot study demonstrated that early diagnosis could significantly reduce the risk of severe health outcomes if treatment began soon after birth. As Dr. Padilla explained, “It is important that disorders are screened at birth so that treatment can begin early, and so associated disabilities may be minimized.”[4]

Today, newborn screening is implemented in more than 7,000 health facilities across the Philippines. Millions of infants have been screened since the program began, and more than 300,000 babies have avoided severe disability or death through early diagnosis and treatment.

Expanding the Scope of Screening

As laboratory technologies advanced, the newborn screening program expanded beyond the initial set of disorders. Dr. Padilla also supported broader approaches to screening that include sensory impairments, congenital heart disease, and certain visible birth defects.

International public health frameworks now recognize that newborn screening may include tests for hearing and vision, congenital heart disease, and structural conditions such as neural tube defects and oral clefts. In the Philippines, the nationwide network of screening centers provides a platform for expanding these approaches and strengthening early detection of congenital conditions.

Dr. Padilla has emphasized that early detection programs are particularly valuable for countries with limited health resources. By identifying conditions early, health systems can prevent long-term complications and reduce the social and economic burden of untreated disease.

Science, Policy, and Institutional Leadership

Dr. Padilla’s career illustrates how scientific research can influence public policy and health systems. Her advocacy also contributed to the passage of the Rare Disease Act of 2016, which strengthened support for individuals living with rare conditions in the Philippines.

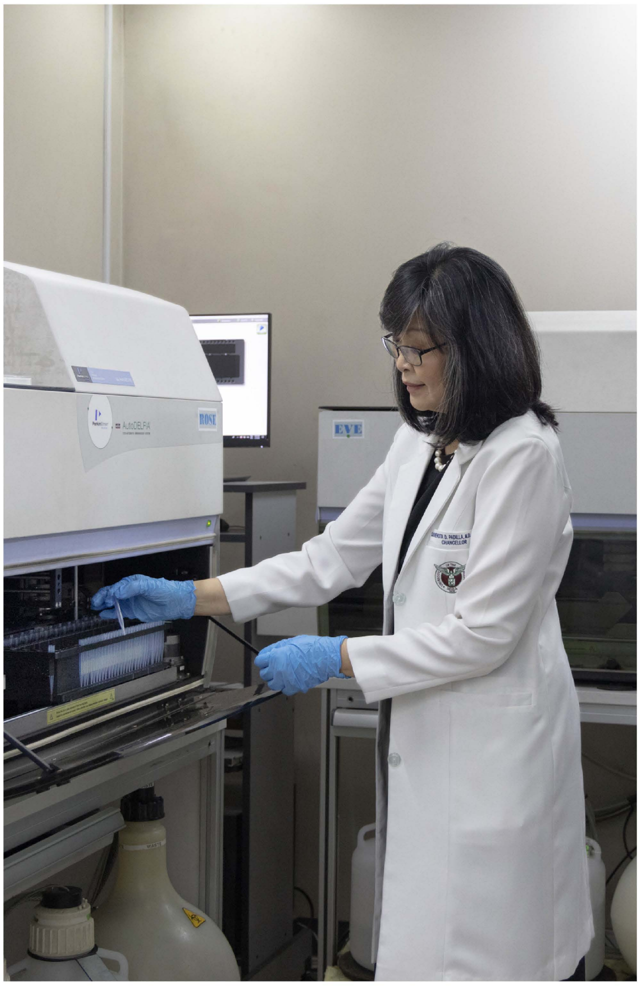
She was also part of the core group that established the Philippine Genome Center in 2009 and later served as its Executive Director from 2011 to 2016. From 2014 to 2023, Dr. Padilla served as Chancellor of UP Manila, leading an academic community that includes programs in medicine, nursing, dentistry, pharmacy, public health, and allied health sciences, while overseeing the Philippine General Hospital and the National Institutes of Health.

A Legacy of Public Health Innovation

Dr. Padilla’s work demonstrates how scientific innovation can evolve into sustainable public health systems. The newborn screening program she helped establish now operates as a nationwide network linking hospitals, laboratories, public health agencies, and policymakers.

Looking back on the years of advocacy required to establish newborn screening nationwide, Padilla has often emphasized the importance of persistence. “Dealing with a government is hard,” she reflected, “but you need to persevere and keep sharing your vision until they see it too.”[5]

In recognition of her contributions, she was named National Scientist of the Philippines in 2023, with the title formalized through Presidential Proclamation No. 642 in 2024.



Dr. Rana Sanyal

RS RESEARCH

Redefining Laboratory Discoveries to Serve Society

Professor Rana Sanyal is an internationally recognized scientist whose pioneering contributions in chemistry, biotechnology, and nanomedicine have significantly advanced global efforts toward the United Nations Sustainable Development Goals (SDGs), particularly SDG 3 (Good Health and Well-Being), SDG 9 (Industry, Innovation and Infrastructure), and SDG 17 (Partnership for the Goals), as well as having an inspirational impact on SDG 5 (Gender Equality). Through her groundbreaking work on targeted polymer–drug conjugates, innovative therapeutic platforms, and translational nanomedicine, she has redefined how laboratory discoveries can be transformed into real-world clinical solutions that improve human health.

Early Exposure

Dr. Sanyal earned her undergraduate degree in Chemical Engineering from Boğaziçi University in Türkiye and completed her PhD in Chemistry at Boston University in the United States. She began her professional career as a research scientist at Amgen Inc. in California, where she worked on oncology and neurology drug discovery. This early exposure to industrial-scale pharmaceutical innovation deeply shaped her understanding of how scientific discoveries transition from the laboratory to patient care.

In 2004, she joined Boğaziçi University as a faculty member in the Department of Chemistry. During this time, she established her laboratory, focusing on targeted drugdelivery systems and development of novel materials for biomedical applications.

Bridging Fundamental Research and Clinicam Application

At the core of Dr. Sanyal's scientific impact is her commitment to bridging fundamental research to clinical application. Her work in drug delivery systems and nanomedicine focuses on designing highly targeted therapies that minimize the harmful side effects of conventional chemotherapy while maximizing therapeutic effectiveness. Her research not only contributes to scientific advancement but also directly responds to urgent global health challenges, particularly in oncology.

Dr. Sanyal has also played a key role in building institutional structures that support interdisciplinary innovation. As the Director of the Center for Life Sciences and Technologies (LifeSci) at Boğaziçi University, she has created a collaborative platform that brings together scientists, engineers, and clinicians to accelerate translational research. She also serves on the managerial board of the Center for Targeted Therapy Technologies (CT3), further strengthening the link between academia, healthcare systems, and industry.

Her entrepreneurial leadership extends to the co-founding of RS Research, a biotechnology company that develops next-generation nanomedicines for cancer therapy. RS Research stands as a landmark achievement in Türkiye's biotechnology ecosystem, having advanced a drug candidate from basic research to clinical trials for the first time in the country's history, while retaining full intellectual property ownership. This milestone demonstrates her ability not only to generate scientific knowledge but also to translate it into tangible healthcare innovations with global relevance while building an ecosystem of partnerships around it. Her goal has always been to contribute to the ecosystem by sharing know-how and partnership experience, helping other innovators advance their inventions to reach human use.

In an interview with the European Research Executive Agency, Dr. Sanyal shares how motivated she is about her work, "I am most passionate about making a difference in people's lives. This has led me to develop the first-ever novel drug candidate of Türkiye, reaching patients at Phase I clinical trials."[6] Today, she is proud to successfully advance this candidate through the completion of its Phase 1 clinical trials.

Dr. Sanyal's contributions include a broad patent portfolio, an h-index of 42, leadership of 40 major research projects, and the mentorship of numerous graduate students. These accomplishments reflect a sustained and highly productive research

career grounded in innovation, leadership, and knowledge transfer. Her scientific output has positioned her as a leading figure in nanomedicine and translational chemistry internationally.

Advocating Women's Participation

As a prominent woman scientist in STEM, Dr. Sanyal has consistently advocated for increased representation and leadership opportunities for women in scientific research and entrepreneurship. At Boğaziçi University alone, her mentorship has supported hundreds of students, including a significant proportion of young women who have gone on to pursue careers in science and technology. Within RS Research, 80% of her team members are women, reflecting her belief that diversity enhances innovation and decision-making.

"Out of the 400 undergraduate and graduate researchers who have joined my lab over the past 20 years, 300 were women. There's no gender when we wear our lab coats. In my lab and start-up, I've asked job applicants the most difficult questions. And it wasn't surprising that female

Global Recognition

Dr. Sanyal's influence extends beyond institutional leadership to global recognition. In 2004, she was the receipient of FP6 Marie Curie International Reintegration Grant (IRG) on drug delivery systems which served as a vital resource for her newly established independent research laboratory at Boğaziçi University. As the first Marie Curie IRG project funded in Türkiye, it marked a significant milestone in her career and research, while also inspiring future researchers.

She has also received several prestigious awards, including the EIC European Prize for Women Innovators (EISMEA & EIT, 2023-2024), the Cartier Women's Initiative Global Science & Technology Fellowship (2021), and the TÜBA Young Investigator Award (2011). These honors highlight her dual impact as both a scientific innovator and a leader advancing inclusive scientific ecosystems.

Mentoring Women Scientists

Aside from her scientific and entrepreneurial achievements, Dr. Sanyal is also known for her authenticity and mentorship. She openly reflects on the challenges of scientific work, emphasizing resilience, persistence, and curiosity as essential traits for success. She actively uses her visibility as an award-winning scientist to inspire young researchers, particularly women, across Türkiye, Europe, the Middle East, Africa, and beyond.

Dr. Rana Sanyal's work from molecular design to clinical translation, from academic leadership to entrepreneurship, demonstrates how science can directly serve society. At the same time, her commitment to gender equality and mentorship ensures that future generations of scientists will inherit not only knowledge and technologies but also a more inclusive, collaborative, and equitable scientific landscape.

Chapter 3

SDG 4: Quality Education

Dr. Sony Baral

TRIBHUVAN UNIVERSITY

Bridging Forest Science and Community Stewardship

Forests shape much of Nepal's ecological and social landscape. They regulate water systems, sustain biodiversity, and support the livelihoods of millions of people living in mountain communities. Managing these forests, however, requires more than ecological knowledge. It requires understanding economics, governance, and the realities faced by people who depend on forest resources.

Dr. Sony Baral, Associate Professor at the School of Forestry and Natural Resource Management, Institute of Forestry, Tribhuvan University, has built her career around these connections. Through interdisciplinary research that integrates environmental economics, natural resource management, and policy analysis, she has contributed to strengthening sustainable resource governance in Nepal while advancing opportunities for women in environmental science.

Advancing Knowledge on Environmental Policy

Dr. Baral's academic journey began in Nepal at the Institute of Forestry of Tribhuvan University, where she studied forestry and natural resource management. Growing up in a country where forests are closely tied to daily life, she developed an early interest in understanding interdependences between ecosystems and rural livelihoods. The challenges she observed—particularly the need to balance conservation with economy, which latter became central to her research.

Her studies eventually brought her to the University of Natural Resources and Life Sciences (BOKU) in Vienna. There, she completed a Master's degree in Mountain Forestry in 2008 and later a PhD in Green Economy in 2019, supported by international scholarships, including funding from the Austrian Development Cooperation. Reflecting on this period, Dr. Baral described her experience abroad as transformative, noting that her time in Austria broadened her knowledge and helped strengthen her career as a researcher.

Integrating Green Economy into Forestry

Dr. Baral's doctoral research examined how community-managed forests contribute to the development of a green economy. Nepal's community forestry system allows local user groups to manage forest resources through participatory governance structures. While widely recognized as a successful model, the system also raises complex questions about sustainability, equity, and economic opportunity.

Her research explored these issues through an interdisciplinary framework linking ecological science with environmental economics. Using what she describes as the "4Ps"—people, perspectives, policy, and practices—Dr. Baral analyzed how community forestry initiatives contribute to resource sustainability, human well-being, and low carbon emissions.

Learning from Mountain Communities

Learning from the community has been central to Dr. Baral's research. Much of her work involves collaborating with community-based forest management practices, where forests and rural livelihoods are closely interconnected. These focused on examining how local governance systems influence forest management practices and community well-being.

Working in these environments has also meant navigating a professional field traditionally dominated by men. By conducting field-based research in remote areas, Dr. Baral has helped challenge assumptions about women's roles in forestry research and environmental policy.

Advancing Women's Leadership in STEM

Dr. Baral's influence extends beyond research into institutional leadership. She currently serves as Associate Professor and Director of the School of Forestry and Natural Resource Management at the Institute of Forestry, Tribhuvan University.

Recognizing the lack of institutional mechanisms addressing gender inclusion, she led the development of the university's first Gender and Social Safeguard Strategy. The initiative integrates gender-sensitive approaches into academic programs, research funding, faculty recruitment, and student engagement. These efforts contribute to SDG 5 (Gender Equality) and SDG 4 (Quality Education) by promoting more inclusive STEM learning environments. She is the one to prepare the first Gender Equality, Disability, and Social Inclusion (GEDSI) and Social Safeguarding Action Plan 2026-2030 policy document for the Institute of Forestry, and this document is the first GEDSI document in the Tribhuvan University, Nepal.

Connecting Science, Policy and Communities

Beyond academia, Dr. Baral has collaborated with organizations such as IUCN, UNDP, and UN Women on projects related to climate resilience, forest governance, and sustainable development. She has contributed to the preparation and revision of various policy documents, including the National Nature Conservation Strategic Framework (2015–2030) for the National Planning Commission; the Policy and Institutional Analysis of the Ministry of Forests and Environment; the Climate Change Policy (2019) of the Ministry of Forests and Environment; and the National Hazard Assessment (2011) of the Ministry of Home Affairs, among others. She is also the founding chairperson and Executive Director of The Resource Nepal, an organization established in 2012 to promote research on environmental sustainability and nature-based solutions.

Through her research, leadership, and collaboration with communities and institutions, Dr. Baral has demonstrated how environmental science can contribute to both ecological sustainability and social inclusion. Her work highlights the importance of linking scientific research, policy development, and community engagement to ensure that forests continue to support both ecosystems and human livelihoods.

Her work has also informed policy discussions in Nepal. She participated in the review of the country's Climate Change Policy (2019), where she emphasized the importance of integrating environmental protection with economic resilience in forest governance.

Dr. Cleofas R. Cervancia

NATIONAL ACADEMY OF SCIENCE AND TECHNOLOGY PHILIPPINES

Bee Science, Pollinator Conservation, and Community Livelihoods

Across farms, forests, and coastal ecosystems, bees perform one of nature's most important ecological functions: pollination. By transferring pollen between flowers, they support plant reproduction, sustain crop production, and help maintain biodiversity. In the Philippines, research on pollinators and the development of beekeeping technologies have been shaped significantly by the work of Dr. Cleofas R. Cervancia, an entomologist at the University of the Philippines Los Baños (UPLB). For more than four decades, Dr. Cervancia has advanced research on bees and pollination while translating scientific knowledge into practices that benefit farmers, communities, and ecosystems.

Known among students and colleagues as the "queen bee" of the UPLB Bee Program, Dr. Cervancia helped build a field of study that connects entomology, ecology, agriculture, and community development.

Academic Training and Early Research

Cervancia began her scientific career at UPLB, where she earned a Bachelor of Science in Agriculture majoring in Entomology in 1968. Her early work focused on agricultural insect pests, including the biology of the corn seedling maggot (Atherigona oryzae), a species that affects crop production. She continued her postgraduate training at the same institution, completing a Master of Science in Entomology in 1972 and later earning a PhD in Entomology and Insect Ecology in 1981.

Her doctoral studies deepened her interest in ecological relationships between insects and plants. Recognizing the importance of pollinators in agriculture, she pursued postdoctoral training in apiculture and pollination biology at the University of Wales in Cardiff in 1986 and again in 1991. These experiences strengthened her research focus on bees as essential components of both natural ecosystems and agricultural landscapes.

The UPLB Bee Program

In 1989, Dr. Cervancia became one of the founding members of the UPLB Bee Program, an initiative designed to strengthen research and training in bee science in the Philippines. At the time, systematic studies on pollinators and beekeeping technologies in the country were limited. The program aimed to generate scientific knowledge while providing practical guidance for farmers and beekeepers.

Over time, the Bee Program grew into a multidisciplinary research and extension initiative supporting beekeeping across the Philippines. Dr. Cervancia played a key role in its development. Under her leadership, the program was later recognized as a National Center of Excellence for Bee Research and Development.

Training and outreach became central components of the program. Dr. Cervancia regularly served as a resource person in workshops and community training sessions, sharing knowledge on bee management, pollination ecology, and the production of honey and other bee products.

Stingless Bees and Pollination Research

Much of Dr. Cervancia's research focuses on stingless bees, particularly Tetragonula biroi, a native bee species in the Philippines. Through field studies on pollination biology, she and her colleagues documented the important role these bees play in agricultural systems.

Their research demonstrated that stingless bees are key pollinators for several crops. In mango orchards, for example, the presence of these bees was associated with yield increases of up to 49 percent. These findings highlighted the importance of conserving pollinator populations in agricultural landscapes.

Her studies also examined bee behavior, including foraging patterns, nesting habits, and colony dynamics across different ecosystems.

These insights helped farmers understand how pollination services can be integrated into crop production.

Developing Bee-keeping Technologies

Beyond academic research, Dr. Cervancia helped develop practical technologies to support beekeeping and pollinator management. These innovations include methods for propagating stingless bees using coconut shells, techniques for harvesting honey, pollen, and propolis, and guidelines for managing indigenous bee species.

in Lanao del Sur and Mangyan communities in Mindoro. Participants received training in sustainable beekeeping, honey processing, and value-added product development.

Her work also addressed ecological recovery after Typhoon Haiyan (Yolanda) in 2013, when many communities lost both crops and pollinator populations. In response, Dr. Cervancia and her collaborators launched a Pollinator Restoration initiative in areas such as Tarong in Carles, Iloilo, and Maliwaliw in Eastern Samar.

The program also documented sustainable harvesting methods for giant honey bees (Apis dorsata and Apis breviligula) and promoted the cultivation of other native species such as Apis cerana. These technologies allowed farmers to integrate beekeeping into agricultural systems while producing honey and other bee products as additional sources of income.

Through projects supported by the Department of Agriculture–Bureau of Agricultural Research, these technologies were shared with communities across Luzon and other regions.

Community Livelihoods and Pollinator Restoration

Community engagement has been central to Dr. Cervancia's work. Through the UPLB Bee Program, she helped establish community-based beekeeping enterprises in several regions of the Philippines, including Muslim communities

"The most rewarding training for me is on pollinator restoration,"[8] Dr. Cervancia said.

Reflecting on the results, she later observed: "we were very happy when we returned; in a year, the colonies had expanded, and the bees were strong. Finally, these places had pollinators again."

Dr. Cervancia has also contributed to international collaboration in pollinator research. From 2011 to 2022, she served as President of the Apimondia Asia Commission, becoming the first Asian woman to hold the position.

Even after retiring from UPLB in 2012, she has remained active in research, mentorship, and community training. Her decades of work in pollination biology and beekeeping proved how scientific research can support environmental stewardship while strengthening rural livelihoods.

Dr. Sabrina Elias

INDEPENDENT UNIVERSITY, BANGLADESH

Advancing Genomics Research and Scientific Capacity in Bangladesh

Scientific research today increasingly addresses interconnected challenges in agriculture, the environment, and technology. In Bangladesh, Dr. Sabrina M Elias has contributed to this evolving landscape through work that combines molecular biology, genomics, and bioinformatics. As an Associate Professor in the Department of Life Sciences at Independent University, Bangladesh, she engages in research, teaching, and scientific capacity building focused on plant genomics, microbial systems, and interdisciplinary STEM education.

Her work connects life sciences with computational analysis. Through collaborations with universities, research institutes, and medical institutions, Dr. Elias applies genomic and bioinformatic tools to study crop resilience, microbial applications, and biotechnology. These research directions reflect broader efforts within Bangladesh to strengthen scientific research while addressing challenges such as climate change, food security, and sustainable resource management.

Dr. Elias describes her approach to science in simple terms. “I think I am an enthusiastic explorer of life,” she said in an interview with Scientific Bangladesh. “By profession, I am an educator and researcher, but I prefer not to confine myself to an adjective or defined designation.” The statement reflects a career shaped by curiosity, collaboration, and interdisciplinary work.

Academic Foundations in Molecular Biology

Dr. Elias obtained her Bachelor of Science (Honours) and Master of Science in Biochemistry and Molecular Biology from the University of Dhaka. She later completed her PhD in Plant Genomics and Quantitative Genetics at the same university through an international collaboration involving the University of Nebraska–Lincoln, the University of Texas at Austin, and the International Rice Research Institute in the Philippines.

Her doctoral research investigated the genetic basis of salt tolerance in rice landraces native to Bangladesh. Using genomic, transcriptomic, and phenotypic analyses, the research examined how local rice varieties adapt to environmental stress. The project allowed her to work in multiple international laboratories, gaining exposure to different research methods and collaborative scientific environments.

Research on Crop Resilience

Much of Dr. Elias’s research focuses on improving crops that can withstand environmental stress, particularly soil salinity. This issue is increasingly important in Bangladesh, where rising sea levels and changing environmental conditions affect agricultural productivity.

Her doctoral work identified genes and quantitative trait loci associated with salt tolerance in rice. These findings provide valuable knowledge for crop improvement programs aimed at developing more resilient rice varieties. Following her PhD, Dr. Elias continued exploring these mechanisms through functional genomics.

Her current research includes approaches such as marker-assisted breeding, molecular cloning, and CRISPR-Cas9-based genome editing. Describing the direction of her work, she explained: “Currently, I am trying to focus on doing functional genomics studies to understand the salt tolerance mechanism in rice and help in the development of salt-tolerant high-yielding rice.” Recently, she has started working on understanding the heat stress tolerance in plants as well.

Apart from crop genomics, Dr. Elias has expanded her work into microbial genomics, examining microbial communities for applications in environmental remediation and biotechnology. She has also contributed to the development of point-of-care diagnosis kits utilizing LAMP technology with collaborators. Earlier in her career, she also contributed to Bangladesh’s first national genome sequencing initiative, the jute genome project, which generated genomic resources for one of the country’s major agricultural crops.

Teaching and Scientific Capacity Building

Alongside research, Dr. Elias has developed a substantial teaching portfolio at Independent University, Bangladesh. She teaches courses in genomics, bioinformatics, biostatistics, experimental design, research methodology, etc.—fields that require interdisciplinary training across biology, statistics, and data science.

Through teaching, mentorship, and training initiatives, she introduces students to emerging research tools such as genomic data analysis and computational biology. She is also training the next generation of scientists in cloning and genome editing-based molecular laboratory work. Dr. Elias has also contributed as a resource person in several bioinformatics workshops and training programs, supporting the development of early-career researchers. These efforts contribute to Sustainable Development Goal 4 (Quality Education) by strengthening STEM training and supporting the development of scientific skills among university students and early-career researchers.

Dr. Elias emphasizes that research requires both imagination and persistence. “A researcher needs to be creative to imagine and develop ideas,” she explained. “But only dreaming does not work in the real world.”

Leadership and Collaboration

Dr. Elias has also contributed to scientific leadership and research communities. From 2020 to 2023, she served as Secretary of the National Young Academy of Bangladesh, where she helped organize workshops and policy discussions supporting early-career researchers.

Reflecting on the evolving role of scientists, Dr. Elias noted that research today requires more than laboratory work: “In addition to research work, it involves mentoring, networking, writing, presenting, and most importantly, the ability to think.” She also highlighted that beyond scientific inquiry, a researcher must function as a manager—handling research grants, coordinating team efforts, and ensuring the smooth operation of laboratory activities.

Dr. Elias’s work has been recognized through international fellowships and awards. She has been selected as a Young Affiliate of The World Academy of Sciences (TWAS) and is also a member of the Global Young Academy. Her doctoral research was supported by the Beachell–Borlaug International Scholars Fellowship, and she later received the Beachell–Borlaug Impact Award for contributions to agricultural biotechnology. Her current research works are being supported by national and international research funds.

Dr. Sabrina M Elias continues to contribute to strengthening genomics research and scientific capacity in Bangladesh while addressing challenges that connect agriculture, environment, and technology. She always acknowledges the contributions of her family, collaborators, students, and her mentor in this mutual journey.

Dr. Gahgene Gwon

SEOUL NATIONAL UNIVERSITY

Human-Centered Artificial Intelligence for Learning and Well-Being

As artificial intelligence becomes increasingly embedded in everyday technologies, questions about how these systems shape learning, behavior, and well-being have become central to research in computer science and education. Among the scholars working at this intersection is Dr. Gahgene Gweon, a researcher in human–computer interaction (HCI), artificial intelligence, and learning sciences at Seoul National University. Through her work on intelligent learning systems and data-driven models of student behavior, she has advanced a vision of artificial intelligence that is technically sophisticated yet deeply attentive to human needs.

At the Cognitive Computing Lab (CCLab) at Seoul National University, which she directs, Dr. Gweon leads interdisciplinary research on AI-driven educational technologies, explainable AI, and learner modeling. Her work connects computational methods with insights from psychology and education, aiming to design systems that better understand how people learn

Academic Formation and Interdisciplinary Thinking

Dr. Gweon's academic background reflects the interdisciplinary perspective that defines her research. She earned dual bachelor's degrees in Computer Science and Economics from the University of California, Berkeley in 2002 before pursuing graduate studies in Human–Computer Interaction at Carnegie Mellon University.

At Carnegie Mellon, a leading center for HCI research, she completed a Master's degree in Human–Computer Interaction in 2004 and later earned her PhD in Human–Computer Interaction in 2012 under the supervision of Professor Carolyn P. Rosé, a scholar in learning technologies and computational linguistics.

Her doctoral research explored how computational systems can analyze human behavior in collaborative learning environments, a theme that later became central to her work in educational artificial intelligence.

Artificial Intelligence and the Science of Learning

A central focus of Dr. Gweon's research is understanding how artificial intelligence can support learning while remaining attentive to the human processes behind it. Rather than designing technology simply for technological advancement, her work begins by examining what learners actually need.

As she explains in discussions of human-centered AI, "despite impressive demonstrations of AI technology, building systems that genuinely influence our everyday lives requires understanding the human needs preceding technology."

Her research examines patterns such as problem-solving strategies, hint usage, hesitation patterns, and repeated errors in digital learning environments. By analyzing these behavioral signals, AI systems can identify when students struggle, what concepts they misunderstand, and what forms of support may help them progress.

Such insights enable adaptive learning technologies that respond to individual learning needs rather than assuming that all students learn in the same way.

Reimagining Education with AI

Artificial intelligence, she argues, offers tools for recognizing these differences and responding to them in real time. By analyzing how students interact with digital learning systems, AI can detect patterns that reveal how students think and where they encounter difficulties.

As she explains, "AI allows us to capture these differences through data. It can notice how a student solves a problem, where they hesitate, where they take hints, and what kinds of mistakes they repeat."[9]

Rather than simply marking answers as correct or incorrect, intelligent tutoring systems can respond with prompts, explanations, or guiding questions that help learners build deeper understanding.

Despite rapid advances in artificial intelligence, Dr. Gweon emphasizes that AI should support educators rather than replace them. As she notes, "AI doesn't replace great teachers. It makes great teachers shine."'

In this model, AI systems handle routine tasks such as drills, practice exercises, or basic feedback. This allows teachers to focus on mentoring students, encouraging creativity, and guiding critical thinking.

Global Education Impact

Dr. Gweon's research has also been applied in real-world educational settings. One notable project involved the Global Learning XPRIZE, an international competition focused on developing scalable learning technologies for children in low-resource environments.

She served as the data analysis lead in the development of Kitkit School, a tablet-based learning platform created by the educational technology company Enuma. The project analyzed behavioral data generated by thousands of children in rural Tanzania who used the learning application independently over a fifteen-month period.

Her analysis focused on patterns of engagement and learning progression among children with little or no prior literacy experience. The insights helped improve the platform's design and evaluate its effectiveness. Kitkit School ultimately became one of the two grand prize winners of the 2019 Global Learning XPRIZE, demonstrating how AI-supported technologies can expand educational access for underserved populations.

Mentorship and the Future of Human-Centered AI

In addition to research, Dr. Gweon has supported initiatives promoting gender equality in STEM. For more than a decade she has served as a delegate member of the Women Faculty Council at Seoul National University, contributing to institutional efforts that expand women's leadership in science and engineering.

Through the Cognitive Computing Lab, she mentors graduate students working at the intersection of computer science, data science, and cognitive psychology. Many of her students pursue interdisciplinary careers connecting artificial intelligence with social impact.

At the center of her work is a consistent principle: technology should be designed around human understanding rather than technological novelty. By integrating insights from computer science, psychology, and education, Dr. Gahgene Gweon continues to shape the development of human-centered artificial intelligence and its potential to transform how people learn, interact, and thrive in a digital world.

Saeko S. Hayashi

THE UNIVERSITY OF TOKYO

Building the Instruments that Expand Our View of the Universe

Astronomy often captures public imagination through images of distant galaxies and newly discovered planets. Yet behind every discovery lies a long process of engineering, calibration, and collaboration that allows scientists to observe the universe with increasing precision. Dr. Saeko S. Hayashi has built her career at the intersection of astronomy, engineering, and science education. She is Project Professor and Administrative Director at the Kavli Institute for the Physics and Mathematics of the Universe (WPI), The University of Tokyo Institutes for Advanced Study, The University of Tokyo. Through her work on major telescope projects and her commitment to outreach, she has helped strengthen both the infrastructure of modern astronomy and opportunities for future generations to engage with science.

Learning to Look Up

Dr. Hayashi's curiosity about the universe developed during a period when scientific achievement captured global attention. Born in Japan in 1958, she grew up during the country's rapid societal, economic, and technological transformation. One moment that stayed with her was the Apollo 11 moon landing in 1969. Watching the broadcast as a young student, she recalls her teacher explaining that "this is what human beings are capable of accomplishing when they work together."[10]

Books also nurtured her interest in space. Before the internet era, libraries provided a window to distant worlds. She read widely, including works by Isaac Asimov and Arthur C. Clarke, which gradually transformed her fascination with space into a decision to pursue astronomy.

Choosing science, however, was uncommon for girls in Japan at the time. Reflecting on her high school years, she later observed that "even today, it's pretty uncommon for Japanese girls to choose the math and science track. Back when I was in high school, it was very unusual indeed."

Entering Astronomy

Determined to pursue astronomy, Dr. Hayashi's determination led her to apply to the University of Tokyo, one of Japan's most prestigious institutions. In The Sky is for Everyone: Women Astronomers in Their Own Words (2022), she recounts the experience of taking the national entrance examination there. Arriving from rural northern Japan, she entered examination rooms filled entirely with boys. Even the building's facilities reflected the gender imbalance. One restroom carried a temporary paper sign explaining that girls could use it during the examination.

She completed her Bachelor of Science in 1982, a Master of Science in Astronomy in 1984, and a Doctor of Science in Astronomy in 1987, becoming the first woman to earn a doctorate in astronomy from the university.

During graduate school, she chose to study star and planetary system formation, a topic that was still considered unconventional in Japanese astronomy at the time. She believed that understanding how stars and planets form would become central to the field.

Working at the Frontiers of Telescope

An important stage of her early training took place at the Nobeyama Radio Observatory, where graduate students participated directly in telescope operations. Long nights and days spent calibrating receivers and adjusting instruments taught her that astronomy depends heavily on engineering as well as observation itself, with and from the 45-m radio telescope for mm wave observations.

After completing her doctorate, Hayashi joined the James Clerk Maxwell Telescope (JCMT) in Hawai'i, a 15-m radio telescope for submm wave observations, where she worked on improving the telescope's observational performance through calibration and testing. The work required long hours at high altitude, but it also exposed her to international collaboration. As she later reflected, “the minute you leave Japan, you’re in a different world, where no one cares if you’re a woman or an Asian… as long as you work hard and get results.”

Her expertise later brought her into one of Japan’s most ambitious projects: the Subaru Telescope, an 8.3-meter optical and infrared telescope in Hawai‘i. Dr. Hayashi contributed to the design, fabrication, and commissioning of the telescope’s optical systems and worked directly with teams responsible for maintaining its mirror surfaces and coatings.

Opening Astronomy to the Public

Beyond research and engineering, Dr. Hayashi has played a significant role in science communication. While working at the Subaru Telescope, she founded the Public Outreach and Information Office, which shared the stories behind the observatory’s scientific and engineering achievements with audiences in Japan and Hawai‘i.

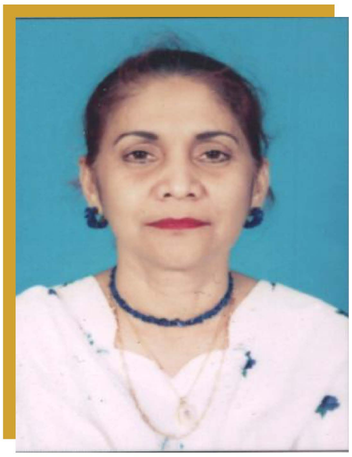
During nearly twenty-five years in Hawai‘i, she also organized outreach programs and workshops at work and off hours from work for students, particularly encouraging girls and underrepresented communities to explore careers in science and engineering. These initiatives contribute to Sustainable Development Goal 4 (Quality Education) by expanding access to STEM learning and helping students see how fun science is and anybody, everybody, can take part in advancing the knowledge.

Leadership and Future Exploration

Dr. Hayashi has also contributed to leadership in the scientific community. From 2017 to 2019 she served as Vice President of the Astronomical Society of Japan, supporting initiatives related to research integrity and gender equity in science.

She later joined the international Thirty Meter Telescope (TMT) project, coordinating aspects of mirror fabrication and optical coating technologies with international partners. Today she serves as Project Professor and Administrative Director at the Kavli Institute for the Physics and Mathematics of the Universe, and since 2024 she has also served as Deputy Director.

Reflecting on the future of astronomy, Hayashi offers a perspective that connects scientific discovery with human potential: “the sky does not have a limit since the Universe is expanding.” For Dr. Hayashi, that expanding universe represents not only new scientific knowledge but also expanding opportunities for future generations who will continue exploring the cosmos.



Dr. Azra Khanum

PIR MEHR ALI SHAH-ARID AGRICULTURE UNIVERSITY

Building Biochemistry Education and Research

In the early 1960s, when Dr. Azra Khanum was still in middle school, science was rarely considered a suitable career path for girls in many parts of Pakistan. Her interest in the subject was sparked by an inspiring teacher. As she later wrote, "*The way my science teacher explained concepts significantly enhanced my enthusiasm for the subject*." That interest became pivotal when students in her school were asked to choose between arts and science in the ninth grade.

Despite her strong inclination toward science, she was not informed that the subject was not for girls. "*I opted for science but was told that I had no choice at our school, unfortunately, so I had to select arts,*" she recalled. Rather than accepting this limitation, she and her classmates approached the school administration and advocated for change. The school eventually introduced science classes for girls – an achievement she later described as her "*humble start with passion and love for science*."

Academic Training

Dr. Khanum completed her Bachelor of Science in 1969 and went on to earn a Master of Science in Chemistry from the University of Karachi in 1971. Although she initially aspired to pursue medicine, circumstances directed her toward chemistry, which she admitted studying "*with a heavy heart.*"

A turning point came when she transitioned into biochemistry and molecular biology, a field that closely aligned with her intellectual interests. She completed her MPhil in Biochemistry and Molecular Biology from Islamabad University in 1976 and later earned her PhD in the same discipline from Quaid-i-Azam University in 1982.

From 1984 to 1987, she conducted postdoctoral research in Molecular Endocrinology at the National Institutes of Health (NIH) in Bethesda, Maryland, later returning as a visiting scientist. Reflecting on this phase, she described biochemistry as "a new opening that enabled me to develop my career and grow myself as a university science teacher and a scientist."

Teaching and Institution Building

Dr. Khanum's career has been defined by a strong integration of teaching, research, and academic leadership. She began as a lecturer and researcher and progressed to positions including Professor, Dean, Faculty of Sciences, and Visiting Professor at the University Institute of Biochemistry and Biotechnology at Pir Mehr Ali Shah-Arid Agriculture University in Rawalpindi. She also held key leadership roles such as Chairperson and Acting Vice-Chancellor.

Over several decades in higher education, she played a pivotal role in developing curricula in the biological sciences at the BS, MS, and PhD levels. Her efforts significantly strengthened laboratory training, research capacity, and faculty development. At Arid Agriculture University, she contributed to the expansion of biotechnology education and postgraduate research in the life sciences.

In parallel with her teaching, Dr. Khanum supervised research addressing pressing public health challenges. Together with her graduate students, she worked on developing cost-effective diagnostic tools and explored DNA-based vaccine strategies for tuberculosis, particularly in resource-limited settings. Her research group also examined genetic risk factors associated with stroke and neurological disorders, bridging laboratory science with medical relevance.

Education during the Pandemic

Dr. Khanum's decision to educate remained unwavering during the COVID-19 pandemic. Despite being in her seventies–a stage at which many might step back–she actively adapted to the transition to online learning. She candidly described feeling "*scrambling and very much stressed with the realization of my shortcomings.*" Nevertheless, she quickly learned to use digital platforms such as Zoom, Google Classroom, Microsoft Teams, and WhatsApp.

She observed that preparing online lessons demanded significantly more effort than traditional teaching, noting that a two-hour lecture could require "four to six hours of preparation and documentation".

Women in Science and Continuing

Dr. Khanum has been a strong advocate for women's participation in science and higher education. In her leadership roles, she helped establish institutional support structures, including initiating the creation of a daycare center for faculty members and serving as Chairperson of the Harassment Committee.

Her contributions have been recognized through national honors, including the Tamgha-i-Imtiaz (2008), the Pakistan Academy of Sciences Gold Medal (2003), and the Higher Education Commission Best Teacher Award (2001). Despite these accolades, teaching has remained central to her identity. As she stated, "*I have always loved teaching.*"

Through decades of teaching, mentorship, and academic leadership, Dr. Azra Khanum has made a lasting contribution to biochemistry education in Pakistan. Her efforts have not only strengthened scientific institutions but have also paved the way for future generations of scientists, particularly women, to pursue careers in science.

