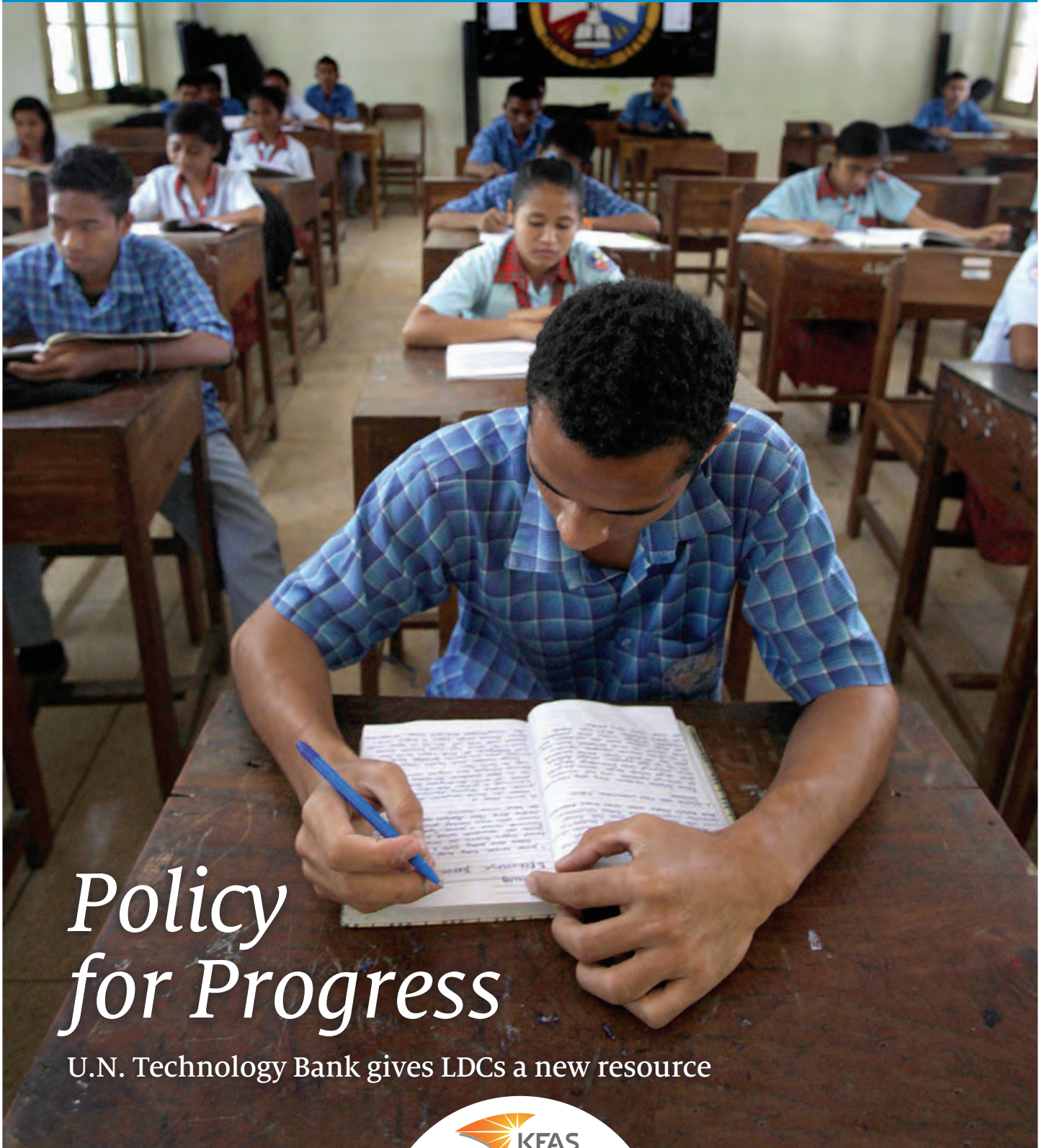




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NEWSLETTER

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Policy for Progress

U.N. Technology Bank gives LDCs a new resource





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▲ Top: In the young small democracy of Timor-Leste, the U.N. Technology Bank is trying to help the country make important advances. Above: Falguni Guharay is designing new plantation systems in Honduras. [Photo provided]

Cover picture: High school students study during their class in Dili, Timor-Leste. [Photo: Asian Development Bank/Flickr/Creative Commons]

▼ TWAS Fellow Klaus Krickeberg says the challenge of how to best organise public health in Vietnam is fundamental to its evolution. [Photo provided]



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EDITORIAL

A PARTNERSHIP FOR SCIENCE IN LDCS



▲ Romain Murenzi,
TWAS Executive Director

For the world's 47 Least Developed Countries, poverty is a trap: To break free, they need expert guidance to help them understand the best tools for their goals, and then they need to invest in technology, education and other knowledge-related resources. But if a country can't afford the investment in the long term, it's much more likely to remain stuck in poverty.

The new United Nations Technology Bank, featured in this issue of the TWAS Newsletter, has remarkable potential for helping Least Developed Countries – LDCs – to break from this trap. Approved by the U.N. General Assembly in 2016, the Bank's work has begun in earnest in recent months. Today countries ranging from Timor-Leste and Bhutan in Asia to Lesotho and Uganda in Africa and to Haiti in the Caribbean are working with the Bank's expert staff and consultants.

The bank will work as a partner to each country, helping them to chart a path to progress. It's not an old-fashioned aid programme. Rather, the Bank can help them to exploit technology and other resources, and to become adept at research and innovation for economic development. It can help them to break the cycle of poverty.