Dr. Asghari Maqsood

AIR UNIVERSITY

Building Physics Research and Education in Pakistan

In 1982, after completing her doctoral studies in Sweden, Dr. Asghari Maqsood returned to Pakistan and joined Quaid-i-Azam University in Islamabad. At the time, experimental materials research in the country was still developing. Within a few years, she established the Thermal Physics Laboratory, which would later train generations of postgraduate researchers and introduce new experimental methods to physics programs in Pakistan. The facility became one of the earliest centers in the country for research in advanced materials and thin film technologies.

Early Influences

Dr. Maqsood was born in Jhang, Pakistan, also known as the birthplace of Dr. Abdus Salam, the country's first Nobel Laureate in science. Even before meeting him, she encountered his influence through family conversations. Her brother had studied mathematics under Salam and often spoke about his dedication as a teacher.

Years later, Dr. Maqsood attended one of Salam's lectures during a visit to Pakistan and briefly spoke with him afterward. She later recalled that he simply encouraged her to work harder in research and teaching. The encounter strengthened her determination to pursue physics.

Her path to education required persistence. Growing up in a village where there were no schools for girls, she faced community resistance to female education. Her father, a schoolteacher, ensured that she could continue her studies by sending her to Abbottabad to live with her brother. There she excelled academically, placing first in her district in matriculation and later first in the Peshawar Board in her intermediate science examinations. These achievements opened the path to university study.

Training Across Institutions

Dr. Maqsood completed her BSc (Hons.) in Physics at the University of Dacca (now the University of Dhaka) in 1970. She then earned an MSc in Physics from the University of the Punjab in 1972, graduating with a gold medal. Her early research in nuclear physics was conducted under the supervision of Dr. Samar Mubarakmand, whom she later described as a demanding but supportive mentor.

In 1973, she joined Islamabad University (now Quaid-i-Azam University) as a lecturer in physics. She was the first woman teacher in the department, where many colleagues already held doctoral degrees. Determined to continue her own studies, she attended advanced lectures alongside her students and completed her MPhil in Physics in 1975 while teaching.

She later pursued further specialization abroad, earning an MSc in Materials Science from the University of Oxford in 1979 and a PhD in Physics from Gothenburg University in Sweden in 1982. During this period, she also trained at Uppsala University, developing expertise in solid-state physics and materials science.

Establishing Research Infrastructure

After returning to Pakistan, Dr. Maqsood focused on strengthening experimental research capacity. At Quaid-i-Azam University, she established the Thermal Physics Laboratory in collaboration with Swedish research partners. The facility introduced advanced techniques for studying thermal transport and electronic materials.

Over time, the laboratory became an important training center for postgraduate researchers. Many of its graduates later pursued academic and research careers in Pakistan and abroad. Dr. Maqsood also introduced thin film technology as a formal subject at the university level, helping develop materials science and nanophysics research in the country.

Across her career, she published more than 280 research papers and book chapters, contributing both to international materials science research and to Pakistan's growing presence in experimental physics.

Teaching and Academic Leadership

Teaching remained central to Dr. Maqsood's work. She has often described education as a deeply human activity, explaining that "*teaching in my opinion is not an intellectual thing, it is an emotional thing.*"[11]

During her 34 years at Quaid-i-Azam University, she helped develop MSc laboratories and supervised numerous postgraduate students. She later became the first female Chairperson of the Physics Department and one of the first women to hold senior academic leadership roles in physics in Pakistan.

After retirement, she continued her academic work at the National University of Sciences and Technology (NUST), where she helped establish the Thermal Transport Laboratory and supervised additional graduate students. In 2014, she joined Air University in Islamabad as founding Dean of the Faculty of Basic and Applied Sciences, helping introduce new programs in physics, mathematics, and computer science and supporting the creation of the Nanoscale Physics Laboratory.

Supporting Women in Physics

Dr. Maqsood's career also reflects the changing role of women in Pakistan's scientific community. When she began teaching in the 1970s, research and leadership positions in physics were largely dominated by men.

She acknowledged the challenges of balancing academic and family responsibilities, noting that "*women cannot escape the responsibilities of a family life… and it always helps to find a good support system in the family.*" At the same time, she encouraged younger women scientists to pursue their ambitions confidently. Her advice to students, "Do not be intimidated by what you don't know. Not knowing and exploring for an answer is your greatest strength."

At Air University, she also helped introduce institutional measures such as daycare facilities and maternity leave policies to support women in academia.

Dr. Maqsood's contributions have been recognized through awards, including the Pride of Performance, Sitara-i-Imtiaz, and the COMSTECH Lifetime Contribution Award in Physics. She was also elected Fellow of the Pakistan Academy of Sciences.

Reflecting on her career, she often emphasizes a principle that guided her work from the beginning: "hard work is the key to success. You can only achieve your goals by looking forward and working with dedication."

Vishaka Nanayakkara

UNIVERSITY OF MORATUWA, SRI LANKA

Expanding Digital Education and Opportunity through Open Learning

As digital technologies reshape economies and societies, access to computing education has become a critical factor in national development. Yet in many countries, opportunities to study technology remain unevenly distributed due to geographic, economic, or social barriers. In Sri Lanka, Ms. Vishaka Nanayakkara, a computer scientist and educator at the University of Moratuwa, has worked to address these challenges by developing scalable digital learning systems that expand access to computing education.

Through her leadership in open and distance learning initiatives, Nanayakkara has helped create pathways for thousands of students—particularly women and learners from underserved communities—to enter the fields of information technology and software development. Her work demonstrates how digital education can advance SDG 4 (Quality Education) while supporting broader goals related to economic opportunity and digital inclusion.

Academic Formation and Early Career

Ms. Vishaka Nanayakkara's academic journey began at the University of Moratuwa, one of Sri Lanka's leading institutions in engineering and technology. She completed a Bachelor of Science in Engineering (First Class Honors) in Computer Science and Engineering in 1994, establishing a strong foundation in computing and engineering.

Seeking further specialization, she pursued graduate studies at Chalmers University of Technology in Gothenburg, Sweden, where she earned a Technical Licentiate in Computer Engineering in 2002. This international experience broadened her understanding of engineering education and technological innovation, perspectives that later influenced her efforts to modernize computing education in Sri Lanka.

After returning to Sri Lanka, she joined the University of Moratuwa as a Senior Lecturer in the Department of Computer Science and Engineering. Over more than fifteen years of teaching, she has instructed undergraduate students in computer engineering, electrical engineering, and information technology. Her research interests focus on technology-based teaching and learning, e-governance, and information and communication technologies for development (ICT4D), fields that combine computing expertise with broader questions about education and social development.

Leadership in Digital Education

Ms. Nanayakkara has played several leadership roles in Sri Lanka's higher education and digital technology sectors. She served as Head of the Department of Computer Science and Engineering at the University of Moratuwa from 2005 to 2011, overseeing curriculum development and strengthening academic programs during a period of rapid technological change.

In 2017, she became Director of the University of Moratuwa's Centre for Open Distance Learning, where she helped expand digital learning initiatives and develop flexible pathways for students outside traditional university systems.
Ms. Nanayakkara has contributed to national digital policy and technological development. She served as a Board Director of the ICT Agency of Sri Lanka, a government organization responsible for advancing digital transformation in public services and economic development. She also participated in the Prime Minister's Task Force on the Digitalization of Education, contributing expertise on integrating technology into national education systems.

Her contributions to ICT education have received national recognition. She was named Female ICT Leader of the Year in 2015 and received the Computer Society of Sri Lanka (CSSL) Elite Award for ICT Educator of the Year in 2021.

Open Education and the open.uom.lk Platform

One of Ms. Nanayakkara's most influential initiatives is the development of open.uom.lk, a large-scale digital learning platform created at the University of Moratuwa to expand access to higher education. The platform provides online courses, open educational resources, and flexible learning opportunities designed for learners who cannot easily participate in traditional campus-based programs.

The platform incorporates multilingual materials, asynchronous learning formats, and low-bandwidth delivery systems that allow students in remote areas to access courses even with limited internet connectivity. These features make digital education more inclusive and accessible.

The success of the initiative has been recognized internationally. The open.uom.lk platform won first place at the European Conference on E-Learning Awards in 2022 and later received the ASOCIO Digital Excellence Gold Award in Education Technology in 2024.

Expanding Access through the BIT Program

Nanayakkara also played a central role in modernizing the Bachelor of Information Technology (BIT) degree program at the University of Moratuwa. Designed as a flexible computing degree delivered through online and blended learning, the BIT program offers an alternative pathway for students who cannot access traditional university programs.

The redesigned program integrates digital learning platforms, open educational resources, and learner analytics to support student progress. Flexible assessments and modular course structures allow learners to balance their studies with employment or family responsibilities.

Women in Technology and Inclusive Education

A central dimension of Ms. Nanayakkara's work is expanding opportunities for women in technology. By designing learning systems that address barriers such as geographic distance, financial constraints, and limited access to universities, her initiatives have created new opportunities for women entering computing fields.

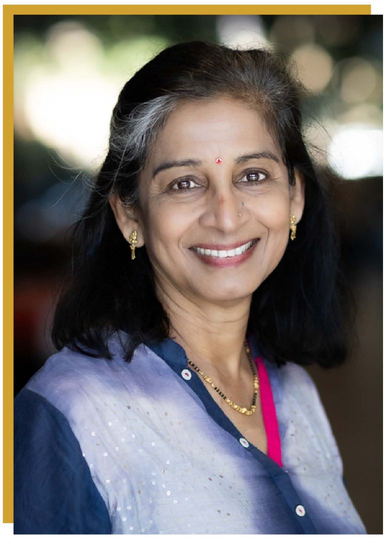
Many women enrolled in the BIT program are first-generation STEM learners. Today, graduates of the program work in software development, cybersecurity, quality assurance, and other digital professions.

Ms. Nanayakkara also supports women's participation in the technology sector through professional organizations. She is a founding board member of the Women's Chamber for Digital Sri Lanka, which promotes women's leadership and entrepreneurship in the country's digital economy.

Capacity Building and Digital Transformation

Ms. Nanayakkara often emphasizes that technological progress depends not only on infrastructure but also on human capability. Reflecting on Sri Lanka's digital development, she explains: "*Capacity is an essential ingredient for ensuring digital growth and for Sri Lanka to achieve its economic goals and sustainable development. It is important that we develop capacity at all levels—among citizens, government institutions, and the developers who create digital applications*."[12]

This emphasis on capacity building reflects her broader vision of digital education as a foundation for economic growth and social development. By strengthening digital skills among students, educators, and professionals, her initiatives contribute to the long-term development of Sri Lanka's technology sector. Ms. Nanayakkara demonstrates how the use of digital technologies can strengthen education systems, promote gender inclusion, and prepare new generations of learners for participation in the digital economy.



Dr. Manjula Sharma

THE UNIVERSITY OF SYDNEY

Strengthening STEM Education through Teacher Development

Improving science education requires more than well-designed curricula. It also depends on teachers who can interpret scientific concepts, design meaningful lessons, and create learning environments where students engage with complex ideas. Over the past three decades, Dr. Manjula Devi Sharma has worked to strengthen science and mathematics education by supporting teachers, building professional networks, and promoting evidence-based teaching practices.

Based at the University of Sydney, Dr. Sharma serves as Director of the STEM Teacher Enrichment Academy. Her work focuses on improving how science is taught through professional development programs, collaborative research, and national initiatives in STEM education. These efforts contribute to broader global goals of improving educational quality by strengthening teacher capacity and classroom practice.

Dr. Sharma often emphasizes that curriculum frameworks alone do not determine learning outcomes. "It is up to the teacher to take that curriculum and map it how they want to deliver it," she explains. For her, effective STEM education requires continuous professional learning and collaboration among educators.

From Physics Research to Education Leadership

Dr. Sharma's academic career began in physics. She earned a Bachelor of Science in Physics and Mathematics from the University of the South Pacific in 1982, followed by a Master of Science in Ionospheric Physics at the Australian Defence Force Academy in 1991. Her early research examined atmospheric and ionospheric measurements using satellite data.

She later completed a PhD in Physical Optics at the University of Sydney in 1999, focusing on optical fibre filters for microscopic applications. Recognizing the growing importance of educational research in improving science teaching, she also pursued a Master of Education in Research Methods in 2005.

Over time, Dr. Sharma shifted her focus from laboratory-based physics research to science education. She became interested in how students understand scientific concepts and how teachers can support deeper learning in STEM subjects.

Building Networks in STEM Education

A major part of Dr. Sharma's work involves building professional communities that support innovation in science teaching. One of her significant initiatives is the Science and Mathematics Network (SaMnet), which connects academics involved in teaching science and mathematics across Australian universities. The network has helped strengthen collaboration among educators and encouraged new approaches to curriculum design and teaching practice.

Dr. Sharma led the establishment of the Australian Conference of Science and Mathematics Education (ACSME) in 2011. The conference provides a national platform where educators and researchers share findings, discuss teaching innovations, and explore strategies for improving STEM education.

In addition, she founded the International Journal of Innovation in Science and Mathematics Education, creating a scholarly venue for research on teaching practices, curriculum development, and educational innovation.

Strengthening Teacher Capacity

Dr. Sharma's work through the STEM Teacher Enrichment Academy focuses on helping teachers deepen both their disciplinary knowledge and their teaching strategies. The academy runs year-long professional learning programs that bring together teams of primary and secondary school teachers for collaborative development.

Participating schools often design STEM projects that connect classroom learning with real-world issues such as environmental sustainability, biodiversity, or energy use. These initiatives encourage teachers to integrate scientific knowledge with inquiry-based problem solving.

Dr. Sharma notes that effective science teaching requires multiple skills. “Effective science lessons, assessment of learning, and pulling apart the curriculum are different skills that teachers need to master,” she explains.

Teachers who participate in these programs frequently report greater confidence in teaching science and increased student engagement in STEM subjects.

Research and Recognition

Alongside her leadership in teacher development, Dr. Sharma has contributed extensively to science education research. Her work through the Sydney University Physics Education Research (SUPER) group explores conceptual learning, laboratory instruction, and inquiry-based teaching in physics and STEM education.

Her publications include more than one hundred refereed journal articles as well as books, book chapters, and conference presentations. She has supervised numerous postgraduate students and secured research funding for projects in science education and teacher development.

Her contributions have received international recognition. In 2025, she was elected Fellow of the American Association of Physics Teachers (AAPT). She has also been recognized by the Australian Institute of Physics, named an Honorary Fellow of the Teachers’ Guild of New South Wales, and holds the distinction of Principal Fellow of the UK Higher Education Academy.

Education for Future Generations

Throughout her career, Dr. Sharma has emphasized that strong education systems depend on well-supported teachers and collaborative professional communities. By promoting research-informed teaching and sustained teacher development, she has helped strengthen how science is taught in schools and universities.

Her work contributes to global efforts aligned with Sustainable Development Goal 4 (Quality Education), demonstrating how investment in teacher capacity and educational collaboration can support meaningful and lasting improvements in STEM education.

Dr. Bina Siddiqui

UNIVERSITY OF KARACHI

Natural Products Chemistry for Medicine and Sustainable Agriculture

At the H.E.J. Research Institute of Chemistry (HEJ), International Center for Chemical and Biological Sciences (ICCBS), University of Karachi, natural products chemistry has long been a major area of research. Scientists at the institute study chemical compounds derived from plants and other natural sources to understand their structures and biological functions. Among the researchers who have contributed significantly to this field is Dr. Bina Shaheen Siddiqui, Distinguished National Professor and a leading scientist whose work connects chemistry, biology, medicine, and agriculture.

Across several decades of research and teaching, Dr. Siddiqui has focused on identifying and analyzing bioactive compounds found in medicinal plants. Her work demonstrates how fundamental chemical research can contribute to public health, sustainable agriculture, and environmental protection.

Academic Formation and Scientific Training

Dr. Bina Shaheen Siddiqui completed her early scientific training at the University of Karachi, earning her BSc in 1967 and MSc in Chemistry in 1969. She later pursued advanced research in biochemistry and molecular biology under the supervision of Dr. Salimuzzaman Siddiqui, FRS, a pioneering chemist whose work helped establish natural products chemistry in Pakistan.

Working in this environment introduced her to the study of plant-derived compounds and their potential applications. She completed her PhD in Chemistry from the University of Karachi in 1980, focusing on natural products chemistry and the identification of bioactive compounds from medicinal plants.

Her sustained contributions to research were later recognized with a Doctor of Science (D.Sc.) degree from the University of Karachi in 2001, one of the highest academic distinctions awarded for long-term scientific achievement.

Research on Natural Products and Bioactive Compounds

Natural products chemistry examines molecules produced by living organisms, particularly plants, that may possess biological activity. Many widely used medicines originate from such compounds, making their discovery and analysis an important area of chemical research.

Dr. Siddiqui's work focuses on the isolation, structural elucidation, and synthesis of biologically active compounds from medicinal plants. Through laboratory techniques involving extraction, purification, and structural analysis, she and her research team have identified hundreds of previously unknown natural products.

Several of these compounds have shown promising biological activity, including anti-cancer, anti-inflammatory, anti-tuberculosis, and anti-epileptic properties. These discoveries highlight the continuing importance of plant-based compounds in the search for new therapeutic agents.

Her work has also resulted in international patents, including patents granted in the United States for compounds with potential medical applications. Such discoveries require extensive experimental research and collaboration between chemists, biologists, and pharmacologists. Through these efforts, Dr. Siddiqui has contributed extensively to global scholarship on medicinal plant chemistry and natural bioactive compounds.

Sustainable Agricultural Innovation

In addition to medical research, Dr. Siddiqui has applied natural products chemistry to agricultural challenges. Concerned about the environmental and health risks associated with conventional chemical pesticides, she and her research team investigated plant-derived compounds that could function as biodegradable bio-pesticides and bio-fertilizers.

One outcome of this work was the development of BIOSAL, a plant-based bio-pesticide designed to control agricultural and horticultural pests. The compound underwent extensive laboratory testing and field trials in different agricultural regions before being evaluated by regulatory authorities.

After multiple stages of testing, BIOSAL was registered by the Plant Protection Department of the Government of Pakistan, confirming its safety and effectiveness.

Dr. Siddiqui's team also developed Neemex, a bio-fertilizer derived from plant sources. To demonstrate its commercial feasibility, she established a pilot-scale facility capable of producing these products. These technologies provide environmentally sustainable alternatives to synthetic agrochemicals and are being prepared for industrial-scale production.
Such innovations illustrate how chemical research can translate into practical technologies that support agriculture and environmental sustainability.

Research Productivity and Scientific Innovation

Dr. Siddiqui's research productivity is substantial. She has authored more than 500 scientific publications and book chapters and has presented her work at more than seventy international conferences. Her research has received over 11,000 citations and an h-index exceeding 80, reflecting its broad influence in the field.

Her contributions have been recognized through numerous honors, including Pakistan's Tamgha-i-Imtiaz and Sitara-i-Imtiaz, as well as the Abdus Salam Prize in Chemistry and the Al-Khwarizmi International Award. She was also named Distinguished National Professor by the Higher Education Commission of Pakistan.

Mentorship and Scientific Leadership

Alongside her research, Dr. Siddiqui has supervised many graduate students, including PhD scholars and MPhil and MSc researchers. Many of her former students now work in universities, research institutions, and pharmaceutical industries in Pakistan and abroad.

She also promotes the participation of women in science. As Chair of the Pakistan National Chapter of the Organization for Women in Science for the Developing World (OWSD), she supports young female scientists through mentorship, networking, and academic collaboration. Dr. Bina Shaheen Siddiqui has helped strengthen natural products chemistry while contributing to the development of scientific research and education in Pakistan.

Dr. Sharmin Sultana

JAHANGIRNAGAR UNIVERSITY

Advancing Nonlinear Plasma Physics and Scientific Training

Plasma, often described as the fourth state of matter, consists of charged particles whose interactions generate complex wave behavior. Within this field, Dr. Sharmin Sultana, Professor of Physics at Jahangirnagar University in Bangladesh, studies nonlinear plasma physics, particularly wave dynamics, solitons, and shock structures in complex plasma systems.

Her research examines the basic features of electrostatic and electromagnetic waves in different plasma environments such as astrophysical plasmas, relativistic multi-ion plasmas, degenerate quantum plasmas, and laser-produced laboratory plasmas. By modeling how waves behave under conditions shaped by charged dust particles, quantum effects, and nonthermal particle distributions, her work contributes to a deeper understanding of plasma behavior. Although largely theoretical, these studies support research in astrophysics, space physics, and laboratory plasma science.

Solitons—one of the phenomena she investigates—are also important in optical fiber communication because they can travel long distances without losing their shape/information.

Academic Formation and Early Career

Dr. Sultana began her academic journey at Jahangirnagar University, where she completed both her Bachelor of Science (Honours) and Master of Science (Thesis) degrees in Physics, securing first-class first position in her class in both programs. During her MSc degree, she conducted research on radioactive waste management under the supervision of Professor Mir Md Akramuzzaman.

In November 2006, shortly after completing her MSc, she joined the Department of Physics at Jahangirnagar University as a lecturer. Two years later, she received the European Engineering and Physical Sciences Research Council (EPSRC) Science and Innovation Award, which supported her doctoral studies at Queen's University Belfast in the United Kingdom.

Her PhD research focused on nonlinear electrostatic excitations in multi-component plasmas, examining how nonlinear waves behave when different charged particle populations interact. She completed her doctorate in Plasma Physics in 2012 under the supervision of Professor Ioannis Kourakis. During this period, her work received several recognitions, including best poster awards at the UNESCO ICTP Centre Poster Competition and the Institute of Physics Annual Plasma Physics Conference.

After completing her PhD, Dr. Sultana returned to Bangladesh and continued her academic career at Jahangirnagar University, choosing to contribute to physics research and training within her home country.

Research and Contributions in Plasma Physics

Over more than fifteen years of research, Dr. Sultana has developed a body of work focused on nonlinear phenomena in plasma systems. Her studies examine how waves propagate and interact in dispersive media where nonlinearity and instability influence plasma behavior.

A central aspect of her research involves mathematical models describing nonlinear wave propagation. These models often use nonlinear partial differential equations such as the Korteweg–de Vries equation, nonlinear Schrödinger equation, and Burgers' equation to analyze soliton formation, wave stability, and shock dynamics.

Her work also explores envelope solitons and dissipative structures in plasma systems, including models based on the complex Ginzburg–Landau equation. These approaches help explain wave behavior in systems where energy exchange and dissipation influence plasma dynamics.

Another area of her research investigates strongly coupled and relativistic plasma environments, including degenerate quantum plasmas and dusty plasmas. In such systems, the presence of charged dust particles or relativistic particle populations introduces additional complexity that affects wave propagation and stability.

Dr. Sultana has published more than eighty-five peer-reviewed articles in international journals, and her work has received significant scholarly attention, with citations exceeding one thousand across her publications.

International Collaboration and Recognition

Dr. Sultana's research has been strengthened through collaborations with scientists in Europe and Asia. She received the Alexander von Humboldt Research Fellowship, which enabled her to conduct postdoctoral research at Ruhr University Bochum in Germany. There, she collaborated with international researchers studying astrophysical plasma systems and nonlinear wave phenomena.

She later received the Alexander von Humboldt Return Fellowship, supporting researchers who return to their home countries to develop an independent research group. This fellowship helped her further strengthen plasma physics research at Jahangirnagar University. In 2023, Dr. Sultana was elected Associate Fellow of the Bangladesh Academy of Sciences in recognition of her contributions to the physical sciences.

Teaching and Mentorship

Alongside her research, Dr. Sultana has maintained an active teaching career spanning nearly two decades. At Jahangirnagar University, she has taught undergraduate and graduate courses including Mechanics, Electricity and Magnetism, Quantum Mechanics, Electrodynamics, Plasma Physics, and Dusty Plasma Physics.

She has supervised more than twenty graduate students, including MSc and doctoral candidates. Many of her former students have pursued doctoral studies or research careers internationally. She continues to contribute to the development of nonlinear plasma physics while helping train the next generation of physicists in Bangladesh.

Dr. Supawan Tantayanon

THE SCIENCE SOCIETY OF THAILAND (SST), CHEMICAL SOCIETY OF THAILAND (CST), CHULALONGKORN UNIVERSITY (CU)

Advancing Green Chemistry and Safer Science Education

After Dr. Supawan Tantayanon completed her doctoral studies in the United States in 1982, she encountered laboratory conditions that raised immediate concerns. Although chemistry laboratories were active spaces of teaching and experimentation, safety practices had changed little over the decades.

Reflecting on those early experiences, she later recalled noticing the risks faced by students working with hazardous chemicals in traditional laboratory setups. Rather than accepting these conditions as inevitable, she began exploring ways to redesign chemistry laboratories to make them safer, more accessible, and environmentally responsible. This effort would eventually lead to her pioneering work in small-scale chemistry, an innovation that has reshaped science education across Thailand and beyond.

Beginnings of a Chemist

Dr. Supawan Tantayanon earned her Bachelor of Science in Chemistry from Chulalongkorn University in 1973. She later completed a Master's degree in Chemistry at Mahidol University in 1975, before pursuing doctoral studies in the United States. In 1982, she earned her PhD in Chemistry from Worcester Polytechnic Institute, gaining exposure to advanced research environments and international scientific networks.

When she returned to Thailand, she began her academic career at Chulalongkorn University, where she would later become one of the country's most influential leaders in chemical education and research.

Her early experience working with petrochemical companies also shaped her perspective on the broader impacts of chemistry. While consulting for industry, she became increasingly aware of the potential risks posed by chemicals to both human health and the environment. These concerns would later guide her work on laboratory safety and sustainable chemical practices.

Reforming Chemical Education

Dr. Tantayanon played a central role in designing new academic programs that expanded opportunities for students in chemistry and related fields.

Among the programs she helped establish were the Master of Science Program in Petrochemistry and Polymer Science (1985), the International Bachelor of Science Program in Applied Chemistry (2005), and the Master's and PhD Programs in Technopreneurship and Innovation Management (2007). More recently, she helped launch the Master's and PhD Programs in Green Chemistry and Sustainability (2021), reflecting the growing importance of sustainability in chemical education.

She also served in major leadership roles within the university, including Founding Director of the Petroleum and Petrochemical College and Deputy Dean for Academic Affairs, where she helped shape academic policy and research development in science and engineering education.

The Development of Small-Scale Chemistry

One of Dr. Tantayanon's most important contributions to science education is her work in small-scale chemistry, an approach that reduces chemical quantities in laboratory experiments while preserving the educational value of hands-on learning.

Her interest in laboratory safety emerged from observing the conditions of chemistry laboratories in the early years of her career. As she later recalled, "in the early years of my career I had to be in the lab all day long, teaching. At that time the world didn't focus on safety much. When I returned to Thailand from the US, the situation was similar. I felt that I wanted to do something—perhaps change the experiments or substitute chemicals for safer ones."[13]

Because laboratory equipment designed for microscale experiments was not available locally, Dr. Tantayanon created her own designs, "everyone said that because no one in Thailand was doing this, I would have to design the laboratory equipment myself. I wanted it to be low cost and convenient. I made many prototypes before arriving at the final design."

The result was the Small-Lab Kit, a portable laboratory system that allows students to perform chemical experiments safely with minimal chemical waste. The technology, supported by several Thai patents, significantly reduced chemical exposure for students while making laboratory learning more affordable for schools with limited resources.

Expanding Access to Science Education

As Dr. Tantayanon explained, "many schools cannot afford laboratories, so they omit the experiments. That is very sad. But with the small-scale kit, students can still see the reactions, discuss them, and understand the concepts. That is what makes me happiest. I want more students to be attracted to science."

Her approach made it possible for schools with limited resources to offer hands-on chemistry education. By lowering costs and reducing hazards, the small-scale laboratory model expanded access to experimental science learning across Thailand and neighboring countries.

This innovation has become an important contribution to SDG 4, demonstrating how improvements in educational design can make science education more inclusive and accessible.

Leadership in Green Chemistry and Global Science

Dr. Tantayanon held various leadership positions in professional organizations both in Thailand and internationally. She served as President of the Chemical Society of Thailand, President of the Polymer Society of Thailand, and President of the Science Society of Thailand. At the regional level, she became the first woman president of both the Pacific Polymer Federation and the Federation of Asian Chemical Societies.

Her involvement with the International Union of Pure and Applied Chemistry (IUPAC) has also been extensive. She has served on the Committee on Chemistry Education, the Interdivisional Committee on Green Chemistry for Sustainability, and the Committee on Ethics, Diversity, Equity, and Inclusion. In these roles, she has helped shape international discussions on responsible chemical practice, sustainability, and inclusive scientific communities.

A Vision of Innovation and Social

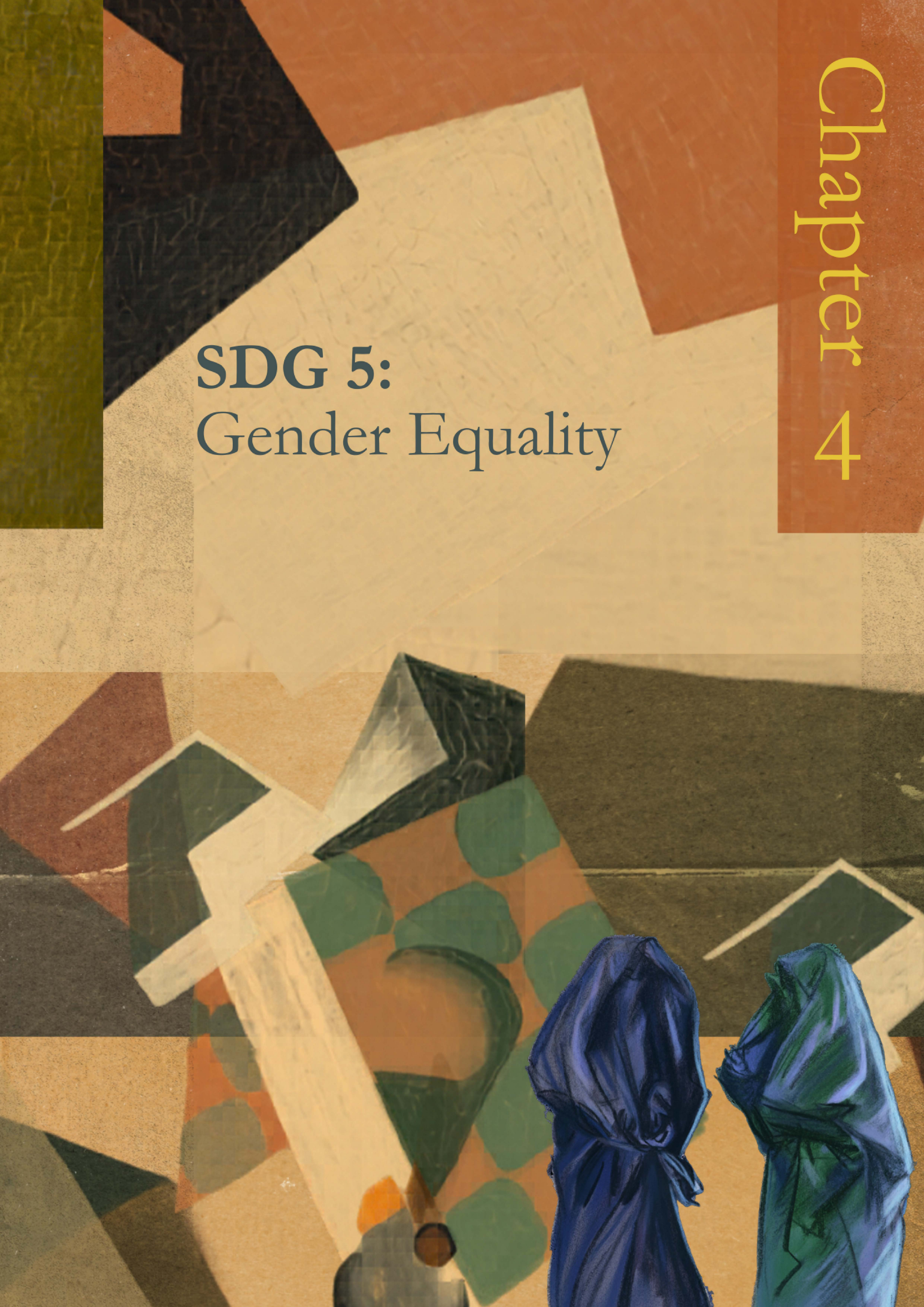
Throughout her career, Dr. Tantayanon has been a strong advocate for women in STEM. As Chair of the Women in Science and Engineering Committee of the Association of Academies and Societies of Science in Asia, she has worked to strengthen networks that support women scientists across the region.

She has also been deeply involved in IUPAC's Global Women's Breakfast, an international initiative designed to connect women chemists and promote mentorship across the scientific community. By holding leadership roles in organizations that had previously been led primarily by men, she helped demonstrate that women can lead scientific institutions at the highest levels.

Dr. Supawan Tantayanon's career reflects a vision of chemistry that combines scientific innovation with social responsibility. By making science education safer, more accessible, and more sustainable, she has shown how chemistry can contribute not only to scientific advancement but also to a broader commitment to education, environmental responsibility, and global cooperation.

Chapter 4

SDG 5: Gender Equality



Dr. Riza G. Abilgos-Ramos

DEPARTMENT OF AGRICULTURE - PHILIPPINE RICE RESEARCH INSTITUTE

Redefining Nutrition for Public Health

Rice is more than a staple food in the Philippines. It is deeply tied to culture, livelihood, and daily life. For Dr. Riza G. Abilgos-Ramos, a scientist at the Philippine Rice Research Institute (PhilRice), rice is also a powerful platform for improving public health, strengthening rural economies, and expanding opportunities for women.

Dr. Abilgos-Ramos is a Supervising Science Research Specialist and Career Scientist at PhilRice whose interdisciplinary work bridges nutrition, food science, agriculture, and analytical biosciences. Her research focuses on transforming rice and rice-based crops into nutritionally improved foods that address micronutrient deficiencies, food insecurity, and community livelihoods. Through this work, she contributes to multiple Sustainable Development Goals, particularly SDG 5 (Gender Equality), while also supporting SDG 3 (Good Health and Well-Being), SDG 4 (Quality Education), and SDG 9 (Industry, Innovation and Infrastructure).

Reimagining Rice for Public Health

Dr. Abilgos-Ramos's work redefines how rice contributes to nutrition. Rather than viewing rice simply as a carbohydrate source, her research highlights how rice-based innovations can support healthier diets and address nutrient deficiencies.

She has contributed to the development of high-iron rice varieties, including MS13, through international biofortification initiatives such as the HarvestPlus program. These efforts aim to address iron-deficiency anemia, a condition that disproportionately affects women and children in many developing countries. She integrates gender-responsive perspectives into her research, ensuring that rice-based innovations address the nutritional needs of women and children.

Her work also focuses on developing rice-based foods and beverages designed to improve nutrition across life stages–from infants to adults. These include fermented rice bran beverages, rice malt drinks, rice-based infant foods, and vegetable-enriched rice products.

For Dr. Abilgos-Ramos, improving nutrition does not mean abandoning traditional foods. Instead, it involves understanding how staple foods can be consumed more wisely. She explains, "when consumed in proper portions and paired with vegetables, fish, and other nutrient-rich foods, rice sustains energy and supports overall health."

She also emphasizes that carbohydrates from rice play an important physiological role, "Carbohydrates, particularly those from rice, serve as the body's primary fuel, supporting brain, heart, and muscle function."

Rather than eliminating rice from the diet, she advocates balance and diversity, "by practicing portion control and maintaining dietary diversity, Filipinos can continue to enjoy rice as part of a nutritious, sustainable, and culturally relevant diet while supporting a healthy and active lifestyle."

These insights guide her work in promoting healthier rice consumption and developing new rice-based food innovations.

From Lab Research to Community Innovation

A defining feature of Dr. Abilgos-Ramos's research is her "Consumer to Lab to Customer" approach. Rather than designing food products solely within laboratory settings, she begins by understanding the needs and preferences of communities, particularly farming households. These insights guide the development of food products that are both nutritious and culturally acceptable.

This approach has led to several innovations now adopted by food enterprises and cooperatives, including brown rice ice cream sandwiches, rice bran–enriched dairy products, and vegetable-enhanced rice foods.

Among these is the Brown Rice Ice Cream Sandwich (BRICS), which has been adopted for commercial production by a Philippine food company. Another is a buffalo milk ice cream bar enriched with vegetables and pigmented rice, which has been manufactured and sold since 2019, demonstrating how research can translate into market-ready products and community-based enterprises.

Women Farmers as Food Innovators

Dr. Abilgos-Ramos's work also demonstrates how scientific innovation can support women's economic empowerment. Through the Rice Business Innovation System (RiceBIS) program, she helped design training and extension initiatives that enable rice-farming communities to develop value-added rice products.

Women farmers participating in the program learned how to transform rice into marketable food products, allowing them to create small food enterprises and generate additional income for their families. These initiatives strengthen women's roles not only as farmers but also as entrepreneurs within the agricultural value chain.

By integrating research, training, and enterprise development, these initiatives create pathways for women to participate more actively in rural economies.

Mentoring the Next Generation of

Aside from her research and extension work, Dr. Abilgos-Ramos is deeply involved in mentoring students, especially female students and early-career scientists. Through internships at PhilRice and collaborations with universities across the Philippines, including institutions in underrepresented regions, she helps build research capacity and expand opportunities in agricultural and food sciences.

Many of her former mentees now pursue advanced studies or leadership roles in academia and industry. Her mentorship reflects a broader commitment to inclusive scientific development and to encouraging young women to enter STEM fields.

Her own story reinforces this message. Raised in a farming community and overcoming illness during childhood, she pursued education through determination and entrepreneurial effort. Her journey from selling fruits to support her studies to earning a PhD in the United Kingdom, demonstrates how education and perseverance can transform lives.

Science for Nutrition, Equity, and Sustainable Development

Dr. Abilgos-Ramos continues to advance research on the health and wellness potential of rice and rice-based crops, developing innovations that connect agriculture with nutrition and public health. Her work has led to patents, scientific publications, and collaborations with academic institutions, cooperatives, and international research organizations.

Her contributions demonstrate how agricultural research can move beyond production to generate practical solutions that support healthier diets, strengthen rural livelihoods, and expand meaningful opportunities for women in agriculture and food systems.

Through this body of work, rice is positioned not only as a staple food, but as a platform for science-driven innovation that advances nutrition, equity, and inclusive development.

Dr. Natalia Galtseva

FAR EASTERN BRANCH OF THE RUSSIAN ACADEMY OF SCIENCE

Shaping Sustainable Development in the Arctic and Northern Regions

For more than four decades, Dr. Natalia Galtseva has contributed to understanding the complex economic and environmental challenges of the Russian North and Arctic regions. As Deputy Director for Science of the N.A. Shilo North-East Interdisciplinary Scientific Research Institute of the Far Eastern Branch of the Russian Academy of Sciences, her work combines economics, environmental analysis, and regional policy to guide sustainable development in one of the most resource-rich yet environmentally fragile parts of the world.

Dr. Galtseva's research focuses on the socio-economic development of northern territories, environmental economics, and the investment attractiveness of resource projects. Her work demonstrates how interdisciplinary STEM approaches—linking economic modeling, environmental considerations, and policy analysis—can help regions balance economic growth with ecological responsibility. Through these contributions, her work advances SDG 9 (Industry, Innovation and Infrastructure) and SDG 5 (Gender Equality) while supporting long-term sustainable development in Arctic communities.

A Career Shaped by the Russian North

Dr. Natalia Galtseva was born in 1957 in Perovo, Moscow Region, but her professional life has been closely tied to the Russian Far East. Since 1967 she has lived in Magadan, a region whose harsh climate and remote geography present unique challenges for economic development.

She graduated from the Khabarovsk Institute of National Economy in 1979 with a degree in industrial planning and economics. Earlier in her life she was also an accomplished athlete, earning the title Master of Sports of the USSR in cross-country skiing, reflecting the discipline and perseverance that would later characterize her academic career.

After graduation, she worked as an engineer at Tomsk Polytechnic Institute and later as an economist in the regional office of the Stroybank of the USSR. In 1984, she joined the Northeastern Complex Research Institute of the USSR Academy of Sciences—now part of the Russian Academy of Sciences, where she would build her long-term research career. Over time, she rose through the ranks from engineer to Deputy Director for Science, becoming one of the leading experts on regional economic development in the Russian Arctic.

Rethinking Energy Systems in Arctic Regions

One of Dr. Galtseva's earliest and most influential research contributions addressed energy supply systems in remote Arctic territories. In 1993, she defended her dissertation on the development strategy for the fuel supply system of the Chukotka Autonomous Okrug, proposing a methodology that balanced the interests of producers and consumers of energy resources.

Her work demonstrated that developing local small-scale oil and gas fields could be more efficient and sustainable than relying on imported petroleum products or coal. These findings had real-world implications. Beginning in 2003, the West Ozernoye gas field in Chukotka was developed, and in 2021 the Anadyrskaya power plant was fully converted to gas, allowing the region to shift toward a cleaner energy source compared with previously used coal.

Research Influencing National Policy

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developed, and in 2021 the Anadyrskaya power plant was fully converted to gas, allowing the region to shift toward a cleaner energy source compared with previously used coal.

Advancing Women in STEM Leadership

Dr. Galtseva's career is also significant in the context of women's leadership in science and policy. She is the first woman to serve as Deputy Director of the NEISRI FEB RAS and the first woman from the Magadan Region appointed Honorary Ambassador to the Association of Regional Administrations of Northeast Asia (NEAR).

Within the Russian Academy of Sciences, women remain underrepresented at the highest levels of scientific leadership. Dr. Galtseva's achievements therefore demonstrate that women can contribute meaningfully to scientific research, institutional leadership, and regional policy development.
Her work on expert councils, editorial boards, and scientific advisory bodies also expands opportunities for collaboration and mentorship in the fields of regional economics and Arctic development.

Long-Term Contributions to Science and Regional Development

Over the course of her career, Dr. Galtseva has authored more than 200 scientific publications, including monographs, textbooks, and research articles. Her work has helped shape discussions on resource management, regional restructuring, and sustainable economic development in northern territories.

She has also contributed to academic training and education, supervising doctoral research and teaching economics and finance at the university level. Through these roles, she helps prepare future scholars and policymakers who will continue addressing the complex challenges of Arctic and northern development.

Her contributions have been recognized through numerous honors, including the Medal "For Assistance to the Development of the Russian Far East," the Prize of the Far Eastern Branch of the Russian Academy of Sciences named after Academician V.S. Nemchinov, and the title of Honored Scientist of the Magadan Region.

Through decades of research and leadership, Dr. Galtseva has shown how economic science can guide real decisions on infrastructure, energy systems, and regional investment in Arctic territories. Her work links research with policy, helping northern regions pursue sustainable development while demonstrating the important role women can play in scientific and policy leadership.

Dr. Motoko Kotani

TOHOKU UNIVERSITY

Mathematics, Leadership, and Advancing Gender Equality in Science

For Dr. Motoko Kotani, mathematics began not as a planned career but as a way of thinking that felt logical, fair, and intellectually freeing. As a child growing up in Japan, she loved reading and often stayed after class to ask teachers questions that came from her curiosity rather than the day's lesson. Mathematics teachers, in particular, welcomed these questions. Reflecting on those early experiences, Dr. Kotani later said, "I found the whole thing very fair and inspiring. This is how I started to like mathematics."[14] That sense of intellectual openness would guide her throughout a career that combined mathematical research, institutional leadership, and advocacy for gender equality in science.

Dr. Kotani eventually became one of Japan's leading mathematicians, specializing in discrete geometric analysis, a field that connects geometry, probability theory, and combinatorics. She earned her Doctor of Science from Tokyo Metropolitan University in 1990, and her research on crystal lattices and geometric structures later received the Saruhashi Prize in 2005, one of Japan's most prestigious awards recognizing outstanding women scientists in the natural sciences.

Discovering a Path in Mathematics

Dr. Kotani's early academic experiences were not without uncertainty. While studying mathematics at the University of Tokyo, she encountered classmates whose mathematical abilities seemed extraordinary. For a time, she wondered whether she truly belonged in the field. She later recalled that others seemed to be "flying in the sky," while she felt she was "crawling on the ground."

Graduate school, however, changed her perspective. She discovered that mathematics was far broader than the competitive hierarchy she had experienced as an undergraduate. Rather than a limited set of problems already claimed by others, it offered a vast landscape of ideas and unanswered questions. As she reflected later, "There are so many problems you can consider, and, if you are motivated, you can find interesting programmes of your own." This realization gave her renewed confidence that she could contribute meaningfully to the field.

Her work soon developed into an innovative research program linking geometry with probability and combinatorics, contributing to the development of discrete geometric analysis and expanding mathematical approaches to the study of crystal lattices.

Beyond traditional boundaries

Kotani's career later moved past the traditional boundaries of mathematics. From 2012 to 2019, she served as Director of the Advanced Institute for Materials Research (WPI-AIMR) at Tohoku University, an interdisciplinary institute focused on developing new approaches to materials science.

Her appointment was unusual: she was a mathematician rather than a materials scientist. Yet the university believed that mathematical thinking could help integrate different areas of materials research. Kotani had long argued that mathematics could serve as a common language across scientific disciplines. Leading the institute provided an opportunity to demonstrate how mathematical ideas could generate new insights in experimental science.

Under her leadership, collaboration between mathematicians and materials scientists strengthened, resulting in new research directions. One example was a 2013 publication in Science that applied mathematical topology to experimental materials data, illustrating how mathematical frameworks could help conceptualize complex physical phenomena.

Leadership in Science and Policy

Dr. Kotani has held numerous leadership roles within Japanese and international scientific communities. In 2015–2016, she became the first woman president of the Mathematical Society of Japan, an important milestone in a field where

Dr. Kotani has held numerous leadership roles within Japanese and international scientific communities. In 2015–2016, she became the first woman president of the Mathematical Society of Japan, an important milestone in a field where women have historically been underrepresented.

During her presidency, she worked with colleagues to modernize the organization’s governance structures, introducing clearer institutional rules and professional administrative practices. These reforms reflected a broader effort to make scientific societies more transparent, inclusive, and sustainable.

Dr. Kotani also served as Executive Director of RIKEN, one of Japan’s leading national research institutions. In this role, she helped guide the institute’s international research strategy and strengthen collaboration between Japanese scientists and global research partners.

She expanded her leadership in international organizations. Kotani serves as Executive Vice President of Tohoku University and Vice President of the International Science Council. In 2024, she was appointed to the United Nations 10-Member Group, which advises on science, technology, and innovation for the Sustainable Development Goals.

Advancing Gender Equality in Science

Dr. Kotani’s career has been contributory to the advancement of SDG 5: Gender Equality, particularly in the field of mathematics. Having experienced the scarcity of women scientists early in her career, she has consistently worked to create more opportunities for future generations.

Dr. Kotani has spoken candidly about the slow pace of change in gender representation within science. Musing on the situation in Japan, she noted that progress exists but remains gradual. “There is progress,” she explained, “but a very, very slow one.” Despite high performance by girls in mathematics and science at school, fewer women continue into scientific careers.

For this reason, she has emphasized the importance of visibility and mentorship. At Tohoku University, female doctoral students serve as science ambassadors, visiting high schools and sharing their experiences with younger students. Through these initiatives, Kotani hopes to encourage girls to see science as a field where they can belong. As she explained, outreach efforts aim to show that “there are a variety of reasons for being interested in science” and that scientific careers are open to diverse paths and motivations.

Her work also extends internationally. As a member of the Committee for Women in Mathematics of the International Mathematical Union, she chaired the working group that helped establish Asian-Oceanian Women in Mathematics in 2020. The organization provides networking opportunities and collaborative support for women mathematicians across the region.

Expanding Possibilities in Mathematics

Dr. Motoko Kotani’s career reflects the evolving role of scientists in the modern world. Her contributions to mathematics, interdisciplinary research, and global science policy demonstrate how scientific expertise can intersect with leadership and social responsibility.

By advancing mathematical knowledge while actively supporting women in science, she has helped reshape expectations about who can lead in mathematics and how scientific institutions can become more inclusive. Her work continues to inspire students and researchers across Japan and beyond, showing that the pursuit of knowledge can also open pathways toward greater equality in science.

Dr. Aree Moon

KOREA FOUNDATION FOR WOMEN IN SCIENCE, ENGINEERING AND TECHNOLOGY (WISET)

Advancing Women's Leadership in Science and Technology

For Dr. Aree Moon, science is not only a field of discovery but also a platform for shaping policies that enable more inclusive and equitable societies. A pharmacist and biochemist by training, Dr. Moon built her early career studying the molecular mechanisms of breast cancer invasion and migration. Over time, her work expanded beyond laboratory research to include science policy, international collaboration, and systemic reforms aimed at strengthening opportunities for women in science and technology.

Dr. Moon serves as President of the Korea Foundation for Women in Science, Engineering and Technology (WISET) and is a member of the United Nations 10-Member Group of Science, Technology and Innovation (STI) Experts for the Sustainable Development Goals (SDGs). Through these roles, she works at the intersection of science, policy, and diplomacy to advance SDG 5 (Gender Equality) and strengthen inclusive innovation systems worldwide.

From Scientific Research to Science Policy

Dr. Moon's academic background is rooted in biomedical science. She earned her PhD in Biochemistry and Biophysics from Iowa State University and began her academic career as a professor at the College of Pharmacy, Duksung Women's University, where she has taught for over three decades.

Her research focused on the biological processes underlying cancer cell migration and metastasis. Through this work, she contributed to expanding knowledge in molecular oncology while mentoring many young scientists. However, her experience in academia also revealed persistent structural barriers facing women in scientific careers.

Recognizing that scientific progress requires inclusive participation, Dr. Moon gradually shifted her focus toward institutional and policy reforms that support women researchers. Her transition illustrates how scientific expertise can inform national and international strategies for gender equality in science.

Building Korea's Ecosystem for Women in STEM

As President of WISET, Dr. Moon has played a central role in strengthening Korea's support systems for women scientists and engineers. Under her leadership, the organization expanded programs that address key challenges such as career interruptions, limited leadership opportunities, and unequal access to professional networks.

"When voices are missing, so are the ideas that move innovation forward. To create sustainable and equitable engineering education, we must empower the next generation of question-askers—especially young women in engineering," Dr. Moon explained in her keynote speech at the 2025 World Engineering Education Forum.

A major focus of these efforts has been creating sustainable career pathways. Under her leadership, WISET's programs, such as the W-Bridge platform, support women in STEM at all stages of their professional journey, providing the mentoring, training, and networking opportunities necessary for long-term career growth.

Dr. Moon also helped strengthen the institutional framework supporting women in STEM by contributing to the revision of Korea's Act on Fostering and Supporting Women Scientists and Technicians. This policy development helped shift the national conversation from simply helping women return to work after career interruptions toward creating long-term career sustainability. Through these initiatives, WISET has become a key regional platform for collaboration, connecting researchers, policymakers, and institutions across Asia.

Gender Equality in Global Science Diplomacy

As a member of the UN 10-Member Group of STI Experts, Dr. Moon contributes to global discussions on how science and technology can accelerate progress toward the SDGs.

In this role, she has participated in major international forums, including the UN High-Level Political Forum (HLPF) and the UN STI Forum, where she has highlighted the importance of addressing gender gaps in digital innovation and emerging technologies.

At the APEC 2025 Women in STEM Symposium, hosted by WISET, she brought together policymakers and scientists from across the Asia-Pacific region with the theme "Empowering Women in AI for a Sustainable Future." The initiative encouraged collaboration among governments, research institutions, and industry to expand women's leadership in rapidly evolving technological fields such as artificial intelligence.

Her work emphasizes that gender equality in STEM is not only a social objective but also a driver of innovation and sustainable development.

Mentoring the Next Generation of Women Scientists

Alongside her policy leadership, Dr. Moon remains deeply committed to education and mentorship. As a Distinguished Professor with over 30 years of teaching experience, she has guided hundreds of students, many of them women who have gone on to careers in academia, research institutions, and science policy.

Dr. Moon's career illustrates how scientific expertise can evolve into broader leadership roles that shape institutions and public policy. She demonstrates that scientists can play an important role in addressing societal challenges.

Science Leadership for Inclusive Innovation

Dr. Moon's contributions have been recognized through numerous national honors, including the Order of Women Promotion Merit, the L'Oréal Korea–UNESCO Women in Science Award, and a Presidential Citation for Excellence in Science and Technology.

Through her work in academia, government advisory bodies, and international science diplomacy, she continues to advocate for inclusive innovation systems that support diverse participation in research and technology development.

Her leadership demonstrates that advancing gender equality in STEM requires both scientific excellence and institutional change—ensuring that future generations of women in STEM have the opportunities and support needed to thrive.

Dr. Oh Nam Kwon

SEOUL NATIONAL UNIVERSITY

At the Forefront of Korean Science and Technology

Dr. Oh Nam Kwon stands at the forefront of Korean science and technology, working at the intersection of mathematics education, science policy, and gender equity in STEM. In March 2026, she was inaugurated as the 22nd President of the Korean Federation of Science and Technology Societies (KOFST), only the second woman to lead the federation in its sixty-year history. KOFST serves as the umbrella organization for over six hundred member societies across Korean science and technology. She concurrently serves as President of the International Group for the Psychology of Mathematics Education (PME), representing a global community of mathematics education researchers across five continents, and as Professor of Mathematics Education at Seoul National University, bringing more than three decades of scholarship on how students learn mathematics into a broader inquiry into who gets to ask the questions that shape science, technology, and society.

She earned her Ph.D. in Mathematics (Complex Analysis) from Indiana University in 1993, after earlier degrees from Ewha Womans University and Seoul National University. Over more than three decades, she has built an influential career combining mathematical scholarship, education research, and policy engagement.

Asking Harder Questions of AI

Dr. Kwon has increasingly connected mathematics education with emerging debates on artificial intelligence. At the UN Women Knowledge and Partnerships Centre's International Women's Day commemoration in Seoul in 2026, she discussed how algorithmic systems often reproduce existing social inequalities.

"AI learns from data," she explained. "That data is produced by our society. If society contains discrimination, so does the data, and AI learns that discrimination, faster and more precisely than anyone."

She illustrated this point through examples of algorithmic bias in criminal justice and hiring systems. These cases, she argued, demonstrate that technological systems reflect the perspectives of those who design them. "Technology is a mirror," she noted. "It reflects the society that built it, and the perspectives of those who built it. The problem is that this mirror is currently only facing one direction."

For Dr. Kwon, this issue is directly tied to education. Mathematics provides much of the language through which algorithms are designed. Ensuring that girls and young women have access to mathematical learning, therefore, shapes not only who builds these systems, but who gets to ask what questions they should answer in the

A Classroom Observation

Over more than thirty years of teaching, Dr. Kwon has observed a recurring pattern in classrooms. In primary school, girls often perform as well as or better than boys in mathematics. As students move into secondary school, however, many girls begin to lose confidence in their mathematical abilities.

According to Dr. Kwon, the shift is rarely about ability. Instead, it reflects teacher expectations, social messages, and the gradual internalization of stereotypes about who "belongs" in mathematics. Her research and teaching aim to challenge these assumptions by emphasizing inquiry, collaboration, and creative problem-solving in mathematics education.

A Bridge Between Mathematics Education and Korean Science

Dr. Kwon's leadership has steadily expanded from mathematics classrooms to the broader landscape of Korean science and technology. She was elected at the PME conference in New Zealand in 2024 and began her three-year term in July 2025 as the first Asian woman to serve as President of PME, the leading global research organization for mathematics learning. Her inauguration as the 22nd President of KOFST in March 2026 placed mathematics education, gender equity, and the ethical dimensions of emerging technologies at the center of Korea's largest science and technology federation. Her presidency builds on her earlier tenure as the 12th President of the Korean Federation of Women's Science and Technology Associations (KOFWST), where she expanded support networks for women scientists and engineers. Through KOFST and PME, she actively works to strengthen scientific cooperation with partner academies and federations across Asia and beyond.

At Seoul National University, she leads the university's Center for Research in Mathematics Education, which trains educators in inquiry-based approaches to teaching mathematics. Through conferences, workshops, and international partnerships, the center has helped link mathematics education researchers across continents.

Mathematics as a Field of Questions

At the heart of Dr. Kwon's work is a different vision of mathematics. Rather than treating mathematics as a discipline defined by speed and memorization, she emphasizes its role in asking meaningful questions about the world.

As she stated during her UN Women address, "We don't need faster technology. We need better questions. And to ask better questions, we need people with diverse lived experiences — especially those who have historically been excluded — at the design table."

From the classroom to the highest levels of Korea's science and technology community, Dr. Kwon continues to widen the circle of those who get to ask — and answer — the questions that will shape the future of science, technology, and society, and the place of equity within them.

Dr. Hyewhon Rim

KOREA INSTITUTE OF SCIENCE & TECHNOLOGY (KIST)

Building Stronger Systems for Women in Science and Engineering

For Dr. Hyewhon Rhim, scientific research and policy leadership are deeply connected. As a neuroscientist and institutional leader, she has spent decades advancing both the understanding of brain disorders and the participation of women in science and engineering. Through her work at the Korea Institute of Science and Technology (KIST) and her leadership as President of the Association of Korean Women in Science and Engineering (KWSE), Dr. Rhim has contributed to strengthening research capacity while promoting structural reforms that support women scientists.

Her career spans more than thirty years of neuroscience research, focusing on the mechanisms underlying neurological disorders such as depression and Alzheimer's disease. At the same time, she has played a pivotal role in building institutional networks and policies that support the advancement of women in STEM. These contributions align strongly with SDG 5 (Gender Equality) while also supporting SDG 3 (Good Health and Well-being), SDG 4 (Quality Education), and SDG 17 (Partnerships for the Goals).

From Neuroscience Research to Scientific Leadership

Dr. Rhim earned her PhD in Physiological and Pharmacological Sciences from the University of Chicago after completing her undergraduate and master's degrees at Seoul National University. Her scientific work focuses on neurophysiology and molecular mechanisms involved in brain disorders.

Over the course of her career, she has produced more than 200 scientific publications and holds over 50 patents, contributing to research on serotonin receptors, protein modification mechanisms, and neurological disease pathways. Her work has also supported the development of high-throughput screening systems for brain-targeted drug discovery, helping accelerate research into treatments for neurological conditions.

In addition to her research contributions, Dr. Rhim has held several major leadership roles in Korean science institutions. She served as President of the Korea Society of Brain and Neural Science, Director at the National Research Foundation of Korea, and Director-General for International Affairs at KIST. These roles allowed her to shape research strategies, promote interdisciplinary collaboration, and strengthen Korea's global scientific partnerships.

Strengthening the National Network for Women Scientists

Since joining KWSE, Korea's largest organization supporting women scientists and engineers in 2002, she has served in multiple leadership roles, including board member, vice president, and now president, helping expand the organization's reach and impact.

During her presidency, Dr. Rhim implemented structural reforms to strengthen the organization's national presence. She established new regional branches, expanded industry participation through the creation of an Industry Committee, and founded a Next-Generation Committee designed to support early-career scientists.

These efforts helped revitalize the organization and increase membership by approximately 15 percent, strengthening KWSE as a national platform for networking, mentorship, and policy dialogue among women scientists.

Transforming Policy into Action

Dr. Rhim's advocacy goes beyond symbolic support for women in science. Recognizing that many gender-related STEM policies remain advisory rather than enforceable, she has actively worked to ensure concrete policy implementation.

She held direct consultations with leaders from more than twenty government-funded research institutes and several universities, urging them to adopt practical measures that support women researchers. Through these efforts, she secured competitive research funding from the Ministry of Science and Technology and the National Research Council of Science and Technology to support the first policy initiative specifically targeting women scientists in government-funded research institutes.

Her leadership also led to a historic milestone for KWSE: the creation of the COSMAX Award, the organization's first corporate-sponsored prize recognizing outstanding women scientists.

Building the Capacity of the Next Generation

Another important dimension of Dr. Rhim's work is mentoring and capacity-building for young researchers. She established initiatives such as the Young Women Scientists (YWS) Webinar and YWS Camp, which provide training, networking opportunities, and global perspectives for early-career scientists.

Under her leadership, KWSE expanded membership eligibility to include university students, enabling younger women to participate in mentorship networks and leadership programs. These initiatives help bridge the gap between education and professional research careers.

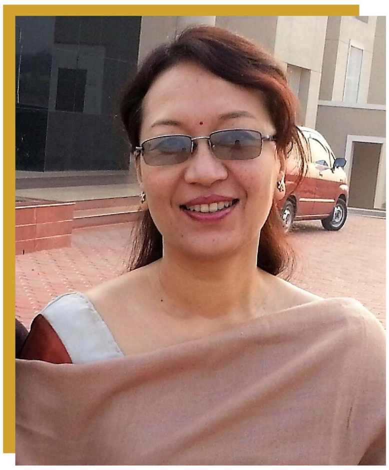
In 2025, Dr. Rhim also led the BIEN 2025 International Convergence Conference, bringing together nearly 700 women scientists from 22 countries. Held alongside the Asia-Pacific regional meeting of the International Network of Women Engineers and Scientists (INWES), the conference strengthened global collaboration among women researchers in fields ranging from biotechnology and information technology to environmental science and nanotechnology.

Towards Inclusive Research Communities

Through her work in neuroscience, national research organizations, and international scientific networks, Dr. Rhim continues to strengthen the participation and leadership of women in science and engineering.

Her achievements have been recognized through national honors, including the Science and Technology Medal of Merit and a Presidential Commendation from the Republic of Korea.

By combining scientific excellence with institutional leadership, Dr. Hyewhon Rhim shows that expanding opportunities for women in STEM is essential not only for equity but also for the long-term vitality and innovation of scientific communities.



Dr. Anjana Singh

TRIBHUVAN UNIVERSITY

Microbiology, Mentorship, and Empowering Women in Science

For Dr. Anjana Singh, the pursuit of science required persistence long before she became a professor, researcher, and national science leader. Growing up in Nepal, she entered a field where very few women pursued careers in science and technology. In her own family, she was the first woman to study science and technology, supported by parents who believed in education despite cultural expectations that often encouraged girls to marry early. Her path to becoming a microbiologist and academic leader would later inspire many young women across Nepal to imagine themselves in scientific careers.

At present, Professor Dr. Anjana Singh is a leading microbiologist at the Central Department of Microbiology at Tribhuvan University and an Academician of the Nepal Academy of Science and Technology (NAST). Her research spans antimicrobial resistance, infectious diseases, water microbiology, and plant health—fields that intersect with major global challenges in public health, environmental sustainability, and gender equality. Through both research and mentorship, she has contributed to advancing SDG 3 (Good Health and Well-Being), SDG 4 (Quality Education), SDG 5 (Gender Equality), and SDG 6 (Clean Water and Sanitation).

Building a Career in Microbiology

Dr. Singh's academic journey reflects a steady dedication to scientific learning. She completed her Bachelor's and Master's degrees in Microbiology at Tribhuvan University, graduating with distinction, before pursuing a PhD in Microbial Biotechnology at Jawaharlal Nehru University in India, supported by the University Grants Commission fellowship. Later, she expanded her research internationally as a Fulbright Postdoctoral Scholar at the University of Virginia in the United States (2008–2009).

Her scientific work focuses particularly on antimicrobial resistance (AMR), one of the most urgent global health challenges today. By studying bacterial infections and microbial behavior, her research contributes to understanding how antibiotic resistance develops and spreads. She has also conducted important work in waterborne diseases and groundwater contamination, issues that have significant public health implications in many parts of Nepal.

In addition, Dr. Singh has explored plant growth–promoting microorganisms, linking microbiology to agriculture and environmental sustainability. This interdisciplinary approach reflects a broader "One Health" perspective that recognizes the connections between human health, environmental systems, and food production.

Leadership in Science and Higher Education

Apart from her academic life, Dr. Singh has played an influential role in strengthening scientific education in Nepal. She has served as a permanent faculty member at Tribhuvan University since 1994 and twice held the position of Head of the Central Department of Microbiology (2004–2008 and 2012–2016). In these leadership roles, she helped guide academic programs, research training, and institutional development within one of Nepal's major universities.

Her academic contributions are equally visible in mentorship. Over the course of her career, Dr. Singh has supervised hundreds of graduate students, helping build a new generation of microbiologists and health scientists in Nepal. She has also contributed extensively to scientific publishing, with more than 150 publications, including journal articles, book chapters, and edited volumes.

Dr. Singh's work extends into science policy and institutional development. She has served on numerous academic committees within Tribhuvan University, the University Grants Commission of Nepal, and regional scientific organizations. Through these roles, she has contributed to improving higher education policy, strengthening research capacity, and supporting digital learning initiatives in universities.

Advancing Women in STEM

A defining feature of Dr. Singh's career has been her commitment to advancing women in science and technology. She has been actively involved in regional and international initiatives supporting women scientists, including service as an executive board member of AASSA Women in Science and Engineering (AASSA-WISE). Through workshops, mentorship programs, and international collaborations, she has helped strengthen networks for women researchers across South and Southeast Asia.

At the national level, she serves as Coordinator of the Women Scientists Forum Nepal (WSFN) under the Nepal Academy of Science and Technology (NAST). Through this platform, she has organized numerous programs aimed at encouraging women and girls to pursue careers in science. These initiatives include training workshops on research methodology, scientific writing, and professional development.

Under her leadership, the forum has also organized regional and international activities addressing the challenges faced by women scientists. One example was a regional workshop examining the impact of COVID-19 lockdowns on women researchers across South Asia, bringing together scientists from Bangladesh, India, Nepal, Pakistan, and Sri Lanka to discuss shared experiences and solutions.

Dr. Singh has also collaborated with international organizations such as UNESCO to support platforms that promote women's participation in STEM. Through ideation workshops and mentoring initiatives, she has helped create networks that provide resources, support, and visibility for women scientists.

A Role Model for the Next Generation

Dr. Singh's personal journey reflects the challenges many women face when pursuing scientific careers. While continuing her studies after marriage, she balanced family responsibilities with academic work, often studying late into the night after completing household duties. Despite these challenges, she remained committed to advancing her education and research career.

Her perseverance earned numerous recognitions, including the Crown Prince Young Scientist Award (2005) from NAST and several national academic honors. More recently, she was awarded the Asta Matrika Honour (2025) for her contributions to science in Nepal.

At present, Dr. Singh continues to mentor students, guide research projects, and advocate for women in science. Her work demonstrates how scientific leadership can extend beyond laboratories and classrooms to shape institutions, policies, and communities. Her career shows that advancing science and advancing equality can go hand in hand, creating a stronger and more inclusive future for the next generation of researchers.

Dr. Jin-Hee Yoon

INHA UNIVERSITY

Breaking Barriers in Nuclear Physics

For more than three decades, Dr. Jin-Hee Yoon has contributed to nuclear physics research while working to broaden participation in scientific communities. A physicist specializing in high-energy heavy-ion physics, she has been actively involved in major international collaborations and national research leadership. At the same time, she has helped build programs and institutional initiatives that encourage young women to pursue careers in physics and strengthen support systems for women scientists.

Dr. Yoon is currently a Professor in the Department of Physics at Inha University, where she has taught and conducted research since 1995. Her scientific career began with doctoral studies at Purdue University, where she completed her PhD in 1994, followed by a postdoctoral appointment at Purdue's Department of Physics. Her research focuses on fundamental questions in nuclear physics, including three-body systems, quarkonium states, and particle correlations in relativistic heavy-ion collisions: topics that contribute to understanding matter under extreme conditions.

Over the course of her career, Dr. Yoon has published more than 300 scientific papers, including articles in leading journals such as Nature, Nature Physics, and Physical Review Letters. Her contributions have advanced knowledge of nuclear matter and particle interactions while reinforcing Korea's presence in international physics research networks.

Breaking Leadership Barriers in Korean Physics

In 2025, Dr. Yoon reached a historic milestone when she became President of the Korean Physical Society (KPS). Founded in 1952, the organization represents thousands of physicists across Korea and plays a central role in shaping national research agendas. Dr. Yoon's election marked the first time in the society's 73-year history that a woman has served as president.

Her work has placed her at the center of major international research collaborations. From 2016 to 2022, she served as the Spokesperson of the Korean ALICE Collaboration at CERN's Large Hadron Collider, representing Korean experimental physicists in one of the world's largest particle physics experiments. The ALICE project investigates the properties of quark–gluon plasma, a state of matter believed to have existed shortly after the Big Bang. Through her leadership in the collaboration, she helped strengthen Korea's participation in global nuclear physics research.

Over the years, she has served in numerous positions within the society, including Chair of the Division of Nuclear Physics and Chair of the Women's Committee. These roles allowed her to shape professional networks and mentoring systems for younger researchers.

Her international leadership is equally notable. She currently serves as Secretary of the Nuclear Physics Division (C12) of the International Union of Pure and Applied Physics (IUPAP) and is a member of the International Advisory Committee of the Asian Nuclear Physics Association.

Supporting Women in Physics

Dr. Yoon has long been committed to improving opportunities for women scientists. Since the establishment of the Women's Committee within the Korean Physical Society in 2003, she has played an active role in its activities for more than two decades.

Among her initiatives was the creation of Women's Special Sessions at KPS meetings, held twice each year to highlight research by women physicists. She also established the Female Graduate Student Award Fund, recognizing promising young researchers and supporting their academic development.

Another important initiative was the Girls' High School Physics Camp, launched in 2002. The program introduces high school students to

physics through lectures, mentoring sessions, and laboratory experiences, helping young women explore scientific careers at an early stage.

Dr. Yoon also organized mentoring visits to universities and research institutes without senior female scientists, connecting early-career women researchers with mentors and professional networks.

Leadership in Science Policy and Collaboration

Beyond academic research and professional societies, Dr. Yoon has also contributed to national science policy. She has served on the National Science and Technology Council of Korea for 4 years and is currently serving as an advisor to the National Science and Technology Advisory Committee, an organization directly under the President. She is now also a member of the Nuclear Fusion Committee under the Ministry of Science and ICT.

She also served at Korea's research infrastructure through her role as President of the RAON Users Association, representing scientists working with Korea's new ion beam accelerator facility. These roles demonstrate the contribution of scientific expertise to shaping national research strategies and international collaborations.

A Legacy of Scientific Leadership and Mentorship

When Dr. Yoon first joined the physics faculty at Inha University, she was the only female professor in the department. At present, several women serve on the faculty, reflecting gradual progress in representation within the field.

Her career demonstrates that leadership in science involves not only advancing knowledge but also strengthening the communities that produce it. Through research, mentorship, and institutional leadership, Dr. Jin-Hee Yoon continues to inspire new generations of physicists while helping build a more inclusive scientific community.

Chapter 5

SDG 9: Industry, Innovation and Infrastructure

Dr. Kadenova Zuurakan Azhimamatovna

INSTITUTE OF MATHEMATICS OF THE NATIONAL ACADEMY OF SCIENCES OF THE KYRGYZ REPUBLIC

Advancing Mathematical Research and Scientific Leadership in Kyrgyzstan

Mathematics provides essential tools for understanding complex systems that arise in science, technology, and environmental processes. Fields such as differential equations and inverse problems are particularly important because they help researchers interpret incomplete data, model physical phenomena, and develop solutions for scientific and technical challenges. Dr. Kadenova Zuurakan Azhimamatovna, a mathematician at the Institute of Mathematics of the National Academy of Sciences of the Kyrgyz Republic, has dedicated her career to advancing research in these areas while also contributing to education, public service, and the development of scientific institutions in Kyrgyzstan.

Dr. Kadenova currently serves as Chief Researcher at the Laboratory of the Theory of Inverse and Ill-Posed Problems at the Institute of Mathematics. With decades of professional work, she has combined research, academic leadership, and public service, contributing to the development of mathematical science and higher education in the country.

Academic Training and Research Development

Dr. Kadenova completed her higher education at Osh State University from 1989 to 1994, graduating with honors from the Faculty of Physics and Mathematics. She continued her academic training through postgraduate studies at Osh Technical University between 1995 and 1999, specializing in differential equations.

Her early research focused on mathematical methods used to analyze integral equations, particularly those that arise in physical and engineering systems. In 2006, she defended her Candidate of Physical and Mathematical Sciences dissertation at Novosibirsk State University in the Russian Federation, examining the regularization and uniqueness of solutions of Fredholm linear integral equations of the first kind. This work addressed mathematical techniques for solving ill-posed problems, where small variations in data can produce large variations in solutions.

Dr. Kadenova later pursued advanced doctoral research at Kyrgyz-Uzbek University, where she defended her Doctor of Physical and Mathematical Sciences dissertation in 2016. Her dissertation, Regularization and Uniqueness of Solutions of Linear Integral Equations of the First Kind with Two Independent Variables, expanded existing theoretical approaches to solving integral equations. These equations are widely used in modeling physical processes, signal analysis, and other applied mathematical problems.

Research in Differential and Integral Equations

Dr. Kadenova's scientific work focuses on the theory and application of differential and integro-differential equations, particularly in the context of inverse and ill-posed problems. These mathematical problems arise in many scientific fields where researchers must determine unknown causes from observed effects.

Her research includes the study of Fredholm and Volterra integral equations of the third kind, as well as the development of methods and algorithms for analyzing these equations. Such mathematical models have applications in engineering, physics, and environmental science.

One area of interest in her work is the application of diffusion equations to environmental analysis, including studies related to air pollution and climate processes. By applying mathematical modeling techniques to environmental systems, her research contributes to understanding how pollutants spread and how environmental conditions evolve over time.

Dr. Kadenova has authored a great number of scientific articles, monographs, and several methodological publications, contributing to the advancement of mathematical theory and its practical applications.

Leadership in Research and Education

In addition to her research work, Dr. Kadenova has played an important role in developing academic institutions and scientific collaboration. She served as Head of the Laboratory of the Theory of Inverse Problems from 2019 to 2024, and since 2024 she has continued her work as Chief Researcher at the Institute of Mathematics of the National Academy of Sciences.

Earlier in her career, she held several leadership and administrative positions in education and government. These included roles as Deputy Minister of Education and Science of the Kyrgyz Republic (2012–2013) and Deputy Minister of Labor, Migration, and Youth (2014–2015). She also served as Rector of the Institute for Social Development and Entrepreneurship and held administrative positions at Kyrgyz-Uzbek University, where she worked to expand academic programs and support technological development in higher education.

Mentorship and Scientific Community

Dr. Kadenova is also actively involved in mentoring young scientists and supporting the development of future researchers. She supervises graduate students and doctoral candidates working in mathematical sciences, including several female researchers pursuing advanced degrees.

She regularly organizes scientific seminars and participates in international academic conferences which bring together researchers from Kyrgyzstan and other countries to exchange ideas and discuss recent developments in mathematical science. Her participation in international research forums and collaborative programs has helped strengthen connections between Central Asian scientific institutions and the broader global research community.

Recognition and Contribution to Science

Dr. Kadenova's contributions to science and education have been recognized through several national honors. These include a Diploma of Honor from the Government of the Kyrgyz Republic (2017) and awards from the Ministry of Education and Science and regional government institutions for her contributions to education and research.

Her work in mathematics, public service, and academic leadership establishes Dr. Kadenova Zuurakan Azhimamatovna as a contributor to development of scientific knowledge and the advancement of education in Kyrgyzstan. Her career reflects the important role that mathematical research and scientific leadership play in strengthening academic institutions and supporting future generations of scholars.

Dr. Christina A. Binag

UNIVERSITY OF SANTO TOMAS

Materials Chemistry for Sustainable Energy

Chemistry can play an important role in addressing everyday problems, especially in countries where energy access, environmental sustainability, and rural livelihoods remain pressing concerns. In the Philippines, Dr. Christina A. Binag of the University of Santo Tomas (UST) has built a research career that connects materials chemistry with practical applications in energy storage, sensing, and sustainable technology. Her work shows how scientific research can move beyond the laboratory and respond to local needs while also creating space for women and young researchers to thrive in STEM. Dr. Binag is a faculty member of the UST Department of Chemistry, a researcher at the university's science research center, and manager of the UST Analytical Services Laboratory.

Beginnings as a Researcher

Dr. Binag earned her B.Sc. in Chemistry from the University of Santo Tomas in 1983 and completed her Ph.D. in Chemistry at the University of New South Wales in Sydney in 1996. Her research interests have included conducting polymer-based chemical sensors and biosensors, composite conducting materials, nanorods and nanowires, and flexible supercapacitor electrodes. Over the years, this body of work has produced a substantial record of scientific publications and sustained recognition within Philippine chemistry.

Her achievements have been recognized through several international and national distinctions. In 2024, she was selected as the Philippine finalist in the Senior Category of the 10th Annual Underwriters Laboratories–ASEAN-U.S. Science Prize for Women in STEM. Earlier, she was awarded a Fulbright Research Fellowship at Pennsylvania State University in 2006, where she worked with Prof. Thomas E. Mallouk on the development of segmented conducting polymer nanosensors for environmental applications. In the same year, she also received a UNESCO grant to participate in the Advanced Workshop on Recent Developments in Inorganic Materials at the International Centre for Theoretical Physics (ICTP) in Trieste, Italy.

Research in Sensors and Energy Materials

A central feature of Dr. Binag's research is the development of conducting materials and flexible energy devices. Her earlier work on nanosensors and conducting polymers contributed to environmental and analytical applications, while her more recent studies have focused on fabric-based supercapacitors for clean energy storage. These supercapacitors are designed to be lightweight, flexible, and more sustainable than conventional devices.

What makes this research distinctive is its use of indigenous Philippine fibers such as abaca, pineapple, banana, and water hyacinth, often blended with cotton and combined with conductive materials such as polyaniline, polypyrrole, and carbon-based additives. These carbon-based materials, known as biochar, are produced from agricultural wastes such as rice straw, coconut husks, and sugarcane bagasse, highlighting the principles of a circular economy.

Her group has developed working pouch-type, rigid-type, and coin-cell prototypes capable of storing solar energy and powering small electronic devices such as temperature and humidity sensors. These applications are particularly relevant in agricultural settings, where low-cost monitoring tools can help improve crop storage and post-harvest management.

Science Rooted in Community Needs

Dr. Binag's work is notable not only for its technical innovation but also for its grounding in local conditions. By using agricultural byproducts and locally available fibers, her research connects chemistry with sustainability, rural livelihoods, and community knowledge. The approach also creates opportunities for collaboration with farmers, weaving communities, and public institutions interested in renewable energy and material innovation.

Her research suggests that advanced materials science does not need to be detached from culture or place. Instead, it can be built around local resources and local expertise. This practical orientation is one reason her work has had impact beyond academic publishing, including workshops, training activities, and partnerships that bring scientific ideas into education and industry.

Mentoring Women and Building Scientific Confidence

Dr. Binag has also made an important contribution as a mentor. In her undergraduate chemistry classes, a large majority of students are women, and she has continued to support gender balance in graduate research by providing technical training, research opportunities, and career guidance. Many of her students and mentees have gone on to work in clean energy, materials science, and related fields.

She has likewise supported high school science research through her work with national science fairs and the Department of Education. In 2024, three female students she mentored won in the Physical Science Team Category in Materials Science. Her encouragement of women in chemistry is closely tied to her own view of science teaching. As she puts it in her interview with The Varsitarian, “Personally I find teachers a big factor in making Chemistry interesting.” She has also advocated building interest in chemistry among teachers and students through seminars and engaging demonstrations.

Dr. Binag’s career demonstrates that chemistry can be technically rigorous, socially grounded, and deeply collaborative. Her work in sensors, conducting materials, and fabric supercapacitors has expanded the possibilities of locally rooted scientific innovation in the Philippines, while her mentorship continues to shape a new generation of chemists, especially women, who see science not only as a profession but as a way to serve communities.

Dr. Dileeka Dias

UNIVERSITY OF MORATUWA

Telecommunications Innovation and Resilient Digital Infrastructure

In Sri Lanka, Dr. Subasinghe Arachchige Dileeka Dias of the University of Moratuwa has been a leading figure in advancing research in telecommunications engineering, intelligent networks, and digital infrastructure. Her work bridges academic research, industry collaboration, and public service, contributing to technological solutions that address national development challenges while expanding opportunities for students and researchers in engineering.

Research in Telecommunications and Disaster Communication

Dr. Dias completed her Bachelor of Science in Engineering in Electronic and Telecommunication Engineering at the University of Moratuwa in 1985. She later pursued graduate studies at the University of California, Davis, where she earned a Master of Science in 1988 and a Doctor of Philosophy in 1992. Her studies were supported by a Presidential Scholarship from the Government of Sri Lanka and the University of California Regents' Fellowship, reflecting early recognition of her academic excellence and research potential.

A major focus of Dr. Dias's work has been the development of telecommunications systems that support public safety and national infrastructure. Following the devastating 2004 Indian Ocean tsunami, she led research initiatives that explored how mobile communication networks could be used for disaster preparedness and early warning systems.

This work led to the development of the Disaster Early Warning Network (DEWN), created through collaboration between the University of Moratuwa, a telecommunications provider, and a software development company. The system enables rapid dissemination of disaster warnings through mobile networks, helping authorities communicate urgent alerts to communities during emergencies. The DEWN project received significant recognition, including awards at the National Best Quality Software Awards and the National Science and Technology Awards for multidisciplinary research and development.

The project also contributed to early research on Cell Broadcast technology, which allows emergency messages to be sent simultaneously to all mobile devices within a geographic area. Today, this approach has become an internationally recognized method for delivering disaster warnings and public safety alerts.

Smart Infrastructure and Emerging Communication Technologies

Apart from disaster communication, Dr. Dias has researched smart metering networks, intelligent transport systems, and next-generation mobile communication technologies. Her work on smart metering systems has helped develop technologies that allow energy providers to monitor consumption patterns, implement time-based tariffs, and improve energy management through digital monitoring.

Her research group has also developed industrial Internet of Things (IoT) systems and monitoring platforms that enable real-time data collection and analysis in industrial environments. These technologies support improved operational efficiency and infrastructure monitoring.

More recently, she has contributed to the development of an open-source 5G testbed that uses software-defined radio technologies and commodity hardware. This platform enables researchers and developers to experiment with new 5G applications before large-scale commercial deployment. It provides a flexible research environment where new communication technologies and digital services can be tested and refined.

Among the experimental applications developed on this platform are virtual reality–based exercise environments, which combine physical activity with immersive digital experiences. These "exer-gaming" systems explore how advanced communication networks can support health-related technologies and interactive digital services.

Building Research Ecosystems and Industry Partnerships

Throughout her career, Dr. Dias has emphasized the importance of collaboration between universities, industry, and government institutions. One of her most significant initiatives was the creation of Sri Lanka's first industry-sponsored research laboratory, established through a partnership between the University of Moratuwa and a telecommunications company. The laboratory introduced new research areas in mobile technologies and provided opportunities for undergraduate and postgraduate students to engage in applied research.

at the University of Moratuwa, she has guided student-led initiatives aimed at encouraging high school girls to pursue careers in engineering and technology.

These activities include workshops, innovation competitions, and mentorship forums that connect students with experienced women engineers and entrepreneurs. Through these initiatives, students gain exposure to technical fields while developing leadership and collaborative skills.

She is also a member of the Women Engineers' Forum of the Institution of Engineers, Sri Lanka, where she continues to advocate for greater participation of women in engineering professions. Through her dedicated mentorship, she has cultivated a new generation of engineers who

As Founding Dean of the Faculty of Graduate Studies at the University of Moratuwa, she introduced institutional frameworks to strengthen postgraduate research and foster collaboration across faculties. She also played a key role in establishing joint doctoral programs with international universities and supporting the creation of multidisciplinary research centers.

Earlier in her career, as Head of the Department of Electronic and Telecommunication Engineering, she oversaw infrastructure development, expanded student enrollment, and strengthened the department's research profile.

Mentoring Future Engineers and Supporting Women in STEM

Dr. Dias has also been actively involved in mentoring young engineers and supporting women in technical fields. As staff advisor to the IEEE Women in Engineering (WIE) Affinity Group

are equipped to tackle complex challenges with a focus on social impact. Her legacy is one of transformation, showing that the integration of research and leadership can pave the way for a more technologically resilient and innovative future.

Dr. Lan Fu

THE AUSTRALIAN UNIVERSITY

Semiconductor Innovation and the Infrastructure of Future Technologies

Scientific progress often depends on infrastructures that remain largely invisible to the public—materials, devices, and systems that support communication, sensing, energy technologies, and digital networks. Dr. Lan Fu, a physicist and engineer at the Australian National University (ANU), has spent her career developing such technological foundations. Through her research on semiconductor materials, optoelectronic devices, and nanotechnology, Fu contributes directly to Sustainable Development Goal 9: Industry, Innovation and Infrastructure, demonstrating how advanced materials science can lead to innovations that shape modern society.

Currently Head of the Department of Electronic Materials Engineering at ANU's Research School of Physics, Fu is internationally recognized for her work on low-dimensional III-V semiconductor materials and devices. Her research connects fundamental physics with applied engineering, enabling new technologies that support communication systems, sensing platforms, and emerging digital infrastructures.

From Physics Training to Advanced Materials Research

Fu's scientific journey began in China, where she completed her Bachelor's degree in Applied Physics at Hefei University of Technology in 1993, followed by a Master's degree in Physics at the University of Science and Technology of China in 1996. She later moved to Australia to pursue doctoral research at the Australian National University, earning her PhD in Physics in 2001. Her doctoral work examined quantum well intermixing in semiconductor materials, an area essential to improving the performance of optoelectronic devices.

Over the course of her career, Fu has published more than 180 journal and conference papers, authored book chapters, and secured patents related to semiconductor lasers, photodetectors, and sensing technologies. Her contributions have been recognized through several prestigious fellowships, including the Australian Research Council Future Fellowship, reflecting her role in advancing Australia's research capability in advanced materials and photonics.

Engineering the Next Generation of Optoelectronic Devices

Much of Fu's research focuses on the design and fabrication of optoelectronic devices, including LEDs, lasers, photodetectors, solar cells, and chemical sensors. These devices rely on semiconductor materials that can convert electrical signals into light or detect light with high sensitivity. Such technologies form the backbone of modern telecommunications, imaging systems, and sensing networks.

A key focus of Fu's work is the use of low-dimensional semiconductor structures, including quantum wells, quantum dots, and nanowires. By manipulating materials at the nanoscale, researchers can control electronic and optical behavior in ways that allow devices to become smaller, faster, and more energy-efficient.

Fu has been particularly influential in research on III-V semiconductor nanowires, which are promising components for technologies such as LiDAR systems, augmented and virtual reality devices, and Internet of Things (IoT) sensors. These innovations contribute to the technological infrastructure required for emerging digital and sensing systems, illustrating how advances in materials science support the goals of SDG 9 (Industry Innovation and Infrastructure).

Translating Research into Real-World Technologies

While Fu values fundamental research, she has consistently emphasized the importance of ensuring that scientific discoveries lead to practical applications. Reflecting on her work, she noted: "*I value all the research projects that I have worked on and collaborated with. However, so far, I have been mainly working on fundamental aspects of the research to publish papers. Ultimately, I would be really proud if one or two of our research work can be translated into real products to improve our lives.*"

This aspiration is evident in her work on nanowire-based sensing technologies. Fu and her collaborators have developed highly sensitive, self-powered gas sensors capable of detecting pollutants such as nitrogen dioxide at room temperature. Because these sensors can operate without external power, they offer promising applications in environmental monitoring and smart sensing networks.

Another notable innovation is the Keto-whistle, a prototype breath sensor designed to detect acetone as a biomarker for diabetes. By analyzing breath instead of blood samples, the device could provide a non-invasive monitoring tool for people living with diabetes. Fu described the promise of such work when discussing her research on nanowire sensors: "*We have shown that III-V semiconductor nanowires present a promising battery-free, highly integrable sensing platform for applications such as environmental and health monitoring.*"

Leadership and Mentorship in Scientific Innovation

Dr. Fu is also committed to developing future generations of scientists and engineers. She views doctoral education not only as technical training but also as a process of intellectual growth and professional development. As she explains, "*Through the PhD training, I want to see my students gradually demonstrate the ability to come up with new research ideas and become independent thinkers.*"

Her achievements have been widely recognized, including her election as a 2025 Fellow of Optica, honoring her contributions to semiconductor materials, optoelectronic devices, and nanotechnology. As a research leader, inventor, and mentor, Dr. Lan Fu exemplifies how scientific work can contribute to technological innovation while strengthening the knowledge infrastructure needed for future industries.

Dr. Valeriya Gribova

FAR EASTERN BRANCH OF THE RUSSIAN ACADEMY OF SCIENCES

Artificial Intelligence Systems and Knowledge-Based Technologies

Artificial intelligence increasingly shapes how societies process information, support decision-making, and develop new digital infrastructures. In Russia, Dr. Valeriya Gribova, Research Deputy Director of the Institute of Automation and Control Processes of the Far Eastern Branch of the Russian Academy of Sciences (IACP FEB RAS), has contributed significantly to the development of intelligent systems and applied artificial intelligence technologies. Her work focuses on knowledge representation, intelligent interfaces, and cloud-based platforms that enable the creation of advanced decision-support systems for various domains, including healthcare.

Dr. Gribova graduated from the Leningrad Polytechnic Institute named after M. I. Kalinin, where she studied applied mathematics at the Faculty of Physics and Mechanics. She later earned a Ph.D. in Technical Sciences in 1998 and a Doctor of Sciences in Engineering in 2008. Her long-standing contributions to artificial intelligence research were recognized in 2022 when she was elected Corresponding Member of the Russian Academy of Sciences, one of the highest distinctions in Russian scientific institutions.

Research in Knowledge Representation and Intelligent Systems

Dr. Gribova is widely known for her research on the design and development of applied and instrumental artificial intelligence systems. A central focus of her work has been the development of knowledge representation models based on semantic structures, which allow intelligent systems to organize, interpret, and apply complex information.

Her research group has developed models, methods, and technologies for creating viable intelligent systems capable of supporting a wide range of applications. These include systems that automatically generate intelligent user interfaces and digital environments, including interfaces based on three-dimensional scenes that allow users to interact with complex information more effectively.

These innovations have contributed to the broader field of knowledge engineering, where artificial intelligence systems are designed to replicate aspects of human reasoning and decision-making. By integrating semantic modeling with software technologies, her work has helped create systems that are more adaptable and easier to use across different domains.

Development of the IACPaaS Artificial Intelligence Platform

One of Dr. Gribova's most significant achievements is the development of the IACPaaS (Intelligent Applications Cloud Platform as a Service). Originally designed as a research platform within the Institute of Automation and Control Processes, IACPaaS provides tools for building, managing, and deploying intelligent systems using cloud technologies.

The platform offers a set of instrumental services that support the creation of intelligent applications in areas such as decision support, knowledge management, and data analysis. Over time, the platform has expanded beyond the laboratory environment and now serves a growing number of users who employ it for developing intelligent services and research applications.

By enabling researchers and developers to construct intelligent systems without building infrastructure from scratch, the platform contributes to wider access to artificial intelligence technologies and supports innovation across scientific and industrial sectors.

Scientific Leadership and Contributions to Education

Dr. Gribova plays a significant role in scientific education and professional development. She supervises graduate students at IACP FEB RAS in the field of Computer Science and Computer

Dr. Gribova plays a significant role in scientific education and professional development. She supervises graduate students at IACP FEB RAS in the field of Computer Science and Computer Engineering and serves as a professor at Far Eastern Federal University and Vladivostok State University. Through teaching and mentorship, she contributes to the preparation of young specialists in artificial intelligence and information technologies.

She has also served national and international organizations. Currently, she is Vice-President of the Russian Association of Artificial Intelligence, helping coordinate research collaboration and professional development within the AI community. She also participates as an expert in several scientific institutions and advisory bodies, including the Russian Science Foundation, the Analytical Center under the Government of the Russian Federation, and the Higher Attestation Commission responsible for evaluating academic qualifications in Russia.

Dr. Gribova has also contributed extensively to scientific publishing and international collaboration. She is the author or co-author of more than 400 scientific publications and serves on the editorial boards of multiple journals in the fields of artificial intelligence, informatics, and information technologies. She also participates in the program committees of numerous international scientific conferences.

Recognition and Impact

Dr. Gribova's contributions to artificial intelligence research have received wide recognition. She has received a Letter of Gratitude from the President of the Russian Federation, the Medal for Impeccable Work and Distinction from the Ministry of Science and Higher Education, and the Medal commemorating the 300th Anniversary of the Russian Academy of Sciences. She has also received the ITHEA Prize for Outstanding Achievements in Information Theories and Applications.

Dr. Valeriya Gribova's initiatives in intelligent systems, knowledge engineering, and scientific education have helped strengthen the development of artificial intelligence technologies in Russia while contributing to the global advancement of intelligent information systems and in shaping the growth of emerging technological fields and supporting the next generation of scientists and engineers.

Dr. Danilda Hufana-Duran

DEPARTMENT OF AGRICULTURE - PHILIPPINE CARABAO CENTER - NATIONAL INSTITUTE FOR ANIMAL SCIENCES

Reproductive Biotechnology and Livestock

Advances in animal biotechnology have played an important role in improving livestock productivity, strengthening food security, and supporting agricultural livelihoods. In the Philippines, Dr. Danilda Hufana-Duran, Scientist II and Senior Agriculturist at the Department of Agriculture–Philippine Carabao Center (DA-PCC), has been a leading researcher in reproductive biotechnology for water buffalo and cattle. Her work focuses on improving breeding technologies, strengthening genetic resources, and translating scientific innovations into practical solutions for farmers.

Academic Background

Dr. Hufana-Duran earned her Bachelor of Science in Biology, majoring in Zoology, from Central Luzon State University in 1986. She later pursued advanced training in reproductive biotechnology, completing a Master's degree in Agriculture majoring in Animal Science at the University of Miyazaki in Japan in 1996 and a Ph.D. in Agricultural Science specializing in Reproductive Biotechnologies at the University of Tsukuba in 2009.

Her academic career has also included international research fellowships, including a Fulbright Postdoctoral Fellowship at the University of Wisconsin–Madison in 2012, a Prometeo Fellowship at the Universidad Técnica de Babahoyo in Ecuador in 2015, and a Japan Society for the Promotion of Science (JSPS) Bridge Fellowship at Hokkaido University in 2018.

Research in Animal Reproductive Biotechnology

Dr. Hufana-Duran's scientific expertise lies in reproductive technologies that improve livestock breeding efficiency and genetic quality. Her work covers several areas, including in vitro embryo production, oocyte maturation and fertilization, embryo cryopreservation, artificial insemination, estrus synchronization, ovum pick-up, multiple ovulation, in vivo collection of embryos, and embryo transfer. She has also researched fertility assessment and methods to enhance reproductive performance in inactive bulls and breeding animals, and predicting bull fertility by sperm nuclear shape.

These technologies are particularly important for improving the genetic potential of livestock populations and supporting more efficient dairy and meat production systems. At the Philippine Carabao Center, Dr. Hufana-Duran has contributed to the development and application of reproductive biotechnologies that strengthen the breeding programs for water buffalo, a species that plays a central role in Philippine agriculture and rural livelihoods.

Strengthening Livestock Genetics and Food Security

One of her current research initiatives focuses on the verification and optimization of Multiple Ovulation and Embryo Transfer (MOET) techniques for the production of purebred Wagyu cattle in the Philippines. This project applies advanced reproductive biotechnology to improve genetic quality and productivity in the livestock sector.

Even before the official start of the project, Dr. Hufana-Duran initiated preliminary MOET trials to refine the methodology and prepare her research team. These early efforts produced encouraging results, including the birth of Wagyu calves, including several twins of Brahman and Wagyu after innovating the breeding techniques by AI-ET combination. Twins from the transfer of 2 embryos to surrogate dams were also realized in buffalo and Wagyu through embryo transfer techniques. The project also involves international collaboration, including partnerships with Japanese researchers such as Team Todoroki ARR, allowing the Philippines to access advanced technologies and expertise in livestock genetics.

Aside from cattle breeding, her work on reproductive biotechnology for water buffalo continues to support programs that improve milk production and genetic quality in carabao populations. These innovations help strengthen the livestock sector and support farmers who rely on dairy and draft animals as sources of income and food.

Science, Community Engagement, and Public Health

Dr. Hufana-Duran's work extends beyond laboratory research. During the COVID-19 pandemic, she helped initiate a Buffalo Milk Drive, distributing carabao milk and dairy products to communities as a source of nutrition. The program later evolved into Buffalo Milk on Wheels, which expanded milk distribution through regional centers of the Philippine Carabao Center.

Her engagement with farmers and local communities reflects an approach to science that connects research with public service. By promoting improved livestock production, milk consumption, and agricultural innovation, her work contributes to both rural development and community well-being.

In addition to her research work, Dr. Hufana-Duran taught as an Affiliate Professor at Central Luzon State University, Occidental Mindoro State College, and Visayas State University, where she teaches courses in animal physiology, reproductive biotechnology, and breeding and genetics. She mentors undergraduate and graduate students, helping train the next generation of Filipino scientists in animal biotechnology.

She is also actively involved in professional and scientific organizations, including the Fulbright Philippine Agriculture Alumni Association, the JSPS Alumni Association of the Philippines, the Philippine Society of Animal Reproduction, the ASEAN Regional Society of Animal Production, and the National Research Council of the Philippines. Through these networks she supports scientific collaboration and knowledge exchange within the Philippines and internationally.

Dr. Danilda Hufana-Duran's career demonstrates the role of biotechnology research in strengthening agricultural systems while creating opportunities for scientific development. From improving livestock genetics and reproductive technologies to mentoring young scientists and supporting rural communities, her work bridges laboratory science with practical applications in agriculture. Her contributions continue to enhance the Philippines' capacity in animal biotechnology while demonstrating how scientific innovation can contribute to food security, rural livelihoods, and the long-term development of the agricultural sector.

Dr. Marlene Kanga

AUSTRALIAN RAIL TRACK CORPORATION AND STANDARDS

Engineering Leadership and the Global Infrastructure of Innovation

Engineering plays a crucial role in shaping the systems that support modern societies. From energy production and transportation networks to industrial safety and emerging technologies, engineers design and manage the technology, systems, and infrastructure that allow economies and communities to function. Dr. Marlene Kanga, AO FAA FTSE FREng, a renowned Australian engineer and global STEM leader, has spent her career strengthening these systems through engineering practice, policy leadership, and international collaboration. Her work reflects the objectives of Sustainable Development Goal 9: Industry, Innovation and Infrastructure, demonstrating how engineering expertise is essential for resilient industries, promotes technological innovation, and supports sustainable development.

Currently serving in leadership roles across industry and engineering institutions, including the Australian Rail Track Corporation and Standards Australia, Dr. Kanga has become a prominent voice linking engineering practice with global development goals.

Foundations in Engineering and Interdisciplinary Training

Dr. Kanga began her engineering education at the Indian Institute of Technology Bombay, where she earned a Bachelor of Technology in Chemical Engineering. She then pursued advanced studies at Imperial College London, completing both a Master of Science with distinction in Chemical Engineering and a Diploma of Imperial College (DIC) with specialization in industrial safety. She later completed a PhD in Business Administration at Macquarie University, Sydney, Australia.

This combination of engineering science and management training shaped Dr. Kanga's career. Her expertise focuses on complex system safety and industrial risk management, fields essential to ensuring the safe operation of large-scale high-hazard facilities such as oil refineries, petrochemical and manufacturing plants, and energy facilities. By addressing how technological systems interact with human and organisational processes, her work highlights the interdisciplinary nature of modern engineering.

Engineering Practice and Industrial Innovation

Throughout her professional career, Dr. Kanga has worked across sectors where engineering innovation directly influences industrial productivity and infrastructure reliability. Her expertise in process engineering and industrial safety systems has contributed to improving operational practices in hazardous industries, where careful risk management is critical to both environmental protection and worker safety.

In addition to her technical work, Dr Kanga has served as a non-executive director and advisor to organisations in the energy, water, and infrastructure sectors, helping guide the adoption of new technologies and sustainable engineering practices. She has also been involved in technology ventures, developing hydrogen storage solutions, a field that supports the transition toward cleaner energy systems. These activities demonstrate how engineering leadership can help translate research and technological advances into practical industrial applications—an essential component of SDG 9's focus on innovation and sustainable infrastructure.

Global Leadership in Engineering for Sustainable Development

Dr. Kanga's influence extends well beyond national engineering institutions. From 2017 to 2019, she served as President of the World Federation of Engineering Organisations (WFEO), representing more than 30 million engineers worldwide. During her presidency, she played a key role in strengthening the connection between engineering practice and the global sustainability agenda.

One of her most significant achievements during this period was leading the successful proposal for

UNESCO to declare 4 March as World Engineering Day for Sustainable Development. Celebrated annually around the world, this event highlights the critical role of engineering and technological innovation in addressing global challenges such as climate change, infrastructure development, and sustainable industry.

By promoting engineering as a central contributor to the United Nations Sustainable Development Goals, Dr. Kanga helped bring greater international recognition to the profession's role in shaping sustainable futures.

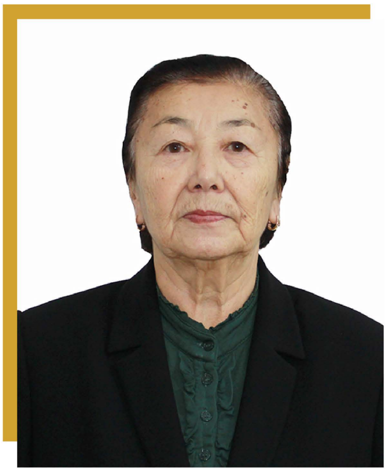
Leadership, Recognition, and Professional Impact

Dr. Kanga has also played an important role in shaping the engineering profession itself. In 2013, she served as National President of Engineers Australia, becoming only the second woman to hold the position in the organisation's history. She also hosted the inaugural meeting of the International Network for Women Engineers and Scientists (INWES) Asia Pacific Nation Network (APNN) in 2011, resulting in new women in engineering networks being established across Asia, now with a thriving network of 19 organizations, mentoring thousands of women in STEM. Through this leadership role and others, she has promoted professional standards, ethical engineering practice, and inclusive participation within STEM fields.

Her contributions have been widely recognized. In 2022, she was appointed Officer of the Order of Australia (AO) for distinguished service to engineering and for her advocacy for women in STEM. In 2025, the University of New South Wales awarded her an Honorary Doctor of Engineering in recognition of her global leadership in advancing engineering standards, sustainability, and diversity in the profession.

Engineering Leadership for Future Innovation

Dr. Kanga's career illustrates the role of engineering expertise in shaping not only technologies but also the global systems that guide innovation and infrastructure development. By strengthening engineering institutions, promoting sustainable industrial practices, and encouraging collaboration between industry, academia, and government, she has helped position engineering as a key driver of sustainable development.



Dr. Asankulova Mayram

NATIONAL ACADEMY OF SCIENCES OF THE KYRGYZ REPUBLIC

Mathematical Approaches to Economic Planning and Resource Optimization

Mathematics plays an essential role in understanding complex systems and guiding decisions in economics, industry, and regional development. Through mathematical modeling and optimization methods, researchers can identify efficient ways to allocate resources, plan production, and support sustainable economic growth. Dr. Mayram Asankulova, a mathematician at the Institute of Mathematics of the National Academy of Sciences of the Kyrgyz Republic, has devoted her career to applying mathematical tools to real economic challenges.

Dr. Mayram currently serves as Head of the Laboratory of Economic and Mathematical Methods at the Institute of Mathematics. Over several decades, she has developed mathematical models that help analyze production systems, optimize enterprise placement, and improve the management of regional economic resources, contributing to SDG 9: Industry, Innovation, and Infrastructure.

Academic Formation and Early Career

Dr. Mayram studied at the Kyrgyz State University, at the Faculty of Mechanics and Mathematics from 1970 to 1975. After graduating, she worked as a mathematics teacher and later as an engineer in automated control systems for enterprises. These early professional experiences exposed her to practical problems in production systems and industrial management.

She later pursued postgraduate studies at the Institute of Physics and Mathematics of the Academy of Sciences of the Kyrgyz SSR from 1982 to 1985, where she began focusing on mathematical approaches to economic and production systems. In 1996, she earned the degree of Candidate of Physical and Mathematical Sciences from Al-Farabi Kazakh National University. Her research addressed mathematical methods for solving allocation problems involving nonlinear objective functions—problems that frequently arise in industrial and economic planning.

More than two decades later, she completed her Doctor of Physical and Mathematical Sciences degree in 2019, defending a dissertation titled Problems of Optimal Enterprise Placement and Methods for Their Solution. This work examined how mathematical models can determine the most efficient location and development strategies for enterprises operating under complex economic conditions.

Mathematical Modeling for Economic Systems

A major focus of Dr. Mayram's research is the development of economic–mathematical models for optimization problems. These models allow analysts and policymakers to evaluate different development scenarios and identify strategies that improve efficiency while minimizing costs.

Her work includes methods for solving multi-product allocation and placement problems, particularly in cases where production costs follow nonlinear or discontinuous patterns. Such situations occur frequently in real economic systems where transportation costs, investment levels, and resource availability vary across regions.

By designing algorithms capable of solving these complex problems, Dr. Mayram has contributed to the development of analytical tools that support evidence-based decision-making in economic planning. Her research demonstrates how mathematical theory can guide practical choices about production systems and resource distribution.

Applications in Agricultural Development

One of Dr. Mayram's recent projects focuses on optimizing the production and resource potential of farms in different regions of the Kyrgyz Republic. The project examines how agricultural enterprises can allocate resources—such as land, water, energy, labor, and financial investment–in the most efficient way.

Ms. Mona has also represented Nepal at international conferences, including the SSON Conference in the United States, where she contributed to discussions on digital transformation and emerging technology challenges.

Leadership in a Changing Technology Landscape

An important aspect of Ms. Mona's work is her commitment to expanding opportunities for women in the technology sector. In Nepal, women remain underrepresented in fields such as cybersecurity and software engineering. Through her leadership at Monal Tech and her engagement with national ICT forums, she has encouraged women engineers to take on technical and leadership roles.

She regularly mentors young professionals and participates in hackathons, technology workshops, and Women-in-IT training programs. These activities provide opportunities for women students and early-career engineers to develop technical skills and gain confidence in technology careers. She has also conducted training programs in rural areas of Nepal to promote digital literacy and encourage girls to consider careers in information technology.

Ms. Mona also collaborates with international partners in Canada, Singapore, Africa, and the United States, contributing to projects in cybersecurity, payment systems, and digital transformation.

Ms. Mona Nyachhyon proves that technical knowledge, entrepreneurship, and mentorship can contribute to the growth of a national technology ecosystem. Her work highlights the importance of inclusive leadership in technology, where innovation, collaboration, and education work together to create stronger digital systems and more accessible opportunities for future generations of engineers and entrepreneurs.

Mona Nyachhyon

MONAL TECH PVT. LTD.

Leadership in Cybersecurity and Digital Innovation

In developing countries, strengthening digital infrastructure and cybersecurity has become especially important for ensuring reliable services, protecting data, and supporting economic growth. Ms. Mona Nyachhyon, a Nepali technology entrepreneur and cybersecurity leader, has played an important role in advancing Nepal's information technology sector. As the Founder and CEO of Monal Tech Pvt. Ltd., she has combined technical expertise with leadership and mentorship to promote innovation, strengthen digital systems, and expand opportunities for women in technology.

Ms. Mona Nyachhyon holds a Bachelor of Engineering in Electronics and Communication from Pokhara University, a Master of Public Administration from Tribhuvan University, and an MBA from Purbanchal University. Her academic training in engineering, management, and public administration has helped shape a career that connects technological innovation with organizational leadership and policy engagement.

Building a Career in Information Technology

Ms. Mona began her career as a software engineer and gradually developed expertise in cybersecurity, digital systems, and enterprise technology. Over the years, she gained experience working with complex software systems and large-scale data environments, developing technical and managerial skills that later supported her leadership roles in the IT industry.

One of the most significant stages of her career was her leadership role at LogPoint Nepal, where she served as CEO and led the company's growth as a global research and development hub. Under her leadership, the organization expanded to more than one hundred engineers and achieved EAL 3+ certification, aligning its security products with international standards used in Europe and the United States. This transformation helped establish Nepal as a location capable of contributing to advanced cybersecurity research and development.

Entrepreneurship and Innovation

Building on this experience, Ms. Mona founded Monal Tech Pvt. Ltd., a technology company focused on cybersecurity solutions, enterprise software, and digital transformation. The company provides services such as security audits, threat detection, system monitoring, and enterprise software development, helping organizations strengthen their digital security and operational efficiency.

Monal Tech has gained recognition for its work in Nepal's technology sector, receiving the Huawei ICT Startup Award in 2022 and the National ICT Startup Award in 2024. These recognitions highlight the company's contribution to innovation and digital development in Nepal.

Ms. Mona has also worked on projects involving enterprise resource planning (ERP) systems, Agile transformation, and payment modernization, supporting organizations in adapting to digital systems and improving operational processes. Her work has contributed to the modernization of institutions and businesses that rely on secure

Strengthening Cybersecurity and Digital Capacity

Ms. Mona also plays an active role in shaping Nepal's national technology ecosystem. She serves as an Executive Member of the Computer Association of Nepal (CAN) and leads its Cybersecurity Committee, where she works on initiatives aimed at improving digital resilience and promoting cybersecurity awareness.

In this capacity, she has supported programs that encourage professional training in cybersecurity and promote stronger collaboration between industry, government, and educational institutions. Her involvement in national policy discussions and industry initiatives reflects the growing importance of cybersecurity in protecting digital infrastructure.

Leadership in a Changing Technology Landscape

An important aspect of Mona's work is her commitment to expanding opportunities for women in the technology sector. In Nepal, women remain underrepresented in fields such as cybersecurity and software engineering. Through her leadership at Monal Tech and her engagement with national ICT forums, she has encouraged women engineers to take on technical and leadership roles.

She regularly mentors young professionals and participates in hackathons, technology workshops, and Women-in-IT training programs. These activities provide opportunities for women students and early-career engineers to develop technical skills and gain confidence in technology careers. She has also conducted training programs in rural areas of Nepal to promote digital literacy and encourage girls to consider careers in information technology.

Mona also collaborates with international partners in Canada, Singapore, Africa, and the United States, contributing to projects in cybersecurity, payment systems, and digital transformation.

Mona Nyachhyon Shrestha proves that technical knowledge, entrepreneurship, and mentorship can contribute to the growth of a national technology ecosystem. Her work highlights the importance of inclusive leadership in technology, where innovation, collaboration, and education work together to create stronger digital systems and more accessible opportunities for future generations of engineers and entrepreneurs.

Dr. Bijaya Pant

TRIBHUVAN UNIVERSITY

Plant Biotechnology and the Conservation of Nepal's Botanical Resources

In Nepal, Dr. Bijaya Pant, a botanist and plant biotechnologist at Tribhuvan University, has been a leading figure in developing plant tissue culture technologies for endangered and economically valuable plant species. Her work connects scientific research with conservation, education, and community development, helping translate botanical knowledge into practical applications that benefit ecosystems, livelihood, and local communities.

Dr. Pant is currently a Professor at the Central Department of Botany, Tribhuvan University, and Research Director of the Annapurna Research Centre, a nonprofit organization focused on plant conservation and biotechnology research. Over more than two decades, she has helped establish plant biotechnology as an important research and teaching field in Nepal.

Academic Formation and Scientific Career

Dr. Pant completed her Master of Science in Botany at Tribhuvan University before pursuing doctoral studies abroad. She later obtained her Ph.D. in Biotechnology from Hiroshima University, Japan, where she gained advanced training in plant biotechnology and tissue culture techniques. This international academic experience shaped the direction of her research, particularly in applying modern biotechnology to the conservation and propagation of valuable plant species and their potiential for industry and economy.

After returning to Nepal, she joined Tribhuvan University and began building research and teaching programs in plant biotechnology. Her work has contributed to the development of biotechnology education in the country, including her role in establishing the Central Department of Biotechnology and introducing specialized courses in plant biotechnology within the Department of Botany.

Dr. Pant has also supervised eighty graduate and eight PhD students, helping develop human resources in plant science and biotechnology across Nepal.

Research in Plant Tissue Culture and Conservation

A major focus of Dr. Pant's research is the application of plant tissue culture technology to threatened and economically important plant species. Tissue culture allows scientists to propagate plants in controlled laboratory environments, making it possible to conserve rare species and produce high-quality planting materials for agriculture and horticulture.

She has led many projects aimed at conserving Nepal's native orchids, many of which are endangered due to habitat loss and overcollection. Under her leadership, and in collaboration with Annapurna Research Center, more than fifty germplasms of native orchid species have been conserved, preserving important genetic resources for future research and conservation. Her research group has also investigated the medicinal properties of orchids, including studies suggesting potential anticancer compounds in certain species. This work illustrates the broader

Connecting Laboratory Research with Community Development

Dr. Pant has also worked to ensure that scientific innovations benefit communities. One example is the "Lab to Land" initiative, which applies tissue culture techniques to produce native orchid seedlings that can be reintroduced into natural habitats or cultivated for ornamental purposes.

In collaboration with various institutions, the Annapurna Research Centre organized training programs on orchid cultivation using tissue culture-raised plants. Over two years, more than one thousand orchid seedlings were reintroduced into local environments. Similar programs were later extended to Lumbini, Gorkha, and Ilam, as well as to plantation efforts at the Central Zoo in Lalitpur.

In agriculture, Dr. Pant also led the 2017 project on high-value cardamom production, focusing on the mass propagation of virus-free cardamom seedlings using tissue culture technology. These improved planting materials were distributed to farmers in eastern Nepal together with technical training, helping improve crop productivity and supporting rural livelihoods.

Mentoring Women Scientists and Future Researchers

Dr. Pant has also been an active supporter of women in science. Through her involvement in the Women Scientists Forum, Nepal, she has participated in seminars, workshops, and outreach activities designed to encourage women students and early-career researchers to pursue careers in scientific fields.

Academic Leadership and Scientific Recognition

Dr. Pant has played important roles in academic governance and scientific organizations. She has served on research committees at the Institute of Science and Technology (IoST), Tribhuvan University, and at the Research Center for Applied Science and Technology (RECAST). She has also contributed to national and international scientific networks as Vice President of the Nepal Biotechnology Association and Vice President of the IUCN Species Survival Commission (Nepal).

Her scientific contributions have been recognized through several awards and honors. These include election as a Fellow of The World Academy of Sciences (TWAS) in 2023, the Nabil Science and Technology Award from the Nepal Academy of Science and Technology in 2019, and earlier recognitions such as the Dipendra Young Scientist Award and the Mahendra Vidya Bhushan award from the Government of Nepal.

She has supervised dozens of graduate students and continues to mentor young researchers in plant science and biotechnology. Her guidance has helped many students develop strong research skills and pursue scientific careers, with several graduates going on to become successful entrepreneurs.

Dr. Bijaya Pant's career illustrates how botanical research, conservation, and education can address environmental challenges while supporting scientific capacity in developing countries. Her contributions to plant biotechnology, biodiversity conservation, and higher education have helped strengthen Nepal's scientific community and expand opportunities for the next generation of researchers.

Dr. Rindia Maharani Putri

INSTITUT TEKNOLOGI BANDUNG

Innovation from Biodiversity

Across the world, scientists are exploring how natural resources can be transformed into sustainable technologies that address global challenges. In Indonesia, Dr. Rindia Maharani Putri, a chemist and biomolecular nanotechnology researcher at Institut Teknologi Bandung (ITB), is developing new ways to harness marine microorganisms for biomedical materials, sustainable catalysis, and carbon capture technologies. Through her interdisciplinary work in biomaterials and bionanotechnology, Dr. Putri contributes to Sustainable Development Goal 9: Industry, Innovation and Infrastructure, demonstrating how scientific research can translate natural resources into technological innovation and environmentally responsible industries.

Currently serving as an Assistant Professor and researcher in the Biochemistry and Biomolecular Engineering Research Group at ITB, Dr. Putri's work bridges chemistry, materials science, and nanotechnology. Her research focuses particularly on marine diatoms—microscopic algae that produce intricate silica structures—and their transformation into functional materials. These natural structures offer unique opportunities for developing advanced biomaterials and catalysts, highlighting how marine biodiversity can support innovation in science and engineering.

Academic Foundations in Biomolecular Nanotechnology

Dr. Putri earned her Bachelor of Science in Chemistry from Institut Teknologi Bandung in 2011, graduating with the highest distinction. She continued her studies through a double master's degree in Chemistry at ITB and Chemical Engineering at the University of Twente in the Netherlands, both completed with honors in 2013. Her master's research explored virus-based nanoreactors designed to host synergistic biocatalysts, an early indication of her interest in nanoscale biological systems.

She later pursued doctoral research at the University of Twente, where she completed her PhD in Chemistry in 2017 in the Biomolecular Nanotechnology group. Her doctoral dissertation, Optical Control over Monomeric and Multimeric Protein Hybrids, examined methods for controlling protein structures using light-responsive mechanisms. This research contributed to the growing field of biomolecular nanotechnology, which integrates chemistry, biology, and materials science to create functional nanoscale systems.

Transforming Marine Resources into Functional Materials

Since joining the faculty of Institut Teknologi Bandung in 2018, Dr. Putri has focused her research on marine diatom biosilica and microalgae-based materials. Diatoms produce naturally patterned silica shells with complex nanoscale architectures. These structures can be transformed into biocompatible scaffolds for biomedical applications and biogenic catalysts for green chemical processes.

By converting biological structures into engineered materials, Dr. Putri's work demonstrates how marine biodiversity can support the development of new technologies.

Her research group also leads the development of a microalgae phototank system for carbon capture and conversion, funded through Indonesia's Kedaireka Matching Fund 2024 program. The system uses microalgae to absorb carbon dioxide and convert it into valuable biological products. This approach combines environmental science with engineering innovation, showing how laboratory research can evolve into scalable technologies for climate mitigation and sustainable industry.

Dr. Putri's scientific contributions have been published in leading international journals, including ACS Nano, the Journal of the American Chemical Society (JACS), Langmuir, Biomaterials Translational, ACS Omega, and PLoS ONE. Her work has received more than 440 citations and an h-index of 11, reflecting the growing recognition of her research within the global scientific community.

Recognition and Research Leadership

Dr. Putri's achievements have been supported by numerous competitive research grants and fellowships. She has received funding from the Asahi Glass Foundation Overseas Research Grant (Japan), the Netherlands–Indonesia Blue Economy Merian Fund Initiative, and several Indonesian collaborative research programs. These initiatives support interdisciplinary research addressing marine resources, sustainable technologies, and environmental innovation.

Her work has also been recognized through national and international awards, including the L'Oréal–UNESCO For Women in Science National Fellowship (Indonesia, 2022). Earlier in her academic career, she received the LPDP Overseas Doctoral Scholarship, the Unilever Research Prize in the Netherlands, and the Twente Graduate School Award, the Netherlands. She also won poster awards at international scientific symposia in Spain and Germany, reflecting the early international recognition of her research.

Mentoring the Next Generation of Scientists

Beyond her research contributions, Dr. Putri is committed to supporting young scientists and expanding opportunities for women in STEM. Since joining ITB, she has supervised more than twenty undergraduate and graduate students, many of whom are women from diverse regions of Indonesia. Through mentoring and research training, she encourages students to pursue advanced studies and contribute to scientific innovation.

She is also actively involved in science outreach and national initiatives, including programs organized by the Indonesian Young Academy of Sciences (ALMI) and mentoring activities for Indonesia's International Chemistry Olympiad (IChO) team. Through these roles, she promotes scientific literacy and encourages young people to pursue careers in science and engineering.

Dr. Rindia Maharani Putri's work demonstrates how scientific research can transform natural resources into technologies that address global challenges. By combining marine biology, chemistry, and nanotechnology, she is developing new materials and processes that contribute to sustainable industry and environmental stewardship.

Her research reflects the broader goals of SDG 9, where innovation, scientific discovery, and responsible use of natural resources come together to support more sustainable and resilient futures.

Chapter 6

SDG 13: Climate Action

Dr. Virginia C. Cuevas

NATIONAL ACADEMY OF SCIENCE AND TECHNOLOGY PHILIPPINES

Harnessing Soil Microbes for Sustainable Agriculture

Dr. Virginia C. Cuevas, Professor Emeritus at the University of the Philippines Los Baños (UPLB) and Academician of the National Academy of Science and Technology of the Philippines (NAST-PHL), devoted her scientific career to understanding ecological processes that sustain soil health that often remain invisible and translated them into technologies that promote sustainable agriculture and environmental restoration.

An environmental biologist and plant ecologist, Dr. Cuevas is best known for developing Trichoderma Technology (TT), a microbial innovation that transforms agricultural wastes into useful resources while strengthening soil fertility and plant health. Her work demonstrates how ecological principles can guide agricultural systems toward greater sustainability.

From Batangas to UP

Dr. Cuevas grew up in a large family in Batangas province, where poverty and limited educational opportunities made pursuing higher education difficult. Despite these challenges, she persevered and entered the University of the Philippines, the country's premier state university. She earned a Bachelor of Science in Botany from the University of the Philippines Diliman in 1969.

Her academic journey continued alongside her professional and family responsibilities. Dr. Cuevas obtained a Master of Science in Botany from UP Diliman in 1977 and later completed a PhD in Botany at the University of the Philippines Los Baños in 1987. During these years, she balanced multiple roles: raising four young children, working as a full-time faculty member, conducting research, and mentoring students.

Her experience illustrates the perseverance required to sustain a scientific career while navigating personal and professional responsibilities.

Learning from Nature

Dr. Cuevas approached agriculture from the perspective of ecology. She believed that natural ecosystems offer models for designing sustainable farming systems.

"As a plant ecologist, I strongly believe in this tenet—natural systems like forests are productive, self-regulating, and self-sustaining," Dr. Cuevas explained when discussing the origins of her research. "*The basic question I asked when I began this work was: what attributes can humans copy from natural ecosystems and transfer or mimic in agroecosystems to make them sustainable?*"

Her answer centered on two ecological principles: efficient nutrient cycling and population regulation through biological interactions. These ideas became the foundation of her work on microbial technologies for agriculture.

Trichoderma Technology

Dr. Cuevas's most influential contribution is the development of Trichoderma Technology, a system based on beneficial fungi belonging to the genus Trichoderma. The technology consists of two components. One activates the rapid decomposition of agricultural wastes, converting crop residues into nutrient-rich compost. The second component is a microbial inoculant that functions as a three-in-one agricultural input: it serves as a biofertilizer, suppresses plant diseases, and promotes crop growth.

When applied properly, Trichoderma Technology can increase crop yields while reducing dependence on chemical fertilizers and pesticides. At the same time, it improves soil health by restoring microbial balance and strengthening nutrient cycling in the soil. These outcomes reflect Dr. Cuevas's broader goal of designing agricultural systems that work with ecological processes rather than against them.

The significance of this innovation has been recognized nationally and internationally. In 1995, Dr. Cuevas received the United Nations ESCAP Award for Clean Technology for her rapid composting system using Trichoderma harzianum.

Her work later received further recognition through the Hitachi Global Foundation Asia Innovation Award in 2021, which honored her contributions to ecosystem-based technologies for resilient crop production.

Applying Science to Communities

Dr. Cuevas has consistently applied scientific knowledge to real-world environmental challenges. Her projects have supported farmers whose lands were affected by mining tailings in Benguet and Marinduque, helping them restore soil productivity through ecological approaches.

She also collaborates with Indigenous Aeta communities in Kanawan, Morong, Bataan, documenting their reforestation efforts and the gradual recovery of forest ecosystems in their ancestral lands. Community observations have noted the return of wildlife such as hornbills and wild pigs, as well as the renewed availability of forest resources like edible ferns, freshwater snails, and wild honey. These developments illustrate how ecological restoration can improve both environmental conditions and community livelihoods.

Educator and Mentor

Throughout her career at UPLB, Dr. Cuevas taught undergraduate and graduate courses in ecology and environmental biology, helping train generations of environmental scientists. She advised numerous students whose research addressed environmental problems and sustainable resource management.

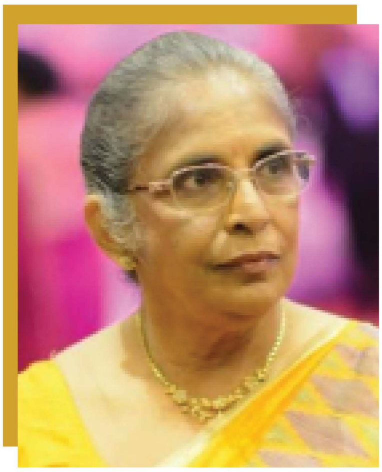
Over the course of her career, she supervised undergraduate theses, master's theses, and doctoral dissertations. Her mentoring emphasized research that contributes to practical environmental solutions and advances global sustainability goals related to education, innovation, climate action, and ecosystem protection.

Even after retiring in 2014, Dr. Cuevas remained active in scientific work. She continues to lecture, mentor students, and participate in research initiatives addressing issues such as plastic pollution, climate change, and sustainable environmental management. She also contributes to policy discussions through the National Academy of Science and Technology.

A Legacy of Ecological Innovation

Dr. Virginia C. Cuevas's career demonstrates how ecological knowledge can guide the development of practical technologies for agriculture and environmental restoration. By studying how natural ecosystems regulate themselves, she developed microbial solutions that help farmers manage agricultural waste, improve soil fertility, and increase crop productivity in sustainable ways.

Her work highlights the powerful role that microscopic organisms can play in building healthier soils, more resilient agricultural systems, and more sustainable ecosystems.
Dr. Virginia C. Cuevas has shown how science rooted in ecology can contribute to environmental stewardship and food security for future generations.



Dr. Em. Ruchira Cumaranatunga

UNIVERSITY OF RUHUNA

Strengthening Fisheries Science and Coastal Research

Professor Emerita Palawinnege Ruchira Tharangini Cumaranatunga is a Sri Lankan fisheries biologist whose career has focused on aquatic science, fisheries education, and coastal ecosystem conservation. A renowned professor at the University of Ruhuna, she played a central role in developing fisheries and marine science education in Sri Lanka while advancing research on aquatic resources and environmental sustainability.

Education and Early Research

Ruchira Cumaranatunga earned her Bachelor of Science Special Degree in Zoology from the University of Sri Lanka, Vidyalankara Campus (now the University of Kelaniya) in 1977. Early in her career, she joined the University of Ruhuna, where she became part of the pioneering academic staff of the Department of Zoology.

In 1982, she received a Commonwealth Academic Staff Scholarship to pursue doctoral studies at the University of Aston in Birmingham, United Kingdom. Her PhD research examined the reproductive biology of fish, focusing on ovarian development in rainbow trout. The work strengthened her expertise in fish physiology and reproductive biology, fields that later informed her research and teaching in fisheries and aquatic sciences. In 1996, she won a Fulbright Senior Research Scholarship, tenable at the University of Hawaii, Manoa Campus, where she gathered experience related to Tuna Fisheries and Marine Science Education, which later helped her to develop Fisheries and Marine Science Education and Research at the University of Ruhuna.

In recognition of her long academic career and contributions to fisheries education and research, the University of Ruhuna conferred upon her a Doctor of Science (DSc) Honoris Causa in December 2025.

Building Fisheries Science Education in Sri Lanka

Over several decades at the University of Ruhuna, Cumaranatunga helped establish and expand academic programs in fisheries and aquatic sciences. She played a leading role in developing Fisheries Biology as a major subject for the Bachelor of Science degree, which was introduced in the early 2000s.

Her efforts later helped lead to the creation of the Faculty of Fisheries and Marine Sciences and Technology, the first faculty of its kind within Sri Lanka's higher education system. The faculty offers degree programs covering fisheries, aquaculture, limnology, oceanography, and marine geology.

Cumaranatunga served in several academic leadership roles during this period. She was Head of the Department of Fisheries Biology from 1990 to 2005, later becoming Professor of Fisheries Biology (Chair) and eventually Senior Professor before her retirement in 2019. She also served as the Founder Dean of the Faculty of Fisheries and Marine Sciences and Technology from 2005 to 2008.

Research on Fisheries and Aquatic Ecosystems

Cumaranatunga's research has addressed issues related to fisheries biology, aquatic ecosystems, and the management of marine and freshwater resources. Over the course of her career, she has produced more than 100 scientific publications, including journal articles, conference papers, and book chapters.

Her work has often focused on the conservation and sustainable use of aquatic resources. She has participated in national scientific committees and advisory bodies that address fisheries management, environmental impact assessments, and marine biodiversity protection.

Her expertise has also been used in national policy discussions, including participation in committees and advisory groups connected with institutions such as the National Science Foundation, National Aquatic Resources Research and Development Agency, and the National Science and Technology Commission of Sri Lanka.

Supporting Women in Fisheries Science

Throughout her academic career, Cumaranatunga has helped expand opportunities for women in fisheries and marine science, with women consistently comprising more than half of the students enrolled at the Faculty of Fisheries and Marine Sciences and Technology. She also encouraged female students to pursue postgraduate studies and international research opportunities, helping connect them with institutions in Thailand, Norway, Belgium, Sweden, the United States, the United Kingdom, Australia, and Taiwan.

Her mentorship extended to early-career academics as well. She supported female colleagues in applying for international research fellowships and scholarships, including Fulbright programs.

Following the 2004 Indian Ocean tsunami, she helped train women in fisheries-dependent communities to develop environmentally responsible fish processing and post-harvest techniques, including the preparation of dried, marinated, smoked and other processed fish products. These training initiatives supported small-scale livelihood activities and community recovery.

Science, Policy, and Community Engagement

Ruchira Cumaranatunga's work has often connected scientific research with community and policy concerns. She has participated in national initiatives related to biodiversity conservation, marine resource management, and environmental protection.

Among these efforts were contributions to the National Action Plan for Marine Turtle Conservation, as well as scientific assessments of biodiversity in coastal regions such as the Gulf of Mannar and Palk Bay. These assessments supported proposals to recognize sensitive marine ecosystems as protected areas.

Her research group provided water quality testing and advisory services for aquaculture operations through the Ruhuna University Service Laboratory, supporting local fisheries and aquaculture industries.

She has also contributed to environmental awareness initiatives promoting sustainable fishing practices and coastal ecosystem protection. In recognition of her long-standing service in advancing scientific research, education, and public engagement in science, particularly in Life and Earth Sciences, she was elected President of the Sri Lanka Association for the Advancement of Science in 2013 and became a Fellow of the National Academy of Sciences of Sri Lanka the same year.

Across more than four decades in academia, Professor Ruchira Tharangini Cumaranatunga has helped to shape fisheries and aquatic sciences education and research in Sri Lanka. Her work reflects the broader role that universities can play in connecting scientific research with environmental stewardship, community development, and national policy discussions related to natural resource management.

Dr. Usukhjargal Dalaikhuu

MONGOLIAN ACADEMY OF SCIENCE

Restoring Mongolia's Landscapes Through Plant Science Industry

Across Mongolia's vast landscapes, plants play a critical role in protecting ecosystems and supporting livelihoods. Yet climate change, desertification, and land degradation are placing increasing pressure on these environments. Dr. Usukhjargal Dalaikhuu of the Botanic Garden and Research Institute of the Mongolian Academy of Sciences studies how plants adapt to environmental stress and how plant science can support ecosystem restoration and sustainable land management.

Born in Gobi-Altai province in western Mongolia, Dr. Dalaikhuu grew up in a region where environmental conditions shape everyday life. Mongolia's ecosystems range from mountain forests to steppe and desert, and these environments are highly sensitive to climate change. This early exposure to fragile landscapes would later inform her scientific focus on plant adaptation and ecological restoration.

From Biology Student to Plant Biotechnologist

Dr. Dalaikhuu began her academic training at the National University of Mongolia in Ulaanbaatar, where she completed a Bachelor of Science in Biology in 2006 and a Master of Science in Botany with specialization in plant physiology in 2008. Her master's research examined the ecophysiology of Larix sibirica, a dominant larch species in Mongolia's northern forests, exploring how trees respond to environmental conditions at the forest–steppe boundary.

Her interest in plant adaptation continued during her doctoral studies at Inner Mongolia University in China. Supported by a Chinese Government Scholarship, she earned a PhD in Biology in 2014. Her doctoral research investigated the molecular function of the ∂-mannosidase gene in melons, combining plant physiology with molecular biology to understand mechanisms involved in plant development.

These experiences positioned her at the intersection of ecology, physiology, and biotechnology, fields that would later shape her research on plant propagation and restoration.

Science for Rare and Vulnerable Plants

Since returning to Mongolia, Dr. Dalaikhuu has worked at the Mongolian Academy of Sciences, first as a researcher in the Plant Biotechnology Laboratory at the Institute of Biology and later, beginning in 2021, as Scientific Secretary of the Botanic Garden and Research Institute.

Her research focuses on the conservation and propagation of rare and ecologically important plants. Through several projects supported by the Mongolian government and scientific institutions, she has investigated methods for cultivating and restoring species that are threatened by environmental change.

Among these efforts is her work on Lycium ruthenicum, commonly known as the black goji berry, a plant adapted to harsh desert conditions. Her research examined propagation techniques, physiological traits, and bioactive compounds of the species, contributing to conservation and cultivation strategies for plants in Mongolia's steppe and Gobi regions.

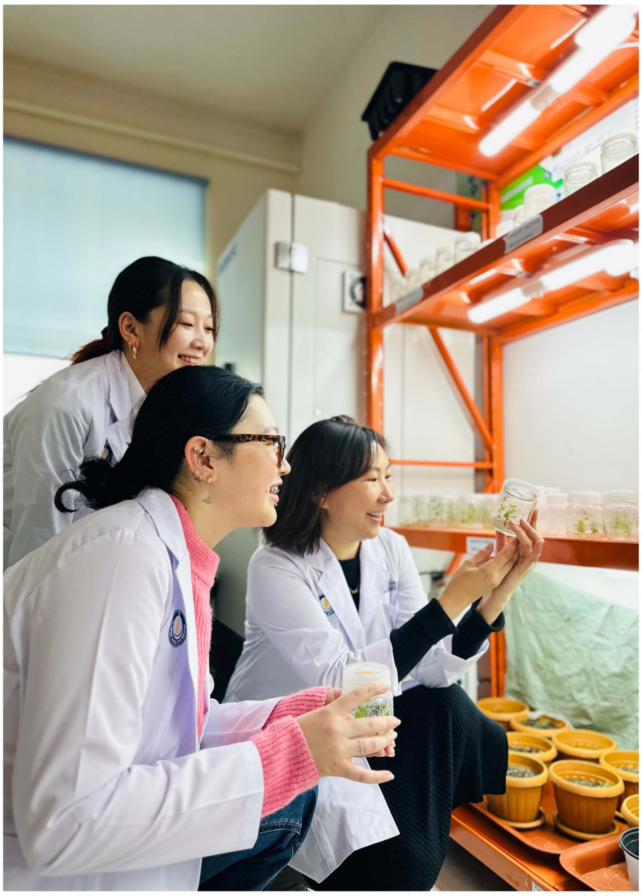
Her other projects have explored the physiology of medicinal plants such as Artemisia annua and the propagation of rare rose species. These studies combine plant physiology, biotechnology, and ecological research to identify practical methods for restoring degraded landscapes.

Innovation in Plant Propagation

Dr. Dalaikhuu's scientific work has led to several patented techniques for plant propagation and restoration. Her patents include methods for micropropagation of black goji berry and

Artemisia annua, approaches for improving seed germination of the rare Baitag rose, and plant regeneration techniques for species such as Betula platyphylla. These innovations contribute to efforts to conserve biodiversity and expand reforestation programs in Mongolia.

The technologies she has developed allow rare or endangered plants to be cultivated more efficiently, supporting ecosystem restoration and sustainable land management.



Connecting Research with Community Use

In addition to laboratory research, Dr. Dalaikhuu has explored ways to connect scientific knowledge with practical applications. Building on her research on Lycium ruthenicum, she founded the “Bekhen Nud” brand, which produces herbal tea products from the plant’s fruit. The initiative demonstrates how plant research can support small-scale innovation and local economic opportunities while promoting awareness of native species.

Alongside these activities, she remains active in scientific communication and education. She has contributed to translation projects related to biology and plant biotechnology, edited scientific publications, and supervised undergraduate and graduate students.

Across Mongolia’s diverse ecosystems, plants remain central to ecological balance and human livelihoods. By studying how species grow, regenerate, and adapt to environmental stress, Dr. Usukhjargal Dalaikhuu contributes to scientific efforts aimed at restoring landscapes and strengthening ecological resilience in a changing climate.

Dr. Jihye Gwak

KOREA INSTITUTE OF ENERGY RESEARCH (KIER)

Advancing Solar Energy Innovation and Policy

Dr. Jihye Gwak, Principal Researcher and Chief at the Korea Institute of Energy Research (KIER), has spent more than three decades working on advanced functional materials and energy-conversion technologies. Her research focuses on next-generation solar technologies and the integration of energy innovation with environmental and policy frameworks. Through her work, she has helped strengthen Korea's renewable energy research ecosystem while supporting the transition toward sustainable energy systems.

Education and Research Training

Dr. Gwak studied Chemistry at Ewha Womans University, where she completed her Bachelor of Science and her Master of Science in Physical Chemistry. She later pursued doctoral studies in France at Université Montpellier II, working at the Institut Européen des Membranes (ENSCM/UMII/UMR CNRS 5635) under a French Government Scholarship. Her PhD in Materials Science, completed in 2003, focused on advanced materials research relevant to gas separation membrane technology.

Following her doctoral training, she carried out postdoctoral research as a Japan Society for the Promotion of Science (JSPS) Fellow at the National Institute for Materials Science (NIMS) in Japan from 2003 to 2005. This international research experience broadened her expertise in materials science and energy technologies and shaped her interdisciplinary approach to renewable energy research.

Solar Energy Research and Innovation

At KIER, Gwak has worked extensively on solar photovoltaic technologies, with particular attention to systems designed At KIER, Dr. Gwak has worked extensively on solar photovoltaic technologies, with particular attention to systems designed for urban and distributed energy applications. Her research examines how advanced photovoltaic technologies can be integrated into buildings and cities as part of sustainable energy systems.

She has also been involved in building research collaborations that link academic institutions, industry, and government agencies. One example is the Center for Advanced Solar PV Technology (CAST), an open innovation platform that supports collaboration across the solar energy value chain and promotes technological development in photovoltaic systems.

Through these initiatives, Dr. Gwak has worked to strengthen the technological foundations needed for expanding renewable energy systems and improving the competitiveness of solar technologies.

Linking Research and Policy

In addition to her research activities, Dr. Gwak participates in national discussions on science and energy policy. She has served as a member of the Presidential Commission on Carbon Neutrality and Green Growth (2050 CNGGC; now renamed the National Climate Crisis Response Committee) and the Presidential Advisory Council on Science and Technology (PACST), where scientists and policy experts advise the government on strategies related to climate action, technological development, and national research priorities.

Her experience in both scientific research and policy advisory roles reflects the growing connection between technological innovation and national energy planning.

Scientific Leadership and Collaboration

Gwak has also played active roles in professional and scientific organizations. She has worked with groups such as the Association of Korean Woman Scientists and Engineers (KWSE), the Korean Society for New and Renewable Energy, and the National Academy of Engineering of Korea. These organizations support research collaboration, professional development, and the advancement of science and engineering in Korea.

At the international level, she has been involved in activities of the International Energy Agency Photovoltaic Power Systems Programme (IEA PVPS), which promotes global cooperation in solar photovoltaic research and deployment.

Her professional activities help connect Korean renewable energy research with international networks of scientists and engineers working on similar challenges.

Supporting Women in STEM

Throughout her career, Dr. Gwak has supported initiatives that encourage women to pursue careers in science and engineering. As a long-time member and leader within the Association of Korean Woman Scientists and Engineers, she has helped organize mentoring programs, workshops, and educational activities designed to support early-career researchers and students.

Programs such as Young Woman Scientist Camp, science exploration classes, and engineering forums provide opportunities for students to interact with researchers and learn about careers in STEM fields. Through these efforts, Dr. Gwak has helped strengthen networks among women scientists and engineers in Korea.

She has also participated in public outreach activities, including lectures, science columns, and media programs, aimed at increasing public understanding of renewable energy and climate technologies.

Science, Energy, and Society

The transition toward renewable energy requires advances not only in technology but also in policy, collaboration, and public engagement. Dr. Gwak's work reflects this broader perspective by linking scientific research with policy discussions and educational outreach.

Her efforts align with several United Nations Sustainable Development Goals, including SDG 7 (Affordable and Clean Energy), SDG 9 (Industry, Innovation and Infrastructure), and SDG 13 (Climate Action). She supports efforts to expand clean energy systems and strengthen technological innovation through research on solar photovoltaics and participation in national and international energy initiatives.

Over the course of her career, Dr. Jihye Gwak has helped advance renewable energy research while encouraging wider participation in science and engineering. Her work illustrates how scientific research, policy engagement, and collaboration can shape the development of sustainable energy systems.

Dr. Yukiko Hirabayashi

SHIBAURA INSTITUTE OF TECHNOLOGY

Measuring Water in a Warming World

Water shapes landscapes, livelihoods, and entire civilizations, yet its movement is never static. Rivers swell and recede, glaciers store and release freshwater, and droughts and floods redraw the boundaries of security for millions of people. Dr. Yukiko Hirabayashi of the Shibaura Institute of Technology has built her career around understanding these changes at a global scale. Her work asks how climate change is altering the global water cycle and what those shifts mean for human societies.

A civil engineer and hydrologist, Dr. Hirabayashi studies the Earth's surface water system using satellite observations, climate models, and large-scale data analysis. Her research spans droughts, floods, glaciers, and long-term changes in water availability. At a time when climate change is increasingly experienced through water extremes, her work has helped make those risks visible, measurable, and harder to ignore.

Training for a Global View

Dr. Hirabayashi began her academic training at Shibaura Institute of Technology, where she earned her Bachelor of Science in Civil Engineering in 1999. She then moved to the University of Tokyo, completing a Master of Science in Civil Engineering in 2001 and a PhD in the same field in 2004.

Her career moved across several institutions and research settings. She served at the University of Yamanashi, later joined the University of Tokyo, and spent two years in Germany as an Overseas Research Fellow of the Japan Society for the Promotion of Science at the University of Frankfurt am Main. In 2018, she became a Dr. at Shibaura Institute of Technology. Across these roles, she developed a research agenda that joined engineering, climate science, and global environmental assessment.

Dr. Hirabayashi was part of professional organizations such as The Science Council of Japan, Associate Member (2023-2026), Scientific Advisory Board (2022-) of the Inter-Sectoral Impact Model Intercomparison Project (ISIMIP), among others.

Floods, Droughts, and the Scale of Risk

One of Dr. Hirabayashi's most influential contributions was her landmark study on global flood risk under climate change, published in Nature Climate Change. The study was the first to quantify flood risk globally while comparing multiple climate models to assess uncertainty. This was not simply a matter of projecting more floods. It was an effort to show where risk would intensify, how strongly, and with what consequences for people and economies.

Earlier, her work on the terrestrial water cycle produced century-scale global maps of water movement and helped validate climate model projections of drought and flood risk. These studies established her as a leading figure in hydroclimatology, a field concerned with the relationship between water and climate across time and space. Her later work pushed further by linking hydrological change with social vulnerability.

Reading the Cryosphere

In recent years, Dr. Hirabayashi has taken a leading role in research on glaciers and mountain water systems. As a Lead Author for the IPCC Special Report on the Ocean and Cryosphere and for the Sixth Assessment Report, she helped assess how warming is transforming frozen regions and the water systems connected to them.

"Changes in the cryosphere are important evidence of global warming," she explains in her interview with Mikiko Kainuma of Institute for Global Environmental Strategies (IGES), "and we can get a very good idea of the impacts of global warming by observing the cryosphere."
That insight is especially important in high

mountain regions. As glaciers melt, river basins may first experience temporary increases in water flow, raising the risk of floods. But as glaciers continue to shrink, the water supply declines. Dr. Hirabayashi notes that this shift has serious downstream consequences: less reliable drinking water, reduced hydropower generation, and greater instability in food production.

Her work makes clear that climate change is not only about temperature. It is also about timing, flow, and access to water.

Science, Policy, and Public Responsibility

Dr. Hirabayashi's research has influenced both science and policy. Her findings have been cited in international assessments and incorporated into Japanese environmental policy discussions. She has also served on committees related to gender equality in academia and contributed to research on the experiences of women and minority authors in major scientific assessments.
Alongside these commitments, she has balanced research, teaching, international collaboration, and family life while mentoring younger women in engineering and climate science.

"Being involved this time in the SROCC as an author," she said, "I felt the need to accurately communicate how the environment will change due to global warming."

That sense of responsibility runs through her work. By tracing floods, droughts, glaciers, and water security across borders, Dr. Yukiko Hirabayashi has helped clarify one of the central realities of climate change: its effects are often carried by water, and their consequences reach far beyond the places where they begin.

Hee Kim

KOREAN ACADEMY OF SCIENCE AND TECHNOLOGY

Engineering a Low-Carbon Future for the Steel

Hee Kim, Research Fellow at the POSCO Research Institute (POSRI) in the Republic of Korea and former Executive Vice President and Head of Carbon Neutral Strategy at POSCO Holdings, has worked for more than three decades at the intersection of manufacturing innovation and climate strategy in the steel industry. Trained as an industrial engineer, she has focused on improving production systems while developing technologies that reduce carbon emissions in one of the world's most energy-intensive industries.

Steel production remains essential for modern infrastructure, transportation, and manufacturing, yet it also contributes significantly to global greenhouse gas emissions. Kim's work addresses this challenge by combining engineering innovation, industrial systems design, and strategic policy engagement to support the transition toward low-carbon steel production.

Education and Early Career

Kim studied Industrial Engineering at Hongik University in Seoul, completing her Bachelor of Science degree in 1989. Her training in industrial systems optimization shaped her approach to manufacturing innovation and large-scale production management.

She joined POSCO in 1990, becoming the company's first female engineer at a time when the steel industry was overwhelmingly male-dominated. Over the following decades she developed extensive experience in steel production systems, plant operations, and technological development.
Kim later completed the Advanced Management Program at Yonsei University in 2014 and earned a Master of Science in Business Administration from Dongguk University in 2023.

Leadership in Steel Manufacturing

During her career at POSCO, Kim held a range of technical and leadership positions across manufacturing operations. Her work focused on improving efficiency, safety, and product quality in large-scale steel production systems.

She later became Korea's first female steel plant director, overseeing a facility capable of producing more than 10 million tons of automotive steel annually. Managing such a complex operation required coordinating production systems, supply chains, quality control, and safety management.
Under her leadership, production processes were reorganized to improve operational efficiency while maintaining strict quality standards. Her work demonstrated how industrial engineering principles could be applied to modernize manufacturing systems and strengthen plant performance.

Innovation for Carbon-Neutral Steel

In the later stage of her career, Kim concentrated on strategies for reducing carbon emissions in steelmaking. Traditional blast furnace technology relies heavily on coal, producing large amounts of carbon dioxide. Developing alternatives has become a major challenge for the global steel industry.

Kim played a key role in advancing Hydrogen Reduction Steelmaking (HyREX), a technology designed to replace coal with hydrogen in the iron-making process. By using hydrogen as the reducing agent, the process has the potential to significantly reduce carbon emissions associated with steel production.

Under her leadership, HyREX became a major research and development initiative within POSCO and was eventually designated as a National Strategic Technology of Korea in 2024. The technology forms part of a broader strategy that also includes expanded use of electric arc furnaces, carbon capture technologies, and improvements in energy efficiency across production systems.

Linking Technology, Policy, and Industry

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Supporting Women in Engineering

Kim's career has also influenced opportunities for women in engineering and industrial leadership. Entering the steel industry as its first female engineer at POSCO, she navigated a professional environment where women were rarely present in technical or operational roles.

Over time, she has been involved in mentoring younger engineers and supporting initiatives that encourage women to pursue careers in science, technology, engineering, and mathematics.
Kim has worked with professional organizations including Women in Science, Engineering and Technology in Korea (WiTeck) and the Korea Federation of Women's Science and Technology Associations, contributing to mentoring programs and leadership development initiatives for women engineers.

In recognition of her contributions to technology and sustainability, she received the Korea Women in Engineering Award in 2024.

Linking Technology, Policy, and Industry

The transformation of the steel industry is essential to achieving global climate goals. Kim's work illustrates how technological innovation, industrial management, and policy coordination can contribute to this transition.

Her efforts support several United Nations Sustainable Development Goals, including SDG 9 (Industry, Innovation and Infrastructure), SDG 13 (Climate Action), and SDG 5 (Gender Equality). By advancing hydrogen-based steelmaking technologies and strengthening leadership opportunities for women engineers, she contributes to both environmental sustainability and inclusive industrial development.

Dr. Maria Kryukova

FAR EASTERN BRANCH OF THE RUSSIAN ACADEMY OF SCIENCE

Mapping Biodiversity and Ecological Landscapes in the Russian Far East

Dr. Maria Kryukova, Director of the Institute of Water and Ecology Problems of the Far Eastern Branch of the Russian Academy of Sciences and Corresponding Member of the Russian Academy of Sciences, is an ecologist whose research focuses on biodiversity and vegetation in the Amur River basin of the Russian Far East. Her work examines how plant communities form and change across ecological transition zones and provides scientific foundations for biodiversity conservation and sustainable land management in the region.

An ecologist and biogeographer, Dr. Kryukova studies vegetation patterns, biodiversity, and ecological processes in the Amur River region. Her research provides scientific foundations for conservation planning and sustainable land use in one of the most environmentally significant regions of Northeast Asia.

Early Career and Academic Training

Dr. Kryukova completed her higher education at Far Eastern State University in 1996, where she studied biology and developed an early interest in plant ecology and biodiversity. Soon after graduating, she joined the Institute of Water and Ecology Problems of the Far Eastern Branch of the Russian Academy of Sciences, beginning her scientific career as a researcher.

Her PhD studies were completed at the Institute of Biology and Soil Science of the Far Eastern Branch of the Russian Academy of Sciences. She defended her PhD dissertation in 1999, focusing on the flora of aquatic and coastal environments in the Middle Amur Lowland. More than a decade later, she completed a Doctor of Biological Sciences degree in 2013, with a dissertation examining the composition, ecological structure, and current condition of vegetation in the Lower Amur region.

Over the years, Dr. Kryukova progressed through a series of scientific and administrative roles at the institute. She served as Academic Secretary, later became Deputy Director for Research, and was appointed Director of the Institute of Water and Ecology Problems in 2021. In 2025, she was elected Corresponding Member of the Russian Academy of Sciences, recognizing her scientific contributions to ecology and biodiversity research.

Studying the Landscapes of the Amur Basin

Kryukova's research focuses on the ecological and geographical patterns that shape vegetation in the Amur River basin and surrounding landscapes. The region represents an ecological boundary where northern boreal forests intersect with temperate ecosystems of East Asia. These ecotone landscapes provide valuable opportunities to study how environmental conditions influence biodiversity.

Her work examines how vegetation communities form, evolve, and respond to natural and human-driven environmental changes. Particular attention is given to the role of plants as indicators of ecological conditions and environmental transformation. By analyzing vegetation patterns, researchers can better understand how ecosystems respond to economic development, land use change, and climate variability.

Kryukova's research has contributed to the development of scientific frameworks for conserving biological and landscape diversity. Her studies identify key areas that require protection in order to maintain ecological stability and biodiversity across the region.

Conservation Planning and Protected Areas

One of Dr. Kryukova's most significant works lies in her role in developing strategies for biodiversity conservation in the Russian Far East. She helped establish ecological criteria used to identify areas of high biological and landscape diversity that require protection.

These scientific assessments supported the creation of a network of specially protected natural areas across the Khabarovsk Territory. In the late 1990s and early 2000s, research led by Dr. Kryukova and her colleagues contributed to the establishment of 33 protected areas covering approximately 1.8 million hectares. These include major conservation sites such as Anyuysky National Park, Shantarsky National Park, and several nature parks and wildlife sanctuaries.

Her work also included the preparation of the Red Data Book of the Khabarovsk Territory, an official document that identifies rare and endangered species requiring protection. Dr. Kryukova participated in the preparation of the first edition and later coordinated the development of its subsequent editions.

Linking Ecology and Development

In addition to biodiversity research, Dr. Kryukova has participated in environmental assessments related to major development projects in the region. These include monitoring vegetation and ecosystems affected by the construction of oil and gas pipelines, mineral extraction sites, and transport infrastructure.

Environmental studies carried out under her leadership have helped generate recommendations aimed at balancing economic development with ecological protection. Research results have been applied in projects such as the development of oil terminals along the Tatar Strait, the construction of pipelines, and the expansion of mining operations in the Amur region.

Scientific Publications and Leadership

Dr. Kryukova is the author or co-author of more than 170 scientific publications, including 17 monographs and two atlases on vegetation and biodiversity in the Russian Far East. Her work documents plant diversity, ecological patterns, and conservation strategies in the Amur basin and adjacent regions.

She also participates in national and international scientific initiatives related to biodiversity conservation and environmental policy. Her professional affiliations include the Russian Botanical Society, the Russian Geographical Society, and international research networks focused on sustainable development in Northeast Asia.

As an expert, she contributes to advisory bodies under the Russian Ministry of Natural Resources and regional government institutions dealing with environmental protection and biodiversity conservation.

Inspiring and Influencing

Dr. Kryukova's work has been recognized at both regional and national levels. She holds the honorary title of Honored Ecologist of the Khabarovsk Territory and has received multiple awards from the Russian Academy of Sciences and regional government institutions, including the V. I. Vernadsky Medal.

Throughout her career, she has also mentored emerging scientists by supervising graduate students and serving on academic evaluation committees, helping advance research in ecology, biodiversity, and environmental geography. Her career highlights the potential of combining scientific inquiry with environmental stewardship, particularly for young researchers and women in science.

Dr. Arunima Malik

THE UNIVERSITY OF SYDNEY

Tracing the Hidden Costs of Global Trade

In the modern global economy, products travel across continents with remarkable speed. Raw materials extracted in one country may be processed in another and consumed thousands of kilometers away. Behind this movement lies a complex web of supply chains that shape environmental conditions, labor systems, and patterns of inequality. Dr. Arunima Malik of the University of Sydney studies these global connections, asking a deceptively simple question: what are the hidden environmental and social costs embedded in international trade?

A sustainability scientist whose work connects environmental science, economics, and policy analysis, Dr. Malik is a Professor of Sustainability and Interdisciplinary Research, who examines how global supply chains influence progress toward the United Nations Sustainable Development Goals (SDGs), particularly SDG 13 (Climate Action) and other interconnected SDGs. Her research also involves SDGs related to health, inequality, and responsible production.

From Science to Sustainability Systems

Dr. Malik's academic training began at the University of Sydney, where she completed a Bachelor of Science with First Class Honours in 2009. She later earned a Master of Teaching from Western Sydney University in 2010 before returning to the University of Sydney to pursue a Doctor of Philosophy, which she completed in 2016. This combination of scientific research and educational training shaped her interdisciplinary approach to sustainability science.

Today, she holds a joint appointment at the University of Sydney's Faculty of Science and Business School and leads the Sustainable Business Hub. Her work examines how economic systems, environmental processes, and social conditions intersect within global production networks.

Mapping the Invisible

One of Dr. Malik's central research contributions focuses on tracing environmental and social impacts across international supply chains. Consumer demand in one country often produces environmental pressures elsewhere. Pollution, resource depletion, and labor conditions frequently occur far from the markets where products are sold.

Working with colleagues at the University of Sydney's School of Physics, Business School, Engineering, Public Health with collaborators at United Nations Sustainable Development Solutions Network and government agencies, Dr. Malik's work links consumption patterns with environmental and social outcomes.

Dr. Malik explains the challenge clearly, "we live in an increasingly interconnected world driven by complex supply chain networks, where consumer demand in one region influences production in another."

Such interconnections can create economic opportunities but also generate environmental damage and social inequality in regions that supply raw materials and manufacturing.

A Global Prize for Sustainability Science

In 2025, Dr. Malik received international recognition when the Frontiers Planet Prize named her one of three International Champions. The award, valued at US$1 million, supports research that offers scalable solutions for keeping humanity within planetary sustainability boundaries.

The prize recognized her study "Polarising and equalising trends in international trade and Sustainable Development Goals," published in Nature Sustainability. The paper analyzes how international trade affects progress toward numerous SDGs, including No Poverty, Zero Hunger, Clean Water and Sanitation, Responsible Consumption and Production, Life Below Water, and Life on Land.

The research revealed a complex picture. Global trade can reduce certain forms of inequality while intensifying environmental pressures or social disparities elsewhere. Understanding these

dynamics allows policymakers to identify where economic growth aligns with sustainability goals and where it creates unintended consequences.

Trade, Climate, and Health

Dr. Malik's research also examines how sustainability intersects with other sectors, including healthcare. In collaboration with New South Wales Health, she led an environmental footprint assessment of the state's health system, measuring emissions and resource consumption associated with hospitals and medical services. Dr. Malik received the University of Sydney SOAR Prize in 2022 for her growing research trajectory.

Her expertise has contributed to major international scientific initiatives. Dr. Malik served as a Lead Author for the Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report and participated in the Lancet COVID-19 Commission on Green Recovery, which explored how economic recovery strategies could align with environmental sustainability.

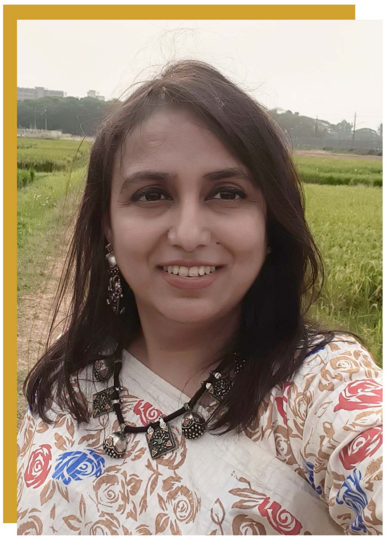
"International trade can amplify these effects by placing pressure on vulnerable nations," Dr. Malik notes, referring to the environmental and social spillovers that cross national borders.

Teaching Systems Thinking

Alongside her research, Dr. Malik teaches students to approach sustainability as a systems problem. Environmental issues cannot be separated from economic policy, global trade, or social development. Understanding how these forces interact is essential for addressing climate change and resource use.

Her teaching has received multiple recognitions, including the University of Sydney Vice-Chancellor's Award for Early-Career Teaching and the SUPRA Teacher of the Year Award.
Dr. Malik's work reshapes how sustainability is measured in an interconnected world. By tracing supply chains across borders, her research highlights the environmental and social consequences embedded in everyday consumption.

Trade, climate, and development are often discussed as separate policy matters. Dr. Malik's research reveals how deeply they are intertwined. Decisions made by consumers, companies, and governments in one country may influence ecosystems and livelihoods elsewhere. Understanding those connections is an essential step toward building more accountable and sustainable global systems.



Dr. Kamrun Nahar

SHER-E-BANGLA AGRICULTURAL UNIVERSITY

Reading the Signs of Stress in Plants

Food security is often discussed in terms of harvests, markets, and climate. But long before shortages appear on a table or in a community, stress has already begun inside the plant. Salt in the soil, drought, toxic metals, and heat can disrupt growth at the cellular level, weakening crops before damage is visible in the field. Professor Kamrun Nahar of Sher-e-Bangla Agricultural University in Bangladesh has built her scientific career around this quiet but urgent reality. Her work asks how plants endure hostile conditions and how science can help them survive.

An agricultural botanist and plant physiologist, Dr. Nahar studies abiotic stress: the non-living environmental pressures that reduce crop growth and yield. Her research focuses on plant stress physiology, antioxidant defense systems, and practical agronomic methods that can sustain food production under changing environmental conditions. In a country where farming is closely tied to climate uncertainty, this work carries both scientific and social importance.

A Scholar Formed by Excellence

Dr. Nahar completed her Bachelor of Science in Agriculture in 2006 at Sher-e-Bangla Agricultural University, Dhaka, Bangladesh, where she ranked first and received a gold medal for outstanding academic performance. In 2008, she earned her Master of Science in Agricultural Botany from the same university, again securing first position in order of merit. Her early academic record also brought her the Dean's Award and an NSICT Fellowship (funded by the Ministry of Science and Technology, People's Republic of Bangladesh) for her master's research on screening of rice genotypes under low-temperature stress.

Her scientific training expanded internationally when she received the Japanese Government Monbukagakusho Scholarship. She completed a Master of Science in Agriculture at Kagawa University in 2013, specializing in plant stress physiology, and then earned a PhD in Environmental Stress Physiology of Plants in 2016 from the United Graduate School of Agricultural Sciences, Ehime University, affiliated with Kagawa University in Japan.

These years of study gave her both depth in laboratory research and a sustained focus on one central question: how can crops remain productive under stress?

The Biology of Survival

Since 2007, Dr. Nahar has worked on the physiological and biochemical mechanisms that help plants to tolerate difficult environmental adversities. Her studies examine how crops respond to salinity, drought, heavy metal contamination, and temperature extremes. She has investigated the roles of melatonin, sulfur, calcium, potassium, phosphorus, silicon, Azolla, caffeic acid, halopriming, and beneficial bacteria in reducing plant damage and improving tolerance.

This research is not limited to theory. It offers concrete pathways for safer and more resilient agriculture. Some projects focus on sustaining rice and wheat under drought or salinity. Others address food safety by reducing arsenic, cadmium, or lead uptake in edible crops such as mungbean, lettuce, and amaranth. In this sense, her work contributes not only to crop yield but also to the quality and safety of food systems.

Science in Service of Farmers

Dr. Nahar's research portfolio reflects the environmental realities faced by Bangladesh. As principal investigator and co-investigator, she has led or contributed to numerous projects funded by the Ministry of Science and Technology, the Bangladesh Climate Change Trust Fund, BANBEIS, the University Grants Commission, and Sher-e-Bangla Agricultural University Research System. These studies span rice under salt stress, wheat under heat and drought stress, heavy metal toxicity in different crops, and climate adaptation strategies for tea production.

Together, these projects form a broader scientific response to two linked concerns: how to maintain agricultural productivity under climate stress and how to reduce contamination in food crops. Her work aligns strongly with SDG 2 (Zero Hunger), while also supporting SDG 13 (Climate Action), SDG 12 (Responsible Consumption and Production), and SDG 15 (Life on Land).

Building Women's Place in Agricultural Science

Dr. Nahar's contribution also extends into mentorship. After returning to Bangladesh in 2016, she began supervising graduate researchers, including many women. She has guided eight female students to complete MS degrees, continues to supervise five female MS students, and co-supervises two women pursuing PhDs. She has also supported women seeking advanced study opportunities abroad, including in the United States and Australia.

Her own career offers an important example. She rose from top-ranked student to professor, earned national and international recognition, and was named an Associate Fellow of the Bangladesh Academy of Sciences in 2021. She also received the Bangladesh Academy of Sciences Gold Medal in 2017 and has been listed among the world's Top 2% scientists for 2024 and 2025.

Dr. Kamrun Nahar's work begins with plant stress, but its implications reach much further. By studying how crops survive under pressure, she helps shape a more resilient and safer agricultural future.

Dr. Jurgenne H. Primavera

NATIONAL ACADEMY OF SCIENCE AND TECHNOLOGY PHILIPPINES

Mangroves, Science, and the Protection of Coasts

Among the scientists who first documented the ecological value of these forests was Dr. Jurgenne H. Primavera, a Filipino marine scientist and academician of the National Academy of Science and Technology. Primavera has spent more than five decades studying aquaculture, mangrove ecosystems, and coastal management. Her work helped reshape how mangroves are understood in Southeast Asia—Mangroves, Science, and the Protection of Coasts from land once considered expendable into ecosystems vital for fisheries, biodiversity, and community protection.

A Journey into Science

Primavera's scientific journey began with determination. In 1961, while still a student in Butuan City, she traveled with her father through a powerful typhoon to take a scholarship examination in Cagayan de Oro. Broken bridges forced them to cross rivers using makeshift bamboo or coconut trunks. The difficult journey took nearly a full day, but she arrived in time for the exam and successfully earned the scholarship that enabled her to pursue higher education.

She later graduated cum laude with a Bachelor of Science in Zoology from the University of the Philippines Diliman in 1966, followed by a Master of Arts in Zoology from Indiana University in 1969 She eventually returned to UP Diliman to complete her PhD in Marine Science in 1996. Her early career included teaching biology and zoology courses, where she introduced thousands of students to marine science and environmental research.

Discovering the Importance of Mangroves

Primavera's engagement with mangrove ecosystems began unexpectedly. In the 1970s, while working as a researcher at the Aquaculture Department of the Southeast Asian Fisheries Development Center (SEAFDEC) in Iloilo, she visited shrimp ponds used for cultivating Penaeus monodon, locally known as sugpo (prawn). "I noted some strange-looking trees along the dikes giving me an A-ha moment," she later recalled during her interview with Camille Rivera of Restoration Stewards in 2021. "I suddenly realized that these trees—mangroves—were the remains of the forests that had been clear-cut to build the ponds."

That moment shaped the direction of her research. While she continued to study aquaculture, her work increasingly focused on the ecological role of mangroves and the consequences of their loss.

That moment shaped the direction of her research While she continued to study aquaculture, her work increasingly focused on the ecological role of mangroves and the consequences of their loss. She later graduated cum laude with a Bachelor of Science in Zoology from the University of the Philippines Diliman in 1966, followed by a Master of Arts in Zoology from Indiana University in 1969. She eventually returned to UP Diliman to complete her PhD in Marine Science in 1996. Her early career included teaching biology and zoology courses, where she introduced thousands of students to marine science and environmental research.

Her studies demonstrated that mangrove forests serve as nursery habitats for shrimp and other marine species. Clearing these forests to build ponds, she found, could ultimately undermine the fisheries that coastal communities depend upon.

From Research to Restoration

Primavera's work expanded beyond scientific research into conservation and community-based restoration. After retiring from SEAFDEC in 2007, she was invited by the Zoological Society of London (ZSL) to lead a mangrove conservation project in the Philippines. The initiative marked the organization's first ecosystem-focused program, shifting attention from charismatic wildlife to coastal habitats.

Through projects on mangrove rehabilitation, ecoparks, and the reversion of abandoned fishponds back to mangrove forests,

Primavera helped demonstrate that coastal ecosystems could be restored while supporting community livelihoods.

One of her most influential contributions to mangrove education is the Handbook of Mangroves in the Philippines – Panay, published in 2004 with colleagues from SEAFDEC. The guide provides detailed descriptions of more than thirty mangrove species, including photographs, ecological characteristics, and practical guidance for rehabilitation efforts. For communities and practitioners engaged in coastal restoration, it remains a widely used reference.

Science, Policy and Public Awareness

Primavera's work has also influenced environmental policy and public awareness. She helped advocate for coastal greenbelts—protective zones of mangroves and beach forests that buffer shorelines from storm surges and erosion. These ideas gained renewed attention after Typhoon Yolanda struck the Philippines in 2013.

Despite existing mangrove protection laws, Primavera has pointed to persistent challenges in enforcement. "The problem is weak law enforcement and a lack of political will,"[15] she observed in discussing national mangrove conservation policies.

According to Primavera, successful mangrove restoration depends on several key factors: the use of science-based protocols, the political will to implement them, strong community participation, and international support that reinforces these scientifically grounded approaches.

Her research emphasizes that restoration efforts must follow ecological principles. "Know the basic biology of mangroves so you can be guided in your actions to protect or rehabilitate them," she advises students and young environmental advocates.

Scientific Legacy

Dr. Primavera has authored around 150 scientific publications and delivered hundreds of lectures, while training thousands of students, researchers, and community practitioners in aquaculture, mangrove rehabilitation, and coastal conservation.

Her work earned international recognition, including a Ph.D. in Science honoris causa from Stockholm University, a Pew Fellowship in Marine Conservation, and election to The World Academy of Sciences and the National Academy of Science and Technology. In 2008, TIME named her among its Heroes of the Environment, and the plant species Begonia jurgenneae was named in her honor in 2025.

Through science, advocacy, and mentorship, Dr. Jurgenne Primavera helped elevate mangrove forests from overlooked ecosystems to vital foundations of coastal resilience.

Dr. Pantana Tor-ngern

CHULALONGKORN UNIVERSITY

Promoting Forest Ecophysiology and Climate Research

Dr. Pantana Tor-ngern is an environmental scientist at Chulalongkorn University in Thailand whose research focuses on forest ecophysiology, water cycling, and the impacts of climate change on tropical forest ecosystems. Her work examines how trees respond to environmental stress and how forest systems regulate water and carbon processes. Through long-term field measurements and environmental monitoring, she has helped improve scientific understanding of Southeast Asian forests and their role in climate regulation and water resources.

Education and Scientific Training

Dr. Tor-ngern completed her undergraduate studies at Duke University in the United States, earning a Bachelor of Science in Engineering in Electrical Engineering and a secondary degree in Physics in 2009. She continued her graduate training at Duke University, completing a Master of Science in Electrical and Computer Engineering in 2010.

Her doctoral studies combined engineering approaches with environmental science. She earned her PhD in Environmental Science from Duke University in 2015, where her research examined forest water use and ecosystem responses to environmental change. This interdisciplinary background allows her to integrate engineering techniques, environmental monitoring, and ecological analysis in the study of forest systems.

Research on Forest Water and Carbon Cycles

Dr. Tor-ngern's research centers on the ecophysiology of tropical forests, particularly the movement of water through trees and forest canopies. Her work uses field-based measurements such as sap-flow monitoring, soil moisture sensors, and environmental data collection to examine how forests respond to drought and climate variability.

Much of her research has taken place in tropical forests in Thailand, including long-term studies in Khao Yai National Park. These studies provide detailed datasets on forest water use, tree physiology, and ecosystem responses to environmental change.

Her work has helped generate some of the longest records of water-flow measurements for successional tropical forests in Southeast Asia, offering insights into how forests regulate water supply and respond to climate stress. These datasets support broader studies of hydrology, ecosystem function, and climate modeling.

Dr. Tor-ngern has also collaborated with international research networks studying forest ecosystems, including projects connected with SAPFLUXNET, which compiles global datasets on tree transpiration and forest water dynamics.

Scientific Recognition

Dr. Tor-ngern's research has received international recognition. In 2025, she received the UL Research Institutes–ASEAN–U.S. Science Prize for Women in Mid-Career Scientists, recognizing significant scientific achievements and leadership in environmental research.

Earlier honors include the L'Oréal-UNESCO For Women in Science International Rising Talents Award in 2022, which recognizes outstanding early-career women scientists worldwide. She had previously received the L'Oréal Thailand For Women in Science Fellowship in 2021.

She was also invited to join the Thai Young Scientist Academy in 2023 and the Thai Academy of Science and Technology in 2024, organizations that recognize distinguished scientists in the country.

Advancing Women in Environmental Science

Throughout her career, Dr. Tor-ngern has worked to support women pursuing careers in environmental science and related fields. She mentors graduate students and young researchers, encouraging them to participate fully in fieldwork and research activities.

Her research projects often involve demanding field conditions, including work in remote forest environments. By involving female researchers in all aspects of scientific work—from sensor installation to data analysis—she helps build confidence and practical research skills.

Dr. Tor-ngern also participates in public outreach activities, including media interviews and educational programs that highlight environmental research and climate science. Through these engagements, she shares the realities of scientific work while encouraging young women to consider careers in STEM.

Forest Research and Sustainable Development

Dr. Tor-ngern's research addresses issues closely connected to several United Nations Sustainable Development Goals, particularly SDG 13 (Climate Action), SDG 6 (Clean Water and Sanitation), and SDG 15 (Life on Land).

Her studies of forest water cycles help improve understanding of how forests regulate water supply for surrounding communities. In regions such as the Chi and Mun river basins, which form part of the Mekong River system, these findings help inform water resource management and forest restoration strategies. Her research also examines drought tolerance among tropical tree species, generating data that can guide forest restoration and conservation efforts in Southeast Asia.

Towards Environmental Change

Dr. Pantana Tor-ngern's work reflects the close connection between field observation, technological tools, and collaborative research in understanding complex environmental systems. By combining ecological measurements with long-term environmental monitoring, her studies provide important insights into how tropical forests respond to climate variability and environmental change.

Alongside her research, she continues to mentor students and engage with broader audiences, helping foster interest in environmental science among younger researchers. Through these efforts, Dr. Pantana Tor-ngern has helped strengthen scientific understanding of tropical forests and their role in sustaining water systems and ecological balance in Southeast Asia.

Dr. Nicole Webster

UNIVERSITY OF TASMANIA

Listening to the Ocean's Smallest Voices

Standing beside the ocean, it is easy to focus on what can be seen: coral reefs, waves, fish, and the vast blue horizon. Yet beneath these visible forms lies a microscopic world that quietly sustains marine ecosystems. Dr. Nicole Webster, Deputy Vice Chancellor (Research) at the University of Tasmania, has spent her career studying that hidden realm. Her research reveals how microbes, organisms too small to be seen without a microscope, play essential roles in the health of coral reefs and the stability of ocean ecosystems.

"There's so much to love about the ocean," Dr. Webster reflects. "It is so vast and so diverse [that] it can generate a sense of insignificance." That perspective has shaped a scientific career devoted to understanding how life at the smallest scales influences some of the planet's largest environmental systems.

Beginnings in Marine Science

Dr. Webster's academic journey began at James Cook University in Australia, where she completed a Bachelor of Science in 1994, followed by a Bachelor of Science with First Class Honours in 1995. Her fascination with marine ecosystems deepened during her doctoral research, also at James Cook University, where she earned a PhD in 2001.

Those early years coincided with a period when scientists were beginning to recognize the importance of microbial communities in shaping ocean environments. Rather than focusing solely on large marine species, Dr. Webster investigated the invisible partnerships between marine animals and the microorganisms living within them.
This shift in perspective would later reshape how scientists think about coral reefs and marine ecosystems.

The Secret Life of Sponges

Long regarded as simple organisms, sponges were often overlooked in discussions of reef ecology. Dr. Webster's research revealed a far more complex story.

By applying molecular tools to analyze microbial communities, she demonstrated that sponges host vast and diverse populations of bacteria and act as a major reservoir of microbial diversity in the world's oceans. These microbes are not incidental passengers; they form intricate symbiotic relationships with their hosts, shaping sponge health, survival, and evolution.

The implications extend beyond microbiology. Sponge-associated microbes help cycle nutrients and organic matter within reef systems, supporting the broader ecological balance of coral reefs.

Microbes and Climate Change

As ocean temperatures rise and reef ecosystems face increasing environmental stress, understanding the functional interplay between marine hosts and their associated microbes is critical. Dr. Webster's research advanced this field through molecular and experimental approaches that showed how host biology and microbial function together shape an animal's resilience.

Her work revealed key roles for sponge-associated microbes in nutrient cycling and demonstrated that microbial responses to temperature stress and ocean pH are tightly linked to host physiology. By uncovering these dynamic interactions, her research provides a more nuanced understanding of why some reef organisms withstand environmental change while others are more vulnerable.

Dr. Webster has also explored the role of viral genes within sponge ecosystems, revealing how viruses can influence microbial metabolism and ecological function. These discoveries highlight how processes occurring at microscopic scales shape the resilience of marine ecosystems.

From Coral Reefs to Polar Seas

Dr. Webster's research career has taken her from tropical reefs to polar environments and she now serves as Australia's Delegate to the Scientific Committee for Antarctic Research and chairs the National Committee for Antarctic Research.

Her leadership responsibilities are substantial. As Deputy Vice-Chancellor (Research) at the University of Tasmania, Dr. Webster provides strategic oversight of the University's research mission, driving excellence, integrity, and real-world impact. She has previously served as Executive Director of the Institute for Marine and Antarctic Studies and as Chief Scientist of the Australian Antarctic Program, following an earlier career as a research leader at the Australian Institute of Marine Science and the University of Queensland.

Recognition for her contributions includes election as a Fellow of the Australian Academy of Science in 2025. Reflecting on the honor, Dr. Webster emphasized the collaborative nature of scientific

Science, Leadership, and the Next Generation

In addition to her research achievements, Dr. Webster has devoted significant effort to mentoring scientists and expanding opportunities in global research communities. She helped develop the International Ambassador Program for the International Society of Microbial Ecology, which delivered training workshops across dozens of countries and strengthened scientific networks in Latin America, Africa, and Asia.

Yet her research continues to return to the same fundamental insight: understanding the smallest organisms can reveal the deepest truths about life in the oceans.

By studying microbes that inhabit sponges, corals, and polar seas, Dr. Webster's work has expanded scientific knowledge of how marine ecosystems function and adapt in a rapidly changing world. The health of the ocean, it turns out, depends not only on the visible life within it but also on the vast microbial networks that sustain it.

Chapter 7

Conclusion

Conclusion

Reflections on the Interconnectedness of Women's Empowerment and Sustainable

MARIA AURA TEODORA MATIAS

Sustainable development is fundamentally about people—about expanding freedoms, enhancing capabilities, and ensuring that progress today does not foreclose opportunities for future generations. At the heart of this aspiration lies women's empowerment, not as a peripheral concern or a discrete goal, but as a central driver of inclusive, resilient, and transformative development. This volume has documented how women in science, technology, engineering, and mathematics (STEM) across Asia are advancing the Sustainable Development Goals (SDGs) through leadership, innovation, and advocacy. The collective narratives and analyses presented in the preceding chapters converge on a powerful insight: **women's empowerment and sustainable development are deeply interconnected, mutually reinforcing, and inseparable.**

This concluding chapter reflects on that interconnectedness, drawing together lessons from diverse sectors—health, education, gender equality, industry and innovation, and climate action—to illuminate how empowering women in STEM accelerates progress across the SDGs, while sustainable development frameworks, in turn, create enabling environments for women to thrive. The chapter also considers persistent structural barriers and outlines pathways for sustaining momentum toward a more equitable and sustainable future.

Women's Empowerment as a Catalyst for Sustainable Development

Women's empowerment encompasses access to education, economic opportunities, leadership, decision-making power, and the freedom to shape one's life course. When women are empowered, the benefits extend far beyond individual advancement; they ripple through families, communities, institutions, and entire economies. This multiplier effect is especially evident in STEM fields, where women's participation introduces diverse perspectives, enhances problem-solving, and fosters socially responsive innovation.

Across Asia, women scientists, engineers, educators, and technologists featured in this book have demonstrated how empowerment translates into tangible development outcomes. Their work challenges the long-standing assumption that technological progress is gender-neutral. Instead, it reveals that **who designs solutions matters,** because lived experience shapes research questions, design priorities, and implementation strategies. When women are excluded from STEM, development solutions risk being incomplete, inequitable, or misaligned with community needs. Conversely, when women are present and influential, sustainable development becomes more inclusive and effective.

Health and Well-Being: Gender-Responsive Innovation for SDG 3

The chapter on SDG 3 highlighted women leaders in healthcare research and technology whose work improves health outcomes while addressing systemic inequities. Women scientists often bring heightened awareness to gender-specific health needs, community-based care models, and preventive approaches that strengthen health systems. From biomedical research to digital health solutions, women's leadership has been instrumental in ensuring that innovation reaches marginalized populations, including women, children, the elderly, and rural communities.

This intersection of empowerment and health underscores a critical feedback loop: healthier populations enable women to participate more fully in education and economic life, while empowered women design health systems that are more equitable and resilient. The COVID-19 pandemic further exposed the importance of women's leadership in crisis response, public health communication, and frontline care. Sustainable development in health cannot be achieved without recognizing and amplifying women's expertise, leadership, and agency.

Education as Foundation and Force Multiplier: SDG 4

Quality education is both a prerequisite for and an outcome of women's empowerment. The stories of educators and technologists transforming access to education illustrate how women in STEM are reimagining learning ecosystems—through digital platforms, inclusive curricula, and community-based innovations—that expand opportunities for learners across socioeconomic divides.

Educated women are more likely to enter STEM careers, advocate for evidence-based policies, and mentor the next generation of leaders. At the same time, women educators play a critical role in challenging gender stereotypes that discourage girls from pursuing science and technology. This virtuous cycle—where education empowers women, and empowered women transform education—demonstrates why SDG 4 is foundational to all other goals.

In the Asian context, where disparities in access to quality education persist across geography, income, and gender, women-led innovations in education have proven particularly impactful. By integrating technology with culturally responsive pedagogy, women educators are not only closing learning gaps but also building human capital essential for sustainable development.

Gender Equality as Both Goal and Enabler: SDG 5

SDG 5 occupies a unique position in the sustainable development agenda. Gender equality is an end in itself—a matter of rights and justice—but it is also a powerful enabler of progress across all SDGs. The chapter dedicated to SDG 5 examined women who actively advocate for gender parity in STEM, highlighting strategies that range from institutional reform and policy advocacy to mentorship networks and grassroots initiatives.

These efforts reveal that women's empowerment does not occur automatically through participation alone. Structural barriers—such as biased hiring practices, unequal access to funding, disproportionate care responsibilities, and limited representation in leadership—continue to constrain women's full participation in STEM. Addressing these barriers requires deliberate action at multiple levels: organizational cultures that value diversity, policies that support work–life integration, and systems that recognize and reward women's contributions.

Importantly, the experiences documented in this volume show that progress toward gender equality strengthens institutional capacity and governance. Organizations that promote women's leadership tend to be more transparent, innovative, and socially responsive—qualities that are essential for sustainable development.

Innovation, Industry, and Infrastructure: SDG 9

Women engineers and entrepreneurs featured in the SDG 9 chapter exemplify how empowerment fuels innovation that is both economically viable and socially beneficial. Their work spans advanced manufacturing, digital technologies, infrastructure development, and entrepreneurship—sectors traditionally dominated by men and often disconnected from social concerns.

By entering and reshaping these spaces, women leaders are redefining what innovation looks like. They emphasize sustainability, user-centered design, and long-term impact over short-term gains. This approach aligns closely with the principles of sustainable development, which call for resilient infrastructure, inclusive industrialization, and innovation that benefits all segments of society.
The presence of women in these sectors also challenges persistent narratives about technical competence and leadership. As role models and mentors, women innovators expand the horizons of what is possible for younger generations, contributing to a more diverse and dynamic STEM ecosystem.

Climate Action and Environmental Stewardship: SDG 13

Climate change represents one of the most complex and urgent challenges of our time, intersecting with health, food security, livelihoods, and social justice. The women pioneers highlighted in the SDG 13 chapter demonstrate how empowerment enhances climate action through science-based solutions, community engagement, and policy advocacy.

Women's roles in environmental science and conservation are particularly significant in Asia, where climate impacts disproportionately affect vulnerable communities. Women scientists and practitioners often work at the interface of research and practice, translating data into actionable strategies that consider local contexts and social dynamics. Their leadership underscores the importance of integrating gender perspectives into climate policy and adaptation strategies.

Empowering women in climate-related STEM fields not only improves the quality of environmental solutions but also strengthens community resilience. When women participate in decision-making around natural resource management and climate adaptation, outcomes tend to be more sustainable and equitable.

Interconnectedness Across the SDGs

While each SDG-focused chapter highlights distinct domains, the overarching lesson of this book is that sustainable development is inherently interconnected. Progress in one area reinforces progress in others, and setbacks in one domain can undermine gains elsewhere. Women's empowerment functions as a connective thread across these goals, linking health, education, equality, innovation, and environmental sustainability into a coherent development narrative.

For example, educating girls (SDG 4) increases women's participation in STEM, which enhances innovation (SDG 9), improves health technologies (SDG 3), strengthens climate action (SDG 13), and advances gender equality (SDG 5). This interconnectedness suggests that siloed approaches to development are insufficient. Instead, integrated strategies that center women's empowerment are essential for achieving the SDGs in a holistic and sustainable manner.

Persistent Challenges and the Work Ahead

Despite the progress documented in this volume, significant challenges remain. Gender gaps in STEM education and employment persist, particularly at senior leadership levels. Women in many parts of Asia continue to face cultural norms and institutional constraints that limit their participation and advancement. Intersectional inequalities—based on class, geography, ethnicity, and disability—further compound these challenges.

Addressing these issues requires sustained commitment from governments, academic institutions, industry, and civil society. Policies must move beyond symbolic inclusion toward structural transformation, supported by data, accountability mechanisms, and adequate resources. Equally important is the cultivation of supportive ecosystems—mentorship networks, professional associations, and international collaborations—that enable women to thrive in STEM careers.

Toward a Shared Vision of Empowerment and Sustainability

As this book concludes, it affirms that women's empowerment is not merely compatible with sustainable development—it is indispensable to it. The women whose stories and achievements are documented here embody a vision of development that is innovative, inclusive, and grounded in social responsibility. Their work challenges us to rethink conventional models of progress and to recognize that sustainability is as much about equity and empowerment as it is about technology and growth.

Moving forward, the task is not only to celebrate these contributions but also to institutionalize the conditions that make them possible. By investing in women's education, leadership, and participation in STEM, societies lay the foundation for development pathways that are resilient, adaptive, and just. In this sense, empowering women is both a moral imperative and a strategic necessity for achieving the Sustainable Development Goals.

In reflecting on the interconnectedness of women's empowerment and sustainable development, this concluding chapter underscores a simple yet profound truth: when women rise, societies advance; when women lead, development becomes sustainable. The future envisioned by the SDGs—one of shared prosperity, planetary stewardship, and human dignity—depends on our collective ability to recognize, support, and amplify the transformative power of women in STEM.

A Call to Action: Advancing Women-Led Pathways to Sustainable Development

The reflections offered in this concluding chapter point to an unmistakable imperative: advancing sustainable development in Asia requires deliberate, sustained, and collective action to empower women in STEM. The achievements documented in this volume demonstrate what is possible when women are given the opportunity to lead—but they also remind us that progress cannot depend on individual resilience alone. Systems, institutions, and policies must evolve to make women's leadership the norm rather than the exception.

We therefore call upon governments to integrate gender-responsive policies into national STEM and innovation strategies, ensuring equitable access to education, research funding, and leadership pathways. Academic and research institutions must institutionalize inclusive practices, strengthen mentorship and sponsorship for women scientists, and dismantle structural barriers that hinder career progression. Industry and the private sector are urged to invest in women-led innovation, recognizing that diversity is not only a matter of equity but a driver of competitiveness and sustainability. Regional and international organizations, including scientific academies and professional networks, have a critical role to play in fostering collaboration, amplifying women's voices, and sharing best practices across borders.

Finally, this call extends to the next generation. Empowering girls and young women to pursue STEM is among the most transformative investments societies can make—one that yields dividends across health, education, climate resilience, and inclusive growth. By committing to women's empowerment as a cornerstone of sustainable development, we move closer to realizing the promise of the Sustainable Development Goals: a future in which progress is shared, innovation is inclusive, and no one is left behind.

Chapter 8

AASSA Special WISE Committee

INDONESIA

Prof. Dr. Ivandini Anggraningrum

INDONESIAN ACADEMY OF SCIENCES

TERM 2025-2027

Prof. Dr. Ivandini Tribidasari Anggraningrum is a pioneering Indonesian chemist whose work sits at the critical intersection of advanced materials and sustainable technology. As a Full Professor in the Department of Chemistry at the Faculty of Mathematics and Science, Universitas Indonesia, her highly specialized research focuses on electrochemistry, sensors, and the innovative applications of carbon and diamond materials. By developing real-world technological solutions—such as supercapacitors, batteries, and advanced fuel-cell technologies—she is actively advancing the frontiers of materials science to solve pressing energy and environmental challenges.

Her robust academic foundation began at Universitas Indonesia, where she earned her B.Sc. in 1993 and her M.Sc. in 1996. Selected for the prestigious Monbusho Scholarship from the Japanese government, she completed her Ph.D. at The University of Tokyo in 2003, focusing on the electrochemical detection of biochemical compounds at highly boron-doped diamond electrodes. She further expanded her international expertise through a JSPS postdoctoral fellowship at Keio University in Japan from 2003 to 2007. Throughout her career, she has published over 50 scientific papers in highly respectable journals, holds multiple European and Japanese patents, and has been consistently recognized for her excellence. Her outstanding contributions were honored with the esteemed Habibie Award XXI in 2019, the title of Most Productive Researcher at Universitas Indonesia in 2012, and recognition among the World's Top 2% Scientists in both 2022 and 2024.

Deeply committed to the Sustainable Development Goals (SDGs), Prof. Ivandini's research directly advances SDG 7 (Affordable and Clean Energy) through her critical work on electrocatalysis, energy storage, and fuel cells, as well as SDG 6 (Clean Water and Sanitation) via her innovations in wastewater treatment. Serving as an active member of the AASSA-WISE Committee, she brings a vital Indonesian perspective into global dialogues regarding gender equity in the sciences. Through her dedicated regional advocacy, she strives to ensure that female researchers are equitably represented, supported, and celebrated in highly technical fields like physical chemistry and advanced materials engineering.

Prof. Ivandini's enduring legacy is characterized by her profound dedication to academic mentorship and community engagement. Having previously served as the Manager of Research and Community Engagement at her faculty in 2018, she continually fosters collaborative and inclusive research environments. Since her early postdoctoral years, she has been deeply involved in guiding, training, and uplifting Ph.D. and honors students. By leveraging her extensive international collaborations—particularly her ongoing research partnerships with institutions like Keio University—she consistently provides vital global networking opportunities for the next generation of Indonesian women in STEM, inspiring them to become the scientific leaders of tomorrow.

INDIA

Prof. Bushra Ateeq

INDIAN NATIONAL SCIENCE ACADEMY

TERM 2025-2027

Professor Bushra Ateeq is a distinguished scientist and academic leader, serving as Professor of Cancer Biology and Dean of International Relations at the Indian Institute of Technology Kanpur, India. She is also a Senior Fellow of the Wellcome Trust India Alliance and J.C. Bose fellow. With a Ph.D. from Aligarh Muslim University, India and postdoctoral training at McGill University, Montreal and the University of Michigan, An Arbor, she has built a career at the forefront of molecular oncology and translational research.

Prof. Ateeq leads a highly translational biomedical-clinical research program aimed at developing next-generation diagnostics and therapeutic strategies tailored to cancer patients in India and beyond. Her pioneering work bridges molecular oncology with clinical relevance, advancing precision medicine for prostate and colorectal cancers. She is spearheading a highly translational biomedical-clinical research program that will define new diagnostics and therapeutic strategies for cancer patients, especially in India. She is also serving as a Senior Editor for Translational
Oncology (Elsevier).

Prof. Ateeq received the prestigious Shanti Swarup Bhatnagar Prize in Medical Sciences. She is also the recipient of several other recognitions for her excellence in research, such as Sun Pharma Science Foundation Award, Ramachandran-National Bioscience Award, OPPI-Scientist Award, CSIR-Central Drug Research Institute Award, ICMR-Basanti Devi Amir Chand Prize, Tata Innovation Fellowship and G.D Birla award. Recently, The World Academy of Sciences (TWAS)-UNESCO selected her for the TWAS Award (2026) in Medical & Health Sciences.

Prof. Ateeq is an Elected Fellow of all major National Science academies, such as National Academy of Sciences, India, Indian Academy of Sciences, Bangalore, Indian National Science Academy, Delhi and National Academy of Medical Sciences (India). Prof. Ateeq serves on several national-level scientific committees and is a member of the advisory board for many academic institutions. Her leadership combines rigor, clarity, and inclusivity, making her a powerful advocate for advancing cancer research while inspiring young scientists, especially women in STEM, to pursue
careers in science.

AZERBAIJAN

Dr. Huseynova Aytan

AZERBAIJAN NATIONAL ACADEMY
OF SCIENCES

TERM 2025-2027

Dr. Ayten Huseynova is an Earth scientist whose work focuses on geology, mud volcanism, and environmental monitoring. She is affiliated with the Presidium of the Azerbaijan National Academy of Sciences (ANAS), where she serves as Deputy Head of the Department of Foreign Relations and Cooperation with International Scientific Organizations. Her research centers on the geochemical characteristics of mud volcano fluids, particularly gas and water composition, and their role in greenhouse gas emissions and climate-related processes. By combining field-based observations with modern monitoring techniques, including unmanned aerial vehicles and satellite data, she contributes to a more comprehensive understanding of natural degassing systems and their environmental implications.

Dr. Huseynova received her BSc and Master's degrees in Geosciences from the Azerbaijan State Oil Academy (now the Azerbaijan State Oil and Industry University) between 2003 and 2009. She completed her PhD at the Institute of Geology and Geophysics of ANAS in 2022. She has contributed to a number of peer-reviewed publications in geosciences and environmental research, with a focus on linking geological processes to broader environmental and climate challenges.

Alongside her research, Dr. Huseynova is involved in international scientific cooperation, including participation in academic partnerships, joint research initiatives, and professional exchange programs.

She is also one of the coordinators of the Azerbaijan Summer School on Mud Volcanism and Fluid Migration Systems, organized in cooperation with international partners such as the University of Oslo. The program brings together students and researchers for a combination of lectures and field training in Azerbaijan, a region known for its high concentration of mud volcanoes, and provides participants with practical experience in studying these complex geological systems.

As a member of the AASSA-WISE Committee for the 2025–2027 term, Dr. Huseynova supports initiatives aimed at expanding the participation of women in science. Her work includes promoting access to international research opportunities, training programs, and scientific exchange. Through her involvement in educational and field-based activities, she contributes to creating supportive pathways for early-career researchers, including women in the Earth sciences.

ARMENIA

Dr. Naira Ayvazyan

NATIONAL ACADEMY OF SCIENCES
OF ARMENIA

TERM 2025-2027

Dr. Naira Ayvazyan is a distinguished biophysicist and a dedicated advocate for gender equality in the sciences. Serving as the Director of the Orbeli Institute of Physiology at the National Academy of Sciences of the Republic of Armenia (NAS RA), she leads critical research at the intersection of biology and physiology. Her fascinating academic work delves into how snake venoms interact with biological membranes, translating the complex biophysical properties of these venoms into critical knowledge for biomedical applications. Through her leadership and rigorous scientific inquiry, Dr. Ayvazyan has established herself as a prominent figure in Armenia's scientific community.

Her academic journey is anchored at Yerevan State University, where she earned her Diploma in Biophysics in 1995, followed by her PhD in 2002 focusing on lipid oxidation. In 2015, she achieved her Doctor of Sciences in Biology and Biophysics, defending a highly specialized dissertation on the biophysical aspects of snake venoms. Dr. Ayvazyan's research excellence has been globally recognized; she received an Elsevier Certificate for a Top Cited Article in the Journal of Proteomics in 2010, and a "TASHIR" foundation Award in 2012 for top-cited research in high-impact international journals. In 2023, her enduring scientific contributions were honored with the Medal of Gratitude devoted to the 80th Jubilee of the NAS RA. Furthermore, she was officially granted the title of Professor in Biophysics by the Supreme Certifying Commission of RA in 2023.

Deeply aligned with the Sustainable Development Goals, Dr. Ayvazyan champions inclusive environments for women in STEM. As a member of the AASSA-WISE Committee for the 2025-2027 term, she actively contributes to regional initiatives that promote gender equity. At the institutional level, she took decisive action by authoring the Gender Equality Plan for the Orbeli Institute of Physiology in 2021, which she updates annually to reflect modern STEM requirements. By embedding gender equality into the structural framework of her institution, she ensures that female scientists have equitable opportunities to thrive and lead in biomedical research.

Dr. Ayvazyan's most profound legacy lies in her unwavering dedication to mentorship and educational development. Throughout her career, she has nurtured numerous undergraduate and master's students, meticulously guiding their experimental and writing skills over multi-year periods. She has supervised five completed PhD theses while explicitly keeping gender equality as a priority; she is proud to see these young women now holding senior positions in various biomedical organizations, with three continuing their work under her consultancy as postdoctoral researchers. Serving on the specialized doctoral council for Biophysics and Bioinformatics at Yerevan State University since 2016, and acting as an external PhD examiner internationally in India and the UK, Dr. Ayvazyan continues to shape the future of science, empowering the next generation of female researchers to reach their highest potential.

THAILAND

Prof. Dr. Suchana Apple Chavanich

THE SCIENCE SOCIETY OF THAILAND
UNDER THE PATRONAGE OF
HIS MAJESTY THE KING
TERM 2025-2027

Prof. Dr. Suchana Apple Chavanich is an internationally recognized marine scientist dedicated to protecting our oceans and understanding the profound impacts of climate change on marine environments. Based at Chulalongkorn University in Thailand, she currently serves as a Professor and the Deputy Director of the Aquatic Resources Research Institute. Her pioneering research focuses on developing innovative, science-based restoration techniques designed to enhance the resilience of fragile coral reef ecosystems. By translating complex ecological data into actionable conservation strategies, Dr. Chavanich integrates rigorous scientific research with community engagement and policy collaboration to promote the sustainable management of our oceans across Southeast Asia.

Her distinguished academic journey began with a B.Sc. in Marine Science from Chulalongkorn University, followed by an M.A. in Biology from Central Connecticut State University and a Ph.D. in Zoology from the University of New Hampshire in the USA. Demonstrating extraordinary courage and scientific dedication, Dr. Chavanich made history as the first Thai female scientist to conduct scientific diving in Antarctica. She has since led numerous international research expeditions to study how climate change alters delicate marine ecosystems. Her exceptional contributions to marine science and environmental conservation have earned her prestigious accolades, including the ASEAN Biodiversity Heroes Award in 2022 and the Chevalier dans l'Ordre des Palmes académiques (Knight of the Order of Academic Palms) from the Government of France in 2024.

Dr. Chavanich's life's work is intrinsically linked to global sustainability, directly advancing both SDG 13 (Climate Action) and SDG 14 (Life Below Water). Serving as an active member of the AASSA-WISE Committee for 2025-2027 term, she is a staunch advocate for the participation and leadership of women in marine science and ocean conservation. Through her active involvement in global initiatives such as UNESCO-IOC/WESTPAC, she continually promotes regional cooperation, ocean literacy, and capacity building throughout Asia. As one of Thailand's leading female marine scientists, she stands as a powerful role model, showing young women exactly how STEM careers can effectively address the world's most pressing environmental challenges.

Beyond her own scientific discoveries, Dr. Chavanich is deeply committed to mentoring the next generation of ocean stewards. She regularly supervises graduate students and early-career researchers, successfully guiding many female scientists who subsequently rise to leadership roles in academia, environmental policy, and marine conservation. A passionate voice in science communication, she frequently participates in educational programs, international forums, and community initiatives to elevate public awareness surrounding ocean health. Through her unwavering dedication, Dr. Chavanich is not only restoring coral reefs but also cultivating a more inclusive scientific community where women can thrive and lead in safeguarding our planet.

INDIA

Dr. Srubabati Goswami

INDIAN NATIONAL SCIENCE ACADEMY

TERM 2022-2024

Srubabati Goswami is an outstanding physicist and a pioneering role model who is deeply committed to inspiring young women in science. Based in India, she serves as an Outstanding Professor at the Physical Research Laboratory in Ahmedabad. Through her rigorous scientific inquiry and steadfast advocacy, she actively champions the importance of fostering inclusive academic environments within the broader scientific community.

Her distinguished academic journey is anchored by a PhD in Physics, which she earned from the University of Calcutta in 1997. Throughout her career, her exceptional contributions to her field have garnered extensive global and national recognition. She holds prestigious fellowships with The World Academy of Sciences (TWAS), the Indian National Science Academy (INSA), the National Academy of Sciences India (NASI), and the Indian Academy of Sciences (IAS). Furthermore, her research excellence has been supported by several esteemed awards, including the Humboldt Fellowship in 2005, the J.C. Bose Fellowship spanning 2020 to 2025, and the Fulbright-Nehru Academic and Professional Excellence Fellowship in 2023.

Deeply aligned with the Sustainable Development Goals surrounding gender equality and quality education, Professor Goswami actively shapes the future of women in STEM. She served as a member of the AASSA-WISE Committee from 2020 to 2024, acting as a vital voice for regional advocacy. Within her home country, she has broken historic barriers, notably serving as the first woman President of the Indian Physics Association (IPA). Her leadership in systemic change is further evidenced by her instrumental role as a founding member from 2017 to 2020, and subsequently as Chair from 2021 to 2022, of the IPA's Gender in Physics Working Group.

Professor Goswami's legacy is defined by her hands-on approach to dismantling barriers for women in science. She served as the Co-Convener for the International Conference of Women in Physics (ICWIP 2023) and for "Pressing for Progress 2019," which marked the very first dedicated Gender in Physics conference held in India. To continually push for progress, she is heavily involved in organizing awareness programs, outreach initiatives, and panel discussions. By frequently delivering lectures that address the unique challenges faced by women in STEM, Professor Goswami tirelessly paves the way for the next generation of female physicists to thrive.

RUSSIA

Dr. Elena Grigorieva

FAR EASTERN BRANCH OF THE RUSSIAN ACADEMY OF SCIENCES

TERM 2022-2024

Dr. Elena Grigorieva is a prominent environmental scientist whose work investigates the crucial intersections of climate, agriculture, and human health. Based in Berlin, Germany, she currently serves as a researcher within the Geographical Institute's Climate Geography Group at Humboldt Universität zu Berlin. Her highly specialized research focuses on human bioclimatic indices, thermal acclimatization, and how the human body adapts to extreme climates. Currently spearheading a DFG-funded project focused on human bioclimate in the Arctic, she translates complex meteorological and physiological data into accessible insights, providing a vital understanding of how our rapidly changing climate directly impacts daily human well-being and vulnerable populations.

Her rigorous academic foundation began with a Diploma in Meteorology from the Leningrad State Hydrometeorological Institute (now the Russian State Hydrometeorological University) in St. Petersburg. She subsequently earned her Candidate Degree (Ph.D.) in Environmental Science from the Far Eastern Federal University in Vladivostok. Before relocating to Germany in 2023, she spent years significantly contributing to Russia's scientific landscape as a Leading Researcher at the Institute for Complex Analysis of Regional Problems (ICARP FEB RAS) and as an Associate Professor of Ecology at Sholom-Aleichem Priamursky State University. Notably, it was during her tenure at ICARP FEB RAS that she served as a dedicated member of the AASSA-WISE Committee from 2022 to 2024, championing inclusive science and regional advocacy. Her exceptional international trajectory has been recognized globally; she was a Fulbright Scholar at the University of Miami in 2012 and a Scholar for the Fulbright Arctic Initiative FAI-III at the University of Alaska Fairbanks from 2021 to 2023.

Deeply aligned with the Sustainable Development Goals surrounding climate action and public health, Dr. Grigorieva's work champions global cooperation and inclusive science. A dedicated member of the International Society of Biometeorology since 2005, she has held significant leadership roles, including Councilor from 2014 to 2017 and Vice President from 2014 to 2023. Within the Society, she actively contributes to the 'Climate, Tourism and Recreation Commission' and the 'Climate and Human Health Commission'. Additionally, she shapes global scientific discourse as an Editorial Board Member and Field Editor for the International Journal of Biometeorology, a Topic Editor for the journal Climate, and a Special Issue Editor for leading journals such as Atmosphere.

Dr. Grigorieva's enduring legacy is rooted in her dedication to understanding and mitigating the impacts of climate change on populations living in extreme environments. Beyond her rigorous scientific endeavors, she maintains a well-rounded perspective through her professional interests in climate and tourism, as well as her enjoyment of baking, hiking, and reading. Through her extensive international collaborations and her unwavering commitment to research, she serves as a powerful role model, empowering future generations of scientists to pursue critical environmental research that bridges borders and improves lives globally.

TÜRKIYE

Prof. Dr. Kadriye Arzum Erdem Gürsan

TURKISH ACADEMY OF SCIENCES (TÜBA)

TERMS 2025-2027, 2022-2024, 2017-2021

Prof. Dr. Kadriye Arzum Erdem Gürsan is a highly distinguished analytical chemist and an influential architect of science policy in Turkey. Based at the Faculty of Pharmacy at Ege University, she serves as a Full Professor, dedicating her expertise to the rigorous advancement of analytical chemistry. Her leadership extends far beyond the laboratory, fundamentally shaping national and international scientific frameworks. She actively serves as a Council member of the Science, Technology and Innovation Policies at the Turkish Presidency, seamlessly bridging the gap between advanced chemical research and accessible, impactful public policy.

Her academic journey is deeply rooted at Ege University, where she earned her B.Sc. in Pharmacy in 1993, followed by an M.Sc. in 1996 and a Ph.D. in Analytical Chemistry in 2000. Demonstrating remarkable dedication, she steadily rose through the academic ranks at her alma mater, transitioning from a Research Assistant in 1994 to a Full Professor by March 2009. Her scientific excellence has garnered prestigious recognition, including the "Junior Science Award" in 2006 and the "Science Award" in 2015 from The Scientific and Technological Research Council of Turkey (TÜBİTAK). A globally recognized expert, she was elected as a Fellow of the Royal Society of Chemistry (FRSC) in 2017. Her international influence continues to expand; she serves on the Scientific Committee of COST as a representative of Turkey, as well as on the UNESCO-International Basic Sciences Programme (IBSP) Scientific Advisory Board. Furthermore, she has been a Principal member of the Turkish Academy of Sciences (TÜBA) since 2016, having previously served as an Associate member between 2007 and 2016. She has been the elected member of TÜBA Council since 2020.

Deeply committed to fostering equitable scientific environments, Prof. Erdem Gürsan is a steadfast champion for women in STEM. She has been an active, continuous member of the AASSA-WISE Special Committee since 2017, dedicating years of service to regional advocacy. Her hands-on approach to capacity building is evident through her main role on the organizing committee for the pivotal AASSA-TÜBA "Women in Science and Technology" workshop held in Izmir in 2014. By contributing to essential AASSA-WISE book and web initiatives, she actively ensures that the achievements of women in science and technology are properly documented and celebrated.

Prof. Erdem Gürsan's enduring legacy is defined by her structural approach to dismantling barriers for future generations. Her commitment to systemic change is highlighted by her ongoing role in the ALLEA Equity, Diversity, and Inclusion (EDI) Task Force in Research. By also serving on the evaluation committee for the Professor Yoo Hang Kim's Young Women Scientists Award since 2023, she actively nurtures and rewards the brilliance of emerging female researchers. Through her lifelong dedication to both the chemical sciences and gender equity, she continues to inspire and empower the next generation of women scientists.

NEPAL

Jun Dongol Hada

NEPAL ACADEMY OF SCIENCE
AND TECHNOLOGY

TERM 2022-2024

Jun Dongol Hada is a leading advocate for gender equity and sustainable development within the fields of architecture, urban planning, and engineering. Serving as the Chair and a founding member of Women in Science and Engineering, Nepal (WISE Nepal), she spearheads critical initiatives to empower girls and women in STEM fields. Affiliated with the Nepal Engineering Association (NEA) and Society of Nepalese Architects (SONA), her extensive work bridges technical urban planning with inclusive policymaking and advocacy. Her research and leadership, particularly regarding indoor air quality and rural transport, demonstrate a deep commitment to creating safer, more equitable environments for vulnerable populations.

Her foundation in academic excellence began early; she earned a bronze medal for being the third outstanding female student in Nepal's National Level High School Board Examination and won a silver medal in a national spelling contest. She pursued a Bachelor of Science in Architecture at Manuel L. Quezon University in Manila, graduating in 1993. During her bachelor's degree, she notably led a team of female architecture students to a 4th-place victory in a national design competition for a low-cost housing project aimed at improving conditions in the Tondo railway slum. Supported by a full NORAD scholarship, she later earned a Master of Science in Urban Planning from the Asian Institute of Technology in 1998, receiving the Masako Tanaka Fellowship for her thesis research on urban slums. Her professional excellence has been globally recognized, notably through a 2007 Fellowship with the US Department of State's International Visitor Leadership Program and a Global Leadership Award from the US Environmental Protection Agency for her impactful research on indoor air pollution and its health impacts while working at Practical Action Nepal.

Hada's work directly intersects with the Sustainable Development Goals by ensuring infrastructure and scientific ecosystems are inclusive and gender-responsive. As a member of the AASSA-WISE Committee from 2022 to 2024, she helped amplify Nepal's presence in global STEM conversations. Through WISE Nepal, she consistently participates in the Asia Pacific Nations Network and serves as a vital panelist in international dialogues addressing STEM workforce challenges, the retention of women in STEM, and inclusive workplace practices. Her scholarly contributions, including the peer-reviewed 2020 article "Gender Mainstreaming in the Nepalese rural transport sector: working towards transformative changes," provide crucial frameworks for equitable infrastructure development.

A true catalyst for systemic change, Hada's legacy is perhaps most visible in the direct mentorship and career-building opportunities she creates for young women. Under her leadership, more than 10 Nepali women have attended the Young Women Scientists Camp in South Korea, gaining invaluable international exposure and recognition platforms to showcase their research. Furthermore, she has designed and managed targeted internship programs that have successfully trained over 100 female civil engineering graduates for Nepal's infrastructure sector. By actively dismantling barriers and building robust support networks, she is widely recognized across the Asia Pacific region for strengthening gender inclusion in technical fields and ensuring future generations of women can thrive as leaders in STEM.

JAPAN

Prof. Yukari Ito

SCIENCE COUNCIL OF JAPAN

TERMS 2025-2027, 2022-2024

Professor Yukari Ito is a prominent mathematician whose theoretical work fundamentally strengthens the intellectual infrastructure of modern science. Representing the Science Council of Japan, she currently serves as a Professor and the Deputy Director at the Kavli Institute for the Physics and Mathematics of the Universe (Kavli IPMU) at The University of Tokyo. Specializing in the highly complex field of algebraic geometry, her peer-reviewed publications contribute significantly to the advancement of global mathematical knowledge. While her research is inherently theoretical, she develops the rigorous analytical reasoning and abstraction capacities that are absolutely essential for driving tangible innovation across various scientific disciplines.

Professor Ito's academic journey reflects profound perseverance, intellectual courage, and sustained excellence as she built a distinguished career in a discipline historically marked by significant gender imbalance. By rising to senior leadership within a globally recognized research institute, she powerfully exemplifies how dedication and collaboration can successfully reshape professional landscapes. In her role as Deputy Director, she helps guide interdisciplinary research programs and international workshops, connecting scholars worldwide and strengthening transnational academic partnerships that position Japan as a global hub for advanced mathematical research. Her visibility as a senior woman mathematician provides vital inspiration and practical support to early-career researchers, particularly young women who are navigating highly competitive academic environments.

Deeply committed to creating a more equitable scientific landscape, Professor Ito's work actively champions multiple Sustainable Development Goals. She directly advances SDG 4 (Quality Education) by fostering high-level research training, mentorship, and graduate education within an international academic environment. By actively supporting interdisciplinary collaboration among mathematicians, physicists, and astronomers, she also reinforces SDG 9 (Industry, Innovation, and Infrastructure). Furthermore, her sustained leadership vigorously promotes SDG 5 (Gender Equality) and SDG 10 (Reduced Inequalities). Through her active involvement and leadership roles in the Asian Oceanian Women in Mathematics (AOWM) and related networks, she works to enhance visibility, professional opportunities, and supportive networks for women scholars, actively addressing the structural and cultural barriers in academia to reduce gender disparities in advanced scientific fields.

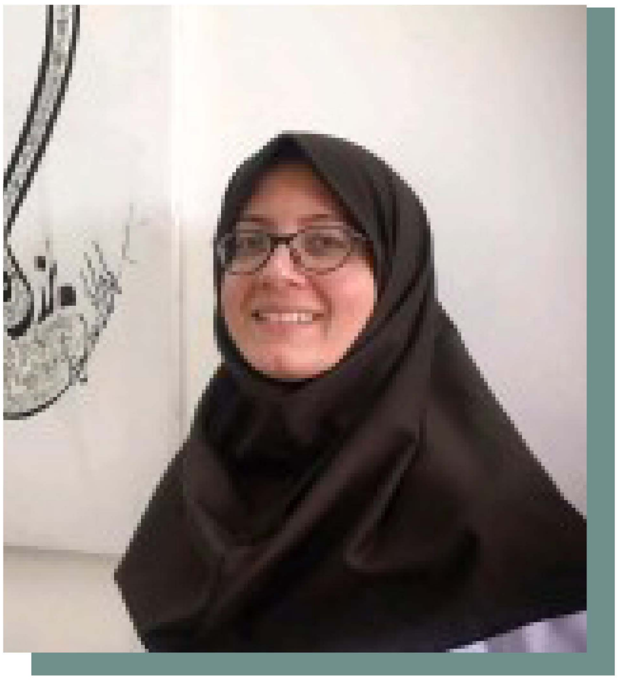
Professor Ito's enduring legacy is defined by her dedication to fostering inclusive, international scientific communities grounded in mutual respect. Through committee service and her work with international organizations, she effectively contributes to institutional practices that emphasize diversity, equitable evaluation, and inclusive governance. By expanding access to high-level scientific environments for scholars across the Asia-Oceania region and beyond, her work nurtures future generations of scientists and strengthens the global research ecosystem. Ultimately, by combining her foundational mathematics—which underpins the analytical tools needed for complex sustainability challenges—with her commitment to social cohesion, she is building a more balanced, equitable, and resilient academic landscape.

IRAN

Dr. Shaghayegh Haghjooy Javanmard

THE ACADEMY OF SCIENCES OF IR OF IRAN

TERM 2025-2027



Dr. Shaghayegh Haghjooy Javanmard is a distinguished medical scientist and a formidable leader in Iran's science and technology policy landscape. As a Professor of Physiology at Isfahan University of Medical Sciences (IUMS), her deep scientific expertise lies in cardiovascular physiology, with a particular focus on microcirculation, endothelial cell function, and angiogenesis. By investigating the intricate behaviors of blood vessels at the cellular level, her research translates fundamental physiological mechanisms into critical insights for treating cardiovascular diseases. Beyond the laboratory, she plays a paramount role in driving national innovation, having served in high-level strategic capacities, including as the Head of the Strategic Technologies Development Center under Iran's Vice Presidency for Science, Technology, and Knowledge-Based Economy.

Her robust academic foundation uniquely bridges clinical medicine and fundamental research. Holding both a Medical Doctorate (MD) and a PhD in Physiology, Dr. Haghjooy Javanmard has consistently pushed the boundaries of biomedical science. Throughout her distinguished career at IUMS, she has helmed the Applied Physiology Research Center, guiding it to become a vital hub of pioneering research. Her extensive body of work—spanning stem cell therapy, vascular biology, and pathophysiology—is widely published in international peer-reviewed journals. Her exceptional ability to merge rigorous scientific inquiry with high-level strategic leadership has established her as a pivotal figure in shaping Iran's medical and technological ecosystems.

Dr. Haghjooy Javanmard's contributions are deeply aligned with the Sustainable Development Goals, particularly SDG 3 (Good Health and Well-being) and SDG 9 (Industry, Innovation, and Infrastructure). Operating at the vital intersection of health science and national policy, she is a powerful advocate for inclusive scientific advancement and the empowerment of women in STEM. By actively championing the development of knowledge-based ecosystems and biomedical startups, she ensures that theoretical scientific breakthroughs are successfully translated into accessible health technologies. Through her regional advocacy within the AASSA-WISE network, her voice amplifies the critical need for equitable research opportunities and collaborative infrastructures for female scientists across Asia.

Her enduring legacy is defined by a steadfast commitment to mentorship and capacity building. Having guided countless medical students, graduate researchers, and early-career scientists, Dr. Haghjooy Javanmard actively cultivates the next generation of medical innovators. Through her remarkable trajectory from a rigorous laboratory researcher to a visionary national policymaker, she stands as a highly visible and inspirational role model. By dismantling systemic barriers and fostering collaborative, interdisciplinary environments, she continues to empower young women in Iran and beyond to lead transformative advancements in science and health.

SRI LANKA

Dr. Nadira Dharshani Karunaweera

NATIONAL ACADEMY OF SCIENCES OF SRI LANKA

TERMS 2025-2027, 2022-2024

Nadira Dharshani Karunaweera is a distinguished medical professional and global leader in parasitology whose work embodies the vital intersection of rigorous health research and the empowerment of women in science. Serving as the Chair and Senior Professor of Parasitology at the Faculty of Medicine, University of Colombo in Sri Lanka, her extensive career directly supports global health equity and capacity building. Her internationally recognized expertise is reflected in her roles as an honorary Visiting Fellow at the School of Public Health, Harvard University, and an adjunct Professor at Jamia Hamdard University in India. Ranked among the World's Top 2% of Scientists since 2019, her groundbreaking contributions continue to shape tropical medicine and public health landscapes.

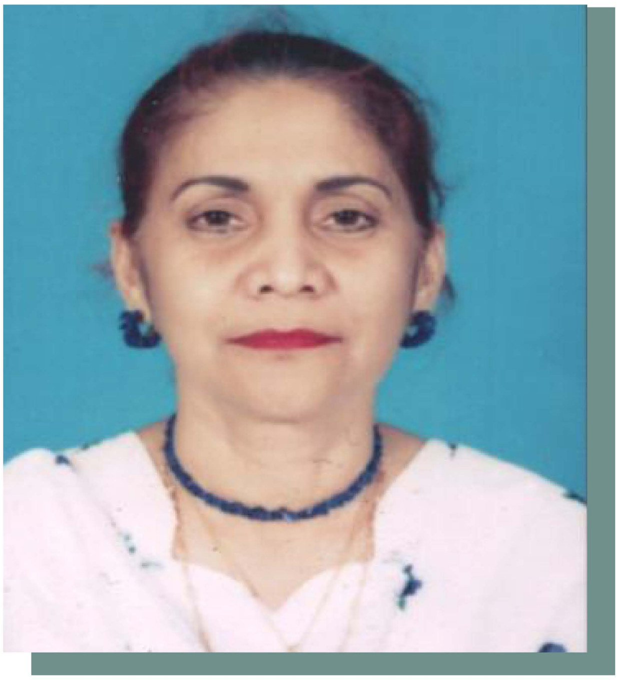
Her profound scientific foundation began with an M.B., B.S. from the University of Colombo in 1986, followed by a Ph.D. from the same institution in 1993, where she deeply researched clinical disease and immunity in human malaria. Dedicated to academic excellence, she also holds a 2003 certificate for the Accreditation of Senior Teachers in Higher Education from the University of Colombo. Professor Karunaweera is a pioneer in her field, holding the distinction of being the first Sri Lankan elected as an honorary member of the American Academy of Arts and Sciences. She has served as President of the National Academy of Sciences of Sri Lanka (the second woman elected President in its history that spans over 5 decades), and is an elected Fellow of The World Academy of Sciences (TWAS), and an International Fellow of the American Society of Tropical Medicine and Hygiene. Her exemplary research has been recognized with numerous accolades, including a Fulbright Advanced Research and Lecturing Award in 2005, a Harvard University Senior Research Scholar Award, and a CVCD lifetime award for the most outstanding senior researcher in Health Sciences.

PAKISTAN

Dr. Azra Khanum

PAKISTAN ACADEMY OF SCIENCE

TERMS 2013-2024



Dr. Azra Khanum is a resilient pioneer in biochemistry and molecular biology whose career exemplifies a lifelong commitment to overcoming gender barriers and advancing science in Pakistan. She currently serves as a Visiting Professor and is the Former Dean of the Faculty of Sciences at the University Institute of Biochemistry and Biotechnology, Pir Mehr Ali Shah-Arid Agriculture University Rawalpindi, Pakistan. Her journey as a trailblazer began as early as 1963 when, as a ninth-grader, she discovered that science classes were exclusively offered in boys' schools. Through sheer perseverance and diligence, she successfully compelled her school's administration to introduce a science curriculum for girls, setting a precedent for young women in the 1960s and launching her own remarkable scientific career.

Building upon this foundational determination, Dr. Khanum established a rigorous academic record, earning her BSc and MSc from the University of Karachi before completing an MPhil at Islamabad University and a PhD in Biochemistry and Molecular Biology at Quaid-e-Azam University in 1982. She further honed her expertise internationally through a Post-Doctoral Fellowship in Molecular Endocrinology at the National Institute of Health (NIH) in the USA from 1984 to 1987, where she later returned as a Visiting Scientist from 1995 to 1997. Her profound scientific contributions and academic excellence have been widely recognized with prestigious honors, including the HEC Best Teacher Award in 2001, a Gold Medal from the Pakistan Academy of Sciences in 2003, and the Government of Pakistan's esteemed Civil Award, the Tamgha-i-Imtiaz, in 2008.

Aligned with the Sustainable Development Goals advocating for gender equality and inclusive institutions, Dr. Khanum has utilized her extensive leadership roles—including serving as Chairperson, Dean, and Acting Vice-Chancellor—to tangibly support women in STEM. Recognizing the practical challenges faced by female researchers, she established a Daycare Center at her university, enabling female faculty to pursue their academic and research activities with peace of mind. Furthermore, as Chairperson of the Harassment Committee, she provided critical administrative leadership in implementing robust anti-harassment policies to ensure a safe, fair, and compliant environment for all individuals. On a regional scale, her dedication to visibility and equity is evident through her remarkable four-term tenure on the AASSA-WISE Committee spanning from 2013 to 2024, where she played a significant role in developing the AASSA Women in STEM database project.

Dr. Khanum's legacy is deeply rooted in her unwavering dedication to mentorship and institutional network building. As the Vice President of the National Chapter of the Organization for Women in Science for the Developing World (PNC-OWSD), she actively utilizes this platform to support young faculty and students. Her expansive affiliations—which include fellowships with the Pakistan Academy of Sciences, the Pakistan Academy of Medical Sciences, and memberships in numerous international societies—further amplify her capacity to champion women in the sciences. By consistently facilitating networking opportunities and delivering lectures both nationally and internationally, Dr. Khanum continues to impart her early lesson that resilient women, guided by strong mentorship, can take on any scientific challenge.

NEPAL

Gunakeshari Pradhan Manandhar

NEPAL ACADEMY OF SCIENCE AND TECHNOLOGY

TERM 2025-2027

Gunakeshari Pradhan Manandhar is a trailblazing senior ICT professional and dedicated science advocate who has fundamentally transformed Nepal's digital landscape. Currently serving as the Chairperson of Women In Information Technology (WIIT), she is also an Associate Academician at the Nepal Academy of Science and Technology (NAST). Making history as the first female computer engineer in Nepal, she shattered glass ceilings early in her career and paved the way for others. Her extensive expertise bridges rigorous technical infrastructure development with a profound commitment to using technology as a tool for social equity and rural development.

Her robust academic foundation began with a Master of Science in Computer Engineering from L'vov Polytechnic Institute in Ukraine, from which she graduated in 1986. She subsequently expanded her expertise through specialized technical training across Finland, China, Sri Lanka, Singapore, Japan, and the USA. Before her retirement, she held paramount leadership roles at Nepal Telecom (the incumbent telecom operator in Nepal), serving as Technical Director, Director of International Services, and Director of Information System Support. In these capacities and many other designations held in the company, she provided the strategic leadership necessary for the nation's ICT transformation and the early computerization of Nepal Telecom. She spearheaded the nationwide deployment of convergent real-time billing system, led large-scale internet network expansions connecting both urban and rural areas, established regional relations for cross-border fiber connectivity, and crucially coordinated for telecom infrastructure continuity during the devastating 2015 national earthquake. Her three decades of exceptional work have earned her significant accolades, including the Ncell ICT Woman ICON 2021 Award and formal recognition from the NTA, ITU, and MOCIT.

Deeply aligned with the Sustainable Development Goals regarding resilient infrastructure and gender equality, Pradhan leverages regional science and policy platforms as an active member of the AASSA-WISE Committee for the 2025-2027 term. Her advocacy has been a lifelong pursuit; in the early 1990s, she co-founded a women-led computer institute specifically to open pathways for women in ICT education. Today, as the Co-founder and Chairperson of WIIT since 2019, she drives national programs—ranging from capacity-building workshops and hackathons to policy advocacy—that actively strengthen the digital skills and career pathways of women and girls. Furthermore, she has guided vital research initiatives assessing the status of women in ICT to provide evidence-based insights for national policy dialogues.

Pradhan's enduring legacy is defined by her unwavering dedication to amplifying women's perspectives in national ICT discourse and decision-making spaces. She continuously serves as a role model and mentor, frequently speaking at STEM events and acting as a jury member for major tech competitions, including Digital Nepal, ICT Awards, and Hacking for Humanity. Previously an Executive Member of the Federation of Computer Association Nepal until 2022, she notably led "ICT as a Profession" initiatives in western Nepal to extend STEM awareness to marginalized communities and youth. Through her visionary leadership, she has not only connected a nation digitally but also laid the foundational networks for generations of female technologists to thrive.

PAKISTAN

Dr. Asghari Maqsood

PAKISTAN ACADEMY OF SCIENCE

TERM 2025-2027

Professor Emeritus Dr. Asghari Maqsood is a transformative figure in the fields of physics and mathematics, serving as a Professor Emerita and Advisor to the Vice-Chancellor at Air University in Islamabad, Pakistan. Recognized as one of Pakistan's Top Lady Physicists, her pioneering research specializes in Thin Film Technology and high-temperature superconductivity. By investigating these complex materials and focusing on advanced subjects like ferrites, she develops the critical foundational knowledge necessary to drive real-world innovations in industry and infrastructure.

Her distinguished academic journey spans the globe, beginning with a B.Sc. (Hons.) in Physics from the University of Dacca in 1970 and an M.Sc. from the University of the Punjab. She went on to earn an M.Phil. in Nuclear Physics from Quaid-i-Azam University in 1975, an M.Sc. in Materials Science from the University of Oxford in 1979, and a Ph.D. in Physics from Gothenburg University in Sweden in 1982. Throughout her illustrious five-decade career, she has published over 300 peer-reviewed papers with more than 6,766 citations. Her unparalleled excellence has earned her the highest national and global honors, including the President's Award for Pride of Performance, the Sitara-i-Imtiaz, and the COMSTECH Lifetime Contribution Award in Physics. Furthermore, she has consistently been ranked among the Top 2% of Scientists globally by Stanford University.

Dr. Maqsood's life's work directly advances several Sustainable Development Goals, particularly Quality Education (SDG 4), Gender Equality (SDG 5), and Industry, Innovation, and Infrastructure (SDG 9). Serving as the founding Dean of Post and Undergraduate Studies at Air University since 2015, she significantly expanded academic offerings and established a state-of-the-art Nanoscale Physics Laboratory. A steadfast advocate for women in STEM, she translates her leadership into tangible support; for instance, she successfully introduced a daycare center and maternity leave policies for women employees at Air University to ensure they can maintain fulfilling careers.

As an elected council member of the Pakistan Academy of Sciences for the 2023-2026 term, Dr. Maqsood continues to shape the strategic direction of national science. However, her most profound legacy lies in her unwavering dedication to mentorship. She has personally supervised and mentored over 150 postgraduate students, empowering numerous young women to break barriers in a traditionally male-dominated field. Through her groundbreaking research and systemic advocacy, Dr. Maqsood stands as a powerful role model, ensuring that the next generation of female scientists in Pakistan and beyond has the inclusive environment needed to thrive.

PHILIPPINES

Dr. Maria Aura Teodora Matias

NATIONAL ACADEMY OF SCIENCE AND TECHNOLOGY PHILIPPINES

TERMS 2025-2027, 2022-2025, 2019-2021

Dr. Aura C. Matias is an Academician of the National Academy of Science and Technology (NAST) Philippines and a Professor at the University of the Philippines. She is a recognized leader in the fields of engineering education, human factors engineering, quality assurance, and public sector governance. By applying rigorous industrial engineering principles to human-centered systems, her extensive academic, administrative, and consulting work has significantly influenced engineering education reform, quality assurance frameworks, and science-based policymaking throughout the Philippines and the ASEAN region. Her professional credentials further underscore her expertise, as she is a Certified Professional Industrial Engineer, an ASEAN Engineer, and a Certified Productivity Practitioner.

Her foundation in academic excellence began with a B.S. in Industrial Engineering in 1982 and an M.S. in Industrial Engineering in 1989, both from the University of the Philippines. She subsequently earned her Ph.D. in Industrial Engineering from Purdue University in the USA in 1996. Throughout her distinguished career, she has held pivotal leadership roles, including Dean of the UP College of Engineering, Director of the UP Diliman Quality Assurance Office, and Chair or Member of numerous national technical panels. Her remarkable contributions have been celebrated with prestigious national and international honors, including the 21st Manuel L. Quezon Gawad Parangal in 2023, the IEOM Women in Industry and Academia Award in 2023, and the National Achievement Award for Engineering Education in 2020. Additionally, she received the Outstanding Science Administrator Award (Dioscoro L. Umali Medal) from the Department of Science and Technology and was named one of the Top 100 Outstanding Engineers of the Century by the UP Alumni Engineers.

Deeply committed to the Sustainable Development Goals (SDGs), Dr. Matias champions the essential role of women in STEM as key drivers of innovation, resilience, and sustainable development. Since 2017, she has served as the NAST Philippines Representative to the AASSA Special Committee on Women in Science and Engineering (WISE), and she remains an active committee member for the 2019-2021, 2020-2023, and 2024-2026 terms. In this capacity, she actively contributes to regional initiatives that promote gender equity, leadership development, and the increased visibility of women scientists and engineers across Asia. Through her vital research and consultancy work, she has advanced women's participation in STEM-related policy discourse, particularly at the critical intersections of human factors, occupational health, public service delivery, and social sustainability.

Dr. Matias's legacy is defined by her enduring dedication as a consistent advocate and leader for the advancement of women in STEM through education, policy, mentorship, and institutional reform. Through her varied leadership roles, she has successfully mainstreamed gender-sensitive policies in engineering education, faculty development, and institutional quality assurance. A sought-after keynote speaker and resource person on topics such as women in engineering, inclusive leadership, ergonomics, occupational safety, and sustainable development, she continually amplifies the importance of equitable scientific advancement. Perhaps most significantly, throughout her academic career at the University of the Philippines, she has mentored generations of women engineers and researchers, many of whom now hold prominent leadership roles in academia, industry, and government.

BANGLADESH

Dr. Aliya Naheed

BANGLADESH ACADEMY OF SCIENCES

TERM 2025-2027

Dr. Aliya Naheed is an internationally acclaimed public health leader and a Senior Scientist at the International Centre for Diarrheal Disease Research, Bangladesh (icddr,b). Widely recognized for her data-driven approach to health system strengthening and her pioneering scientific innovations, she fundamentally transforms global health responses and champions inclusive scientific ecosystems. Her exceptional contributions have been recognized with numerous global and national awards, most notably the BAS Sultan Ahmed Choudhury Science and Technology Gold Medal, which is the highest scientific honor in Bangladesh. She has also received the BMJ Award South Asia, a Cooperative Research Award from Harvard Medical School, the Grand Challenges Canada Stars in Global Health, and a World Health Organization Asia Pacific Observatory Fellowship. Dr. Naheed is a distinguished Fellow of both the World Academy of Sciences (TWAS) and the Bangladesh Academy of Sciences (BAS).

Her profound expertise is built on a rigorous academic foundation. She earned her MBBS from the University of Dhaka in 1992. She subsequently completed an MPH from the Johns Hopkins Bloomberg School of Public Health in 2002 and earned her PhD from the Tulane University School of Public Health and Tropical Medicine in 2012. To further her specialization, she completed a post-doctoral fellowship at the Nossal Institute for Global Health at the University of Melbourne in 2015. Dr. Naheed plays a pivotal role in shaping public health policy and ethics globally, serving on the Board of The Global Health Network (University of Oxford/UNOPS), the South and South East Asia Regional Climate Hub Committee, and various ethics boards, including the National Research Ethics Committee in Bangladesh. Furthermore, she serves on numerous editorial boards, such as Frontiers in Public Health and the BMJ South Asia.

Dr. Naheed is profoundly committed to advancing the Sustainable Development Goals through gender equity in science. As a member of the AASSA-WISE Committee for the 2025-2027 term, she fiercely advocates for women's leadership in STEM, equitable research participation, and work-life balance. A true pioneer within her institution, she founded the Women Scientists and Researchers Forum at icddr,b to explicitly empower women in leadership, research, and career re-entry. Her most significant structural contribution to global research equity is the establishment of The Global Health Network Asia platform; this initiative develops critical networks across Asian hospitals for data collection on NCDs, COVID-19, and maternal health, leading to the creation of regional centers in Bangladesh and Nepal where she has mentored over 100 junior researchers. She also serves on significant jury boards promoting women in science, including the Prof. Yoo Hang Kim Young Women Scientists Award.

Driven by a passion to cultivate the next generation, Dr. Naheed has personally mentored over 75 junior researchers and trained more than 200 clinicians—predominantly women—in data science, research ethics, and publishing. She directly supervises PhD candidates and students through formalized arrangements with prestigious institutions like the University of Oxford, the University of Warwick, and the National University of Singapore. She acts as an academic teacher for Oxford's Postgraduate Diploma in Global Health Research and has built robust internship programs that provide vital field experience for young female scientists from international universities, including Brown, Berkeley, and Toronto. Through these comprehensive capacity-building initiatives and her creation of large-scale national conferences to disseminate innovations, Dr. Naheed actively shapes a more equitable future for women in STEM.

AUSTRALIA

Em. Prof. Cheryl Elisabeth Praeger

AUSTRALIAN ACADEMY OF SCIENCE

TERM 2022-2024, EX-OFFICIO
TERM 2019-2021, CHAIR
TERM 2016-2018, CHAIR

Emeritus Professor and Senior Honorary Research Fellow Cheryl Elisabeth Praeger is a towering figure in mathematics and a dedicated champion for women in STEM. Based at the University of Western Australia, she is deeply affiliated with the Australian Academy of Science, where she previously served as Foreign Secretary from 2014 to 2017. Throughout her illustrious career, her rigorous mathematical research and academic leadership have broken barriers and paved the way for future generations of scientists, firmly establishing her as a global leader in her field.

Professor Praeger's academic foundation includes a BSc and MSc from the University of Queensland, an MSc and DPhil from the University of Oxford, and a DSc from the University of Western Australia. Notably, she also holds an Associate of Music Australia degree, earned in 1970. Recognizing her profound academic influence, she has been awarded six honorary doctorates from institutions across the globe, including universities in Thailand, Belgium, Iran, the UK, Australia, and Slovenia. A true pioneer, she was the first woman to serve as president of the Australian Mathematical Society from 1992 to 1994. Her unparalleled scientific contributions have been recognized with the 2019 Australia Prime Minister's Prize for Science, the title of Western Australian Scientist of the Year in 2009, and the inaugural Ruby Payne-Scott Medal of the Australian Academy of Science. She holds prestigious fellowships with the Australian Academy of Science, the International Science Council, and the Institute of Combinatorics and its Applications, among others.

Driven by a commitment to equitable scientific advancement, Professor Praeger has made monumental contributions to the visibility and support of women in STEM across the Asia-Pacific. Within the AASSA-WISE Committee, she served as Chair for two consecutive terms spanning 2016 to 2021, and continued her service as a member from 2022 to 2024. During her leadership, she chaired the project that produced the inspirational 2018 report, Profiles of Women Scientists in Asia, which featured 50 researchers across AASSA membership countries. She also spearheaded critical digital platforms, chairing both the STEM Women Global project for the InterAcademy Partnership and STEM Women Asia for AASSA-WISE, demonstrating that cross-border collaboration can develop tangible solutions for gender inequality. Furthermore, in 2021, she chaired a vital rapid research report detailing how the COVID-19 pandemic exacerbated pre-existing gender inequities in the regional STEM workforce.

Professor Praeger's legacy as a steadfast advocate is cemented in the very fabric of Australian and international science. In 2021, she was appointed a Companion of the Order of Australia, the nation's highest civilian honor, specifically acknowledging her eminent service to mathematics, tertiary education, international organizations, and her role as a champion of women in STEM careers. Her enduring dedication to mentoring and inspiring the next generation is immortalized through namesake initiatives that empower female mathematicians, including the Cheryl E. Praeger Travel Awards established in 2014, and the Cheryl Praeger Medal, which has recognized top-performing female contestants in the Australian Mathematics Competition since 2017.

GEORGIA

Prof. Tinatin Sadunishvili

GEORGIAN NATIONAL ACADEMY OF SCIENCES

TERM 2021-2024

Georgian National Academy of Sciences Professor Tinatin Sadunishvili is a distinguished Georgian scientist whose internationally recognized contributions bridge the fields of plant biochemistry, microbial biology, and environmental biotechnology. Currently serving as the Academician-Secretary of the Department of Biological Sciences at the Georgian National Academy of Sciences, she also holds the position of Professor and Head of the Department of Plant Biochemistry and Biotechnology at the Agricultural University of Georgia. Her vital work translates fundamental plant metabolism studies into tangible environmental solutions, notably establishing biochemical criteria for selecting plants used in phytoremediation by demonstrating the involvement of basic metabolic enzymes in multistep xenobiotic transformation.

Professor Sadunishvili's rigorous academic foundation began with a Diploma in Biochemistry from Tbilisi State University in 1975, followed by a PhD in Plant Biochemistry in 1980 and a Doctor of Science in 1995 from the Institute of Plant Biochemistry at the Georgian Academy of Sciences. Her pioneering research resolved previously disputed mechanisms regarding ammonia assimilation pathways in higher plants and elucidated complex regulatory mechanisms of plant enzymes. In a landmark achievement, her team isolated a novel bacteriophage infecting Xanthomonas vesicatoria, leading the International Committee on Taxonomy of Viruses to approve the new viral genus Dibbivirus in April 2024. An accomplished author with over 100 peer-reviewed publications, 8 books, and a patent , her excellence has been honored with her election as a Full Member of the Georgian National Academy of Sciences in 2015 and the receipt of the prestigious Georgian National Prize in both 2020 and 2022.

Deeply committed to creating science that serves humanity, Professor Sadunishvili's work aligns seamlessly with global sustainability efforts, directly advancing United Nations Sustainable Development Goals 2, 3, 8, and 9. Her leadership extends to regional advocacy as a member of the AASSA-WISE Committee for the 2021-2024 term. Her dedication to the SDGs is vividly illustrated by her supervision of a female PhD candidate in a joint international agriculture project, which resulted in an innovative biotechnology for producing probiotic apple juice. This breakthrough not only introduced a novel functional food concept to the local market but also directly contributed to food security, public health, sustainable industry, and economic development.

A cornerstone of Professor Sadunishvili's legacy is her unwavering commitment to advancing women in STEM through structured, hands-on mentorship. Throughout her career, she has nurtured numerous female undergraduate, graduate, and doctoral students, guiding them through research design, laboratory management, scientific writing, and international networking. By actively promoting inclusive research environments and encouraging women to take on leadership roles within laboratory and project settings, her mentorship has measurably increased women's participation, retention, and leadership in the sciences.

AUSTRALIA

Prof. Em. Frances Separovic

AUSTRALIAN ACADEMY OF SCIENCE

TERM 2025-2027, CHAIR

Distinguished Professor Emeritus Frances Separovic AO FAA is a trailblazing biophysical chemist whose work bridges the gap between rigorous scientific inquiry and passionate advocacy for gender equity. Based at the Bio21 Institute at the University of Melbourne, she also serves as the Foreign Secretary of the Australian Academy of Science. In her scientific endeavors, Professor Separovic focuses on the behavior of molecules within biological membranes, with a specific emphasis on understanding peptide antibiotics and toxins. By translating complex biophysical interactions into accessible knowledge, her research lays the groundwork for critical advancements in the scientific community.

Her academic journey is marked by historic milestones and exceptional leadership. After earning her BA from Macquarie University in 1986 and her PhD from the University of New South Wales in 1993, she joined the University of Melbourne in 1996. There, she broke significant barriers, becoming the university's first woman professor of chemistry in 2005 and later serving as Head of School in 2010. Her pioneering spirit continued when she became the first female chemist elected to the Australian Academy of Science in 2012. Recognized globally for her expertise, she has held prestigious leadership roles, including serving as President of the Biophysical Society and President of the Australian New Zealand Society for Magnetic Resonance.

Beyond her laboratory, Professor Separovic is a steadfast champion for advancing gender equality within the sciences. Serving on the AASSA-WISE Committee for the 2025-2027 term, as well as on the Executive Board of the Association of Academies and Societies of Sciences in Asia (AASSA), she actively promotes gender equity across the region. She consistently leverages her senior roles in professional organizations, such as the InterAcademy Partnership Advisory Committee and the International Union of Pure & Applied Chemistry, to advocate for women in STEM. Through these platforms, she ensures that women's voices and contributions are integral to shaping the global scientific agenda.

Professor Separovic's legacy is defined not only by her scientific discoveries but also by her dedication to empowering the next generation of female scientists. Her profound impact has been recognized with numerous accolades, including the RACI Margaret Sheil Leadership Award in 2019 and an induction into the Victorian Honour Roll of Women in 2018. Most notably, she was appointed an Officer of the Order of Australia in 2019 for her distinguished service to science education, particularly to biophysical chemistry, and to young women scientists. Through her enduring commitment, Professor Separovic continues to inspire and pave the way for future women leaders in STEM.

MONGOLIA

Dr. Ariunaa Shajinbat

MONGOLIAN ACADEMY OF SCIENCES

TERM 2025-2027

Dr. Ariunaa Shajinbat is a dedicated educational researcher based in Mongolia whose work deeply influences pedagogical philosophy and the integration of technology and design within modern education. Affiliated with the Institute of Education and Training in Mongolia, her specialized expertise bridges transformative education principles with the preservation of cultural heritage. By analyzing the intersections of education, comparative art, and design methodologies, she translates complex pedagogical theories into actionable strategies for national curriculum development.

Her scholarly contributions focus extensively on the modernization and structural improvement of teacher training programs. Notably, Dr. Shajinbat has conducted critical research on the implementation of the CDIO (Conceive-Design-Implement-Operate) approach within design technology teacher programs, specifically analyzing the opportunities to effectively embed advanced design principles into core course content. Her commitment to advancing Mongolian educational discourse on a global stage was prominently highlighted when she presented on the "Shifts in the philosophy of Mongolian education and its alignment with transformative education principles" at the 2024 Mongolia Update, an international academic event hosted by the Australian National University. Furthermore, she actively publishes on the cultural intersections of education, authoring research on the innovation of traditional birch bark handicraft skills and the aesthetic transformation mechanisms of ethnic minority art.

Deeply aligned with the Sustainable Development Goals—most prominently SDG 4 (Quality Education)—Dr. Shajinbat's work is a vital catalyst for capacity-building within Mongolia's educational sector. While her expertise is rooted in pedagogy and educational philosophy, her focus on design technology and the implementation of the CDIO framework directly supports the structural development of robust innovation and STEM education pipelines. By focusing on curriculum reform and equipping future educators with advanced design-thinking principles, her enduring legacy lies in ensuring that the next generation of students receives a high-quality, transformative education that respects cultural heritage while thoroughly preparing them to tackle contemporary global challenges.

KOREA

Dr. So Young Sohn

THE KOREAN ACADEMY OF SCIENCE AND TECHNOLOGY

TERMS 2025-2027, 2022-2024

Dr. So Young Sohn is a preeminent industrial engineering scholar in Korea whose career beautifully synthesizes rigorous research leadership with a profound commitment to sustainable development and STEM capacity-building. Serving as a Distinguished University Professor Emeritus at Yonsei University, her expertise encompasses spatial big data, patent analytics, technology credit scoring, and sustainability analytics. By translating complex data sets into actionable policy, her innovative work directly underpins Korea's national technology rating and guarantee ecosystem, driving real-world industry innovation and sustainable solutions.

Her extensive academic foundation began with a BS in Mathematics from Yonsei University in 1981, followed by an MS in Industrial Engineering from KAIST in 1983. Broadening her global perspective, she earned an MSc in Management Science from Imperial College London in 1986 as a UK Foreign & Commonwealth Office Scholar, and subsequently completed her Ph.D. in Industrial Engineering at the University of Pittsburgh in 1989. Her exceptional trajectory is marked by sustained global collaboration and knowledge transfer, having served as a visiting scholar at prestigious institutions such as the National Institute of Standards and Technology, Imperial College London, the University of Cambridge, and the Harvard Kennedy School's Center for International Development. Her pioneering contributions have been recognized with numerous accolades, including the 1990 ASA/NSF/BLS Research Associateship, the 2002 LG Yonam Fellowship, a 2003 Chevening Scholarship, and an invitation as a keynote speaker at the 2019 Chinese Congress on AI.

Deeply aligned with global sustainability initiatives, Dr. Sohn's service actively advances several Sustainable Development Goals, particularly SDG 4 (Quality Education), SDG 5 (Gender Equality), SDG 9 (Industry/Innovation), SDG 11 (Sustainable Cities), and SDG 13 (Climate Action). She has played a pivotal role in strengthening the STEM pipeline through education and robust institutional leadership, holding positions such as the Executive Director of the Yonsei University Press from 2016 to 2019 and serving as an Associate Editor for the journal Scientometrics. Breaking monumental barriers in her field, she holds the distinct honor of being the only female Fellow within the Engineering division of the Korean Academy of Science and Technology (KAST).

Dr. Sohn's enduring legacy is characterized by her unwavering dedication to advancing women in STEM through both highly visible representation and hands-on mentorship. Honored as an "Outstanding Women in Science & Technology" awardee by Korea's Ministry of Science and Technology in 2007, she has continually leveraged her platform to support the next generation. From serving as a WISE mentoring fellow between 2006 and 2008 to her longstanding tenure as a transformative "Contribution Professor" at Yonsei University, she actively nurtures inclusive academic environments. Through her pioneering analytics research and dedicated advocacy, Dr. Sohn continues to inspire young female engineers to tackle the world's most pressing challenges.

INDONESIA

Prof. Dr. Anny Sulaswatty

INDONESIAN ACADEMY OF SCIENCES

TERM 2022-2024

Prof. Dr. Anny Sulaswatty is a preeminent Indonesian chemical engineer whose research pioneers the sustainable processing of natural resources. Serving as a Senior Researcher at the Research Center for Chemistry within the Indonesian Institute of Sciences (LIPI), her highly specialized work focuses on chemical engineering, process technology, and technology assessment. By advancing non-conventional extraction methods—such as supercritical CO2 extraction and vacuum fractionation—she transforms the way Indonesia's rich agricultural commodities, like nutmeg, citronella, cardamom, and ginger, are processed. Her ability to bridge rigorous chemical engineering with practical technology assessment directly supports the modernization and commercialization of local agro-industries.

Her robust academic foundation was built through international and national training, having earned her Master's degree from the Tokyo University of Agriculture and Technology and her Doctoral degree from Bogor Agricultural University. Throughout her distinguished career, she has held key strategic positions, including working with the Indonesian Ministry of Research and Technology and serving as the Coordinator of a working group for a food development research project under the Ministry of Research, Technology and Higher Education. Recognized for her prolific scientific output, she achieved the prestigious title of Research Professor in Chemical Technology in 2019. Her highly cited publications and books on Indonesian essential oils, such as her work on citronella and its derivative products, serve as essential guides for both the scientific community and the national industrial sector.

Deeply aligned with the Sustainable Development Goals, Prof. Sulaswatty's work is a powerful driver for sustainable agro-industry and responsible consumption. By optimizing the use of agricultural by-products—such as converting cardamom waste and seed residues into biochar and liquid smoke through pyrolysis—she champions circular economy principles and environmental pollution reduction. Furthermore, she is a dedicated advocate for gender equality in the sciences. As an active member of the AASSA-WISE Committee representing the Indonesian Academy of Sciences (AIPI), she leverages her regional platform to promote the visibility, participation, and leadership of women in STEM across Asia.

Prof. Sulaswatty's enduring legacy is defined by her commitment to transforming fundamental research into tangible, sustainable economic growth. By conducting life cycle assessments and exploring eco-labeling to improve the competitiveness of Indonesian food and agricultural products, she ensures that technological advancements benefit both the environment and local communities. As a prominent female leader in chemical engineering and an active voice in the Indonesian Academy of Sciences, she serves as a highly visible role model. Through her sustained dedication to research commercialization and sustainable manufacturing, she continues to inspire young women to harness the power of science to tackle real-world industrial and environmental challenges.

THAILAND

Prof. Supawan Tantayanon

THE SCIENCE SOCIETY OF THAILAND
UNDER THE PATRONAGE
OF HIS MAJESTY THE KING

TERM 2025-2027, EX-OFFICIO
TERM 2022-2024, CHAIR

Professor Supawan Tantayanon is a globally distinguished chemist and a visionary leader in science education and chemical safety. Serving as a Professor of Chemistry at Chulalongkorn University in Thailand, she has also held preeminent national leadership roles as the Former President of both the Science Society of Thailand (SST) and the Chemical Society of Thailand (CST). Her work extends far beyond the laboratory, emphasizing chemical safety, responsible science, and peace-oriented education worldwide. As the current Chair of the Advisory Board on Education and Outreach for the OPCW, she translates chemical expertise into critical global policies that protect and educate societies.

Her foundational academic journey began with a B.Sc. in Chemistry with Honors from Chulalongkorn University in 1973, followed by an M.Sc. from Mahidol University in 1975, and a Ph.D. in Chemistry from the Worcester Polytechnic Institute in 1982. She further specialized with a Diploma in Polymer Science from Ferrara University in Italy in 1989. Demonstrating extraordinary scientific leadership, she has served as President of the Polymer Society of Thailand, the Council of Science and Technology Professionals, the Pacific Polymer Federation, and the Federation of Asian Chemical Societies. Her transformative impact on the field has been honored with the International Microscale Chemistry Award in 2015, the IUPAC Distinguished Women in Chemistry Award in 2021, and three separate Distinguished Contributions to Chemical Education Awards from the CST, FACS, and IUPAC. Nationally, she was recognized as the Outstanding Senior Scientist in 2022 and received the Outstanding Teacher of Thailand for Social Services Award in 2023.

Strongly aligned with the Sustainable Development Goals concerning quality education and gender equality, Professor Tantayanon is a driving force for women in STEM across Asia. As the former Chair of the AASSA-WISE Committee, she established vital platforms—including the WISE Symposium, the WISE Webinar Series, and the YHK Awards—that empower women scientists to showcase their research, expand professional networks, and cultivate leadership skills. Furthermore, through the Chemical Society of Thailand, she initiated a monumental capacity-building project focused on teaching chemistry with hands-on, small-scale experiments. Supported by Bangkok Bank and Dow Thailand, this ongoing program has empowered thousands of teachers across more than ten countries. By strengthening their pedagogical expertise, participants have become influential educators and role models who directly inspire girls to pursue STEM pathways.

Professor Tantayanon's enduring legacy is rooted in her systemic approach to building lasting structures that advance gender equity. Internationally, she actively shapes the global landscape through her involvement in the IUPAC Global Women's Breakfast initiative and the Committee on Ethics, Diversity, Equity, and Inclusion. She also notably served on the task force for the collaborative book Towards Gender Equality in Scientific Organizations, which was launched in February 2026. Beyond her structural advocacy, she remains deeply committed to the individual mentorship of numerous female students and early-career researchers, successfully guiding them into dynamic careers as scientists, educators, and leaders. Through her unwavering dedication, she ensures women have full and equitable participation in shaping the very future of science.

UZBEKISTAN

Dr. Shakhlo Turdikulova

ACADEMY OF SCIENCES OF THE REPUBLIC OF UZBEKISTAN

TERM 2025-2027

Dr. Shakhlo Turdikulova is a distinguished biologist and an influential architect of science policy in Uzbekistan. Currently serving as the Vice President of the Academy of Sciences of Uzbekistan, she also holds the prestigious distinction of being a member of the World Academy of Sciences (TWAS). Her deeply specialized scientific expertise lies in molecular biology, biotechnology, and human genetics. By working closely with physicians in the field of genetic diagnostics, she translates fundamental biological research into critical clinical applications, ensuring that her scientific endeavors directly benefit patient health and societal well-being. Her extensive leadership extends to the highest levels of national policy, having previously served as the Deputy Minister of Higher Education, Science and Innovation.

Dr. Turdikulova's rigorous academic foundation is defined by her relentless pursuit of excellence and global collaboration. She holds a Doctor of Biological Sciences and significantly broadened her international expertise by completing a doctoral program at the University of California, Los Angeles (UCLA). Working in one of the United States' top laboratories allowed her to master a vast array of advanced molecular methods, which she subsequently brought back to implement in Uzbekistan. Demonstrating extraordinary institutional leadership, she built the Center for Advanced Technologies under the Ministry of Innovation Development from scratch. Serving as its Director, she personally drafted laboratory plans, procured state-of-the-art equipment, and navigated complex logistical challenges to cultivate a vibrant, young, and ambitious team of researchers.

Deeply aligned with the Sustainable Development Goals—particularly SDG 3 (Good Health and Well-being), SDG 4 (Quality Education), and SDG 5 (Gender Equality)—Dr. Turdikulova is a fierce advocate for women in STEM. Operating at the vital intersection of health science and national policy, she leverages her international partnerships to create tangible opportunities for young women. Notably, during a strategic visit to Qatar, she successfully negotiated preliminary agreements with the Qatar Development Fund to secure grants specifically designed to cover the training costs for female students studying STEM in Uzbekistan. She also actively participates in high-profile platforms, such as the UN's "Science Heroes" event for the International Day of Women and Girls in Science, where her insights reinforce the critical necessity of supporting female scientists.

Her enduring legacy is rooted in her inspirational life principle: to "aim at the moon and find yourself among the stars". Acknowledging that women in science globally often have to work twice as hard to climb the career ladder, she views her leadership positions not as an endpoint, but as a broader opportunity to contribute to her country's development. Through her transformative journey from a dedicated molecular biologist to a visionary national leader, Dr. Turdikulova stands as a highly visible role model, empowering the next generation of young women in Uzbekistan to remove mountains, harness the power of biotechnology, and shape a more equitable, sustainable future.

RUSSIA

Dr. Natalia Varlamova

FAR EASTERN BRANCH OF THE RUSSIAN ACADEMY OF SCIENCES

TERM 2025-2027

Far Eastern Branch of the Russian Academy of Sciences Dr. Natalia Varlamova is a dedicated geomechanics researcher and educator working to advance the sustainable development of Earth's resources in Russia. Serving as a Senior Researcher at the Mining Institute of the Far Eastern Branch of the Russian Academy of Sciences since 2018, her highly specialized work focuses on the development of high-temperature geothermal fields. By applying mathematical modeling methods to complex thermophysical processes, she studies the precise mechanisms that ensure the stable operation of production wells in steam-lift mode. Through her development of a set of mathematical models for calculating steam-water flows in both production wells and surface pipelines, she translates rigorous physics into practical, real-world solutions for the energy and mining sectors.

Her strong foundation in engineering and earth sciences began at the Far Eastern State Transport University's Institute of Transport Construction, where she earned her degree as an Engineer specializing in hydraulics and water supply in 2014. She subsequently expanded her expertise at the Khabarovsk Federal Research Center of the Far Eastern Branch of the Russian Academy of Sciences, becoming a Researcher and Teacher-researcher in the geology, exploration, and development of mineral resources in 2020. In 2023, she achieved her PhD of Technical Sciences, specializing in geomechanics, rock destruction, mine aerogasdynamics, and mining thermophysics. Her research excellence has been notably recognized in Khabarovsk's regional competitions for young scientists in the field of Earth and agricultural sciences, where she earned a Diploma for third place in 2021 and subsequently secured the first-place Diploma in 2023.

Deeply aligned with global goals for quality education and sustainable resource management, Dr. Varlamova is an active voice for the scientific community. She brings her expertise to regional advocacy as a member of the AASSA-WISE Committee, with her membership period beginning in 2025. Her commitment to systemic growth is further demonstrated by her leadership role as the chair of the Council of Young Scientists of the Khabarovsk Federal Research Center of the Far Eastern Branch of the Russian Academy of Sciences. In this capacity, she actively shapes the future of the scientific workforce, ensuring that emerging scholars have the support necessary to thrive in highly technical fields.

Beyond her technical research, Dr. Varlamova's legacy is firmly rooted in education and broad science communication. Since 2014, she has seamlessly combined her primary research work with teaching, serving as an associate professor in the Department of Bridges, Tunnels, and Underground Structures at the Far Eastern State Transport University. She is intensely passionate about inspiring the next generation, developing tailored curricula and plans in mining sciences for schoolchildren while teaching supplementary education. A highly visible advocate for STEM, she relentlessly works to popularize science by appearing on television and radio, participating in All-Russian Congresses of Young Scientists, and organizing popular science festivals, round tables, seminars, and scientific and practical conferences.

CHINA

Dr. Linxiu Zhang

CHINESE ACADEMY OF SCIENCES

TERM 2021-2024

Linxiu Zhang is a globally recognized agricultural economist and a trailblazing leader in international environmental strategy. Based in Beijing, China, she serves as a senior staff member at the United Nations Environment Programme (UNEP) and the Director of the UNEP-International Ecosystem Management Partnership (UNEP-IEMP). In this paramount leadership role, she spearheads the implementation of a UNEP flagship programme specifically focused on the critical nexus of climate change, ecosystem services, and sustainable livelihoods (CEL). By strategically leveraging South-South cooperation, her work seamlessly translates complex agricultural and economic data into actionable, cross-border environmental policies that uplift vulnerable communities.

Her rigorous academic and professional foundation is deeply rooted in her extensive work with the Chinese Academy of Sciences (CAS). She previously served as the Director and Deputy Director of the Center for Chinese Agricultural Policy at CAS. Today, she continues to shape academic excellence as an Adjunct Professor at the University of Chinese Academy of Sciences (UCAS) and as an affiliated Senior Research Fellow with the CAS Institute of Geographic Sciences and Natural Resources Research. Her vital research focuses on policy-relevant studies concerning rural development, particularly poverty alleviation, climate change adaptation, biodiversity conservation, ecosystem management, and gender. Her profound scientific excellence has been honored with numerous prestigious accolades, including the TWAS Social Science Award, the Fudan Management Science Award, and the Outstanding Young Scientist Award from the National Natural Science Foundation of China. Furthermore, she is a distinguished Fellow of The World Academy of Sciences (TWAS).

Deeply aligned with the Sustainable Development Goals, Dr. Zhang's pioneering initiatives directly advance global efforts toward poverty alleviation (SDG 1), gender equality (SDG 5), climate action (SDG 13), and life on land (SDG 15). By explicitly integrating gender perspectives into her research on climate and ecosystems, she actively ensures that women's roles and vulnerabilities are prioritized in international sustainable development frameworks. Through her strategic use of South-South cooperation, she fosters essential collaborative infrastructures that empower developing nations to share knowledge, build resilience, and tackle interconnected environmental and socio-economic challenges together.

Dr. Zhang's enduring legacy is defined by her exceptional ability to bridge the critical gap between empirical research and actionable global policy. By consistently placing inclusive, sustainable livelihoods at the center of ecosystem management, she redefines how international organizations approach rural development and climate adaptation. As a highly visible female leader operating at the highest levels of the United Nations and the Chinese Academy of Sciences, she stands as a powerful role model, inspiring the next generation of women in STEM and economics to leverage their expertise for profound global impact.

Chapter 9

AASSA WISE Activities (2020-2025)

AASSA WISE Activities (2020-2025)

YUKARI ITO

We had several online meetings and discussed several topics. Main topics are organization of WISE symposiums, selection of recipients of Prof. Yoo Hang Kim Young Women Scientists Award. We are also planning webinar series of scientific talks in member countries of AASSA.

There were three WISE symposiums in 2022, 2024 and 2025.

1st WISE Symposium

(1) Title of the meeting: AASSA-WISE Symposium on Food System Transportation and SDGs & 48th International Congress on Science, Technology and Technology-based Innovation (STT48)
(2) **Dates:** November 29–30, 2022 (2 days)
(3) **Venue:** Nakhon Si Thammarat, Thailand
(4) **Organizes:** Supawan Tantayanon, Azra Khanum, Aura C. Matias, Yukari Ito
(5) **Participation (Partially Hybrid Format)**
(6) **Schedule and Main Agenda**

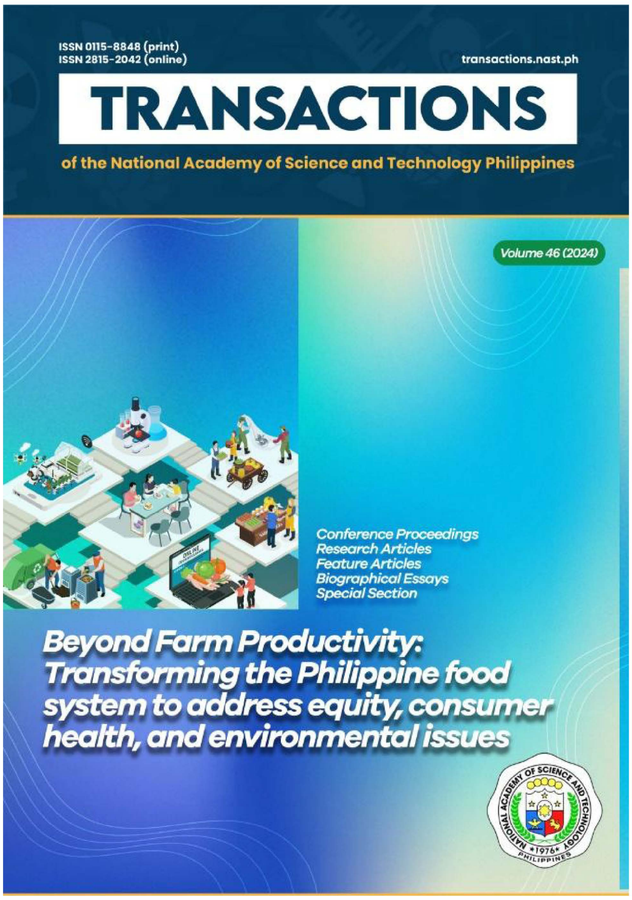
November 29, 2022, WISE Committee Meeting and STT48 (Oral presentation of research results)
November 30, 2022, WISE Symposium: Lectures and discussions on food-related issues

Lectures were delivered on food system issues in various countries and on recent environmental challenges. This was followed by a panel discussion among participants. It was reaffirmed that mathematics—particularly through statistics and AI—can contribute to addressing food-related challenges, and that a wide range of scientific and technological fields have significant potential to contribute to sustainable solutions.

Picture from WISE Committee

Picture from WISE Symposium

2nd WISE Symposium



(1) Title of the meeting: The 2nd AASSA-WISE International Symposium on Diversity, Equity, and Inclusion in STEM: Food Systems Transformation and the Sustainable Development Goals (SDGs)
(2) **Dates**: March 6-9, 2024
(3) **Venue**: The Manila Hotel, Manila, Philippines
(4) **Organization**
The National Academy of Science and Technology, Philippines (NAST PHL) - Department of Science and Technology (DOST) in collaboration with the Association of Academies and Societies of Sciences in Asia - Women in Science and Engineering (AASSA-WISE)
(5) **Organizers**: The organizing committee from NAST are the NAST Gender and Development Committee namely, Academician Aura Matias, Academician Agnes Rola, Academician Edward Wang, Academician Roel Suralta, Academician Maribel Nonato, and Academician Arvin Diesmos.
(6) The rationale of the symposium includes:

1. Conduct of an activity in line with the vision of NAST's GAD program to promote women empowerment and pursue equal opportunities for women, men, and all genders in all its activities and policy recommendations, propelled by Science, Technology and Innovation (ST&I);
2. Sharing of experiences of women's work towards the SDGs; and
3. Showcase women scientists and engineers.

(7) The papers based on the reports in the symposium were published in **Volume 46 (2024) of the Transactions of the National Academy of Science and Technology Philippines (Transactions NAST PHL)** https://transactions.nast.ph/?p=3727

(Starting from the left first row) Academician Roel Suralta, Academician Agnes Rola, Prof. Suchana Chavanich, Prof. Azra Khanum, Prof. Supawan Tantayanon, Prof. Nadira Karunaweera, Prof. Yukari Ito, National Scientist Lourdes Cruz, Academician Evelyn Mae Tecson-Mendoza, Academician Edward Wang (Starting from the left second row) Academician Aura Matias, Prof. So Young Sohn, Architect Jun Hada, DOST Secretary Renato Solidum Jr., PCW OIC Atty. Khay Ann Magundayao-Borlado, Ms. Luningning Samarita-Domingo, Academician Jaime Montoya during the official photo opportunity.

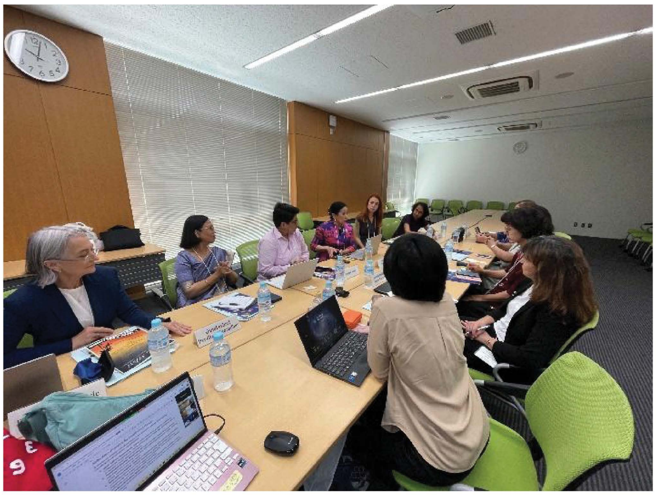
(Starting from the left) Architect Jun Hada (Nepal), Prof. So Young Sohn (Korea), Academician Aura Matias (Philippines), Prof. Nadira Karunaweera (Sri Lanka), Prof. Yukari Ito (Japan), Prof. Suchana Chavanich (Thailand), Prof. Supawan Tantayanon (Thailand), and Prof. Azra Khanum (Pakistan)

3rd WISE Symposium

(1) **Title of the meeting:** Conference "Women in STEM"- The 3rd AASSA-WISE-SCJ Symposium
(2) August 4-6, 2025
(3) **Venue:** Kavli Institute for the Physics and Mathematics of the Universe, The University of Tokyo, Japan.
(4) **Organization**: This conference was supported by Science Council of Japan, The Association of Academies and Societies of Sciences in Asia and Kavli Institute for the Physics and Mathematics of the Universe, The University of Tokyo.
(5) **Conference webpage:** https://indico.ipmu.jp/event/469/
(6) **Organizers:**
Yukari Ito, Elisa Ferreira and Anamaria Hell (Kavli IPMU)
(7) **Participation:**
The number of registrations: 248 (25 countries) and the onsite participants: 75 (15 countries)
(8) The symposium will provide a forum to discuss initiatives supporting women researchers in the STEM (Science, Technology, Engineering and Mathematics) fields, and to exchange views on the current status of women researchers in STEM across the Asia-Pacific region. In addition, the event will aim to build a lasting network among women researchers and to share mentoring practices and support measures to further promote their active engagement.
(9) **Booklet of the symposium talks** were available on the webpage of AASSA and IAP: https://www.interacademies.org/publication/3rd-aassa-wise-scj-symposium-women-stem
(10) **Schedule**

August 4 (Monday) morning WISE committee at Conference room of Kavli IPMU

(Starting from the left) Architect Jun Hada (Nepal), Prof. So Young Sohn (Korea), Academician Aura Matias (Philippines), Prof. Nadira Karun-aweera (Sri Lanka), Prof. Yukari Ito



August 4 – 6 Conference "Women in STEM" with 15 talks by WISE members and others,

Credit: Kavli IPMU

4th WISE Symposium will be held in Seoul, Korea in May 2026.

Endnotes

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