How will they do this? The Technology Bank will provide policy advice, both from developed countries and from other low-income countries that have worked through similar challenges. It will emphasise the importance of recruiting women into science, because LDCs need to utilise all of their intellectual resources. And the Bank will help partner countries to develop science academies and other institutions that can help assure long-term progress.

But there's an underlying story to the U.N. Technology Bank – a story about the critical importance of international partnerships, and about TWAS's work in Global South.

The idea for the Bank emerged at the Fourth United Nations Conference on LDCs in 2011. In 2015, then-U.N. Secretary-General Ban Ki-

moon appointed a panel of high-level experts to consider the mission and function of such an institution. That panel included five members of TWAS and leaders of associated organisations, including TWAS Fellow Fang Xin [China], who then served as president of the Organization for Women in Science for the Developing World [OWSD], and TWAS Treasurer Mohamed Hassan of Sudan, then co-chair of the InterAcademy Partnership [IAP], the global network of science academies. [I chaired the panel.]

We delivered our recommendation to the Secretary-General in 2015, and the next year the U.N. General Assembly brought the bank to life.

Prof. Hassan has been appointed to chair the Bank's Governing Council, and at the start of 2019 he also began a four-year term as president of TWAS. He has made clear that our Academy, a programme unit of UNESCO, welcomes the opportunity to work in cooperation with the Bank and its team.

Meanwhile, current U.N. Secretary-General António Guterres has expressed strong support for the Bank and its work.

From TWAS's earliest years, Founder Abdus Salam worked to build institutions that could support science in the developing world. Prof. Hassan has lengthy experience in building international networks, and that work will continue during his presidency.

Clearly this is a natural and timely partnership: It brings together OWSD, IAP, TWAS, UNESCO and the U.N. in support of the Bank's strong team. Together, we are committed to a mission that will help LDCs, and all countries, achieve the 17 Sustainable Development Goals.

Romain Murenzi, TWAS Executive Director

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IN THE NEWS

Cholera spreads across Yemen

Yemen is seeing a sharp spike in the number of suspected cholera cases this year, with 1,000 children a day.

More than 120,000 cases have been reported, with 234 deaths in the country, which has been at war for four years this month. Almost a third of the 124,493 cases documented between 1 January and 22 March were children under fifteen. Increasing rates of malnutrition among Yemen's children have left them more prone to contracting and dying from the disease.

The Guardian:

www.bit.do/CholeraYemen

Controversy arises over Myanmar dams

Myanmar media has become focused on China's apparent efforts to revive the stalled Myitsone dam, its role in advising the Myanmar government on developing a new hydropower strategy, and the implications of these developments for the adoption of the World Bank-led strategic environmental assessment of Myanmar's hydropower sector.

The debate revolves around the assumption that the country must choose between a strategy for large hydropower development supported by Western donors and the World Bank or one supported by China.

The Third Pole:

www.bit.do/MyanmarRivers

Drug-resistant TB tests needed

Rapid diagnosis of drug-resistant tuberculosis is urgently needed to improve treatment outcomes in low- and middle-income countries, a study says.

Tuberculosis that no longer responds to treatment with first- and second-line medicines — drug-resistant TB — is a serious threat to achieving the Sustainable Development

Goal of ending the disease by 2030 because of inadequate access to laboratory tests and appropriate treatment in many countries with high tuberculosis burden, according to the WHO.

SciDev.Net:

www.bit.do/TBTests

Melting Himalayan glaciers puts 2 billion at risk

A new report warns that even if global warming is held at 1.5 °C, a third of the glaciers in the Hindu Kush-Himalaya (HKH) region will still be lost. The report raises questions about the rivers that flow down these mountains, and the people who depend on them.

The HKH region is home to the tallest mountains on Earth, and also to the source of rivers that sustain close to 2 billion people. These rivers supply agriculture with water and with sediments that fertilise soils in valleys and the floodplain.

Quartz India:

www.bit.do/HimalayanMelt



Bat species may be source of Ebola epidemic

The huge Ebola epidemic that struck West Africa between 2013 and 2016 took the world by surprise, because the virus had never been found in the region.

Now, scientists may have an answer, because they caught a bat that was likely infected with Ebola Zaire near the mouth of an abandoned mineshaft in Liberia. The researchers didn't isolate the virus itself but found about one-fifth of its genome in the animal; it's too early to tell whether it's exactly the same strain as the one that ravaged the region.

Science Magazine:

www.bit.do/EbolaBat



U.N. TECHNOLOGY BANK


A WAY FORWARD FOR LDACS



Growers in Lisadila, Timor-Leste, grow chilis, which also serve as a source of income. [Photo: Dean Sewell/WaterAid/Flickr/Creative Commons]



The new U.N. Technology Bank is taking important steps to help Least-Developed Countries catch up with the digital revolution – and it's getting started with Timor-Leste.

 by Sean Treacy

Timor-Leste is unique in the global community. It is a small, young, island country that endured centuries of colonization and then decades of further occupation and conflict until 1999. Now, it stands out in the world, because despite all its troubles it has managed to establish a stable, democratic government.

Yet because of its tumultuous history, Timor-Leste remains poor in technological resources. As it stands, only about 0.1% of the population has broadband access through computers – less than 10,000 people. This scarcity holds back progress in other areas ranging from agriculture to education. And resolving this technological gap is where the new United Nations Technology Bank can help.

Worldwide, in countries like Timor-Leste, roughly a billion people have been left behind by the information age. The 47 UN-designated Least-Developed Countries, or LDCs, are among the most severely affected. To help them build the technological foundation needed to prosper, the United Nations established the U.N. Technology Bank for Least-Developed Countries (UNTB).

Weak levels of technological development lead to a lack of digital connectivity throughout these countries, which has an impact in areas such as food production, health care, education and energy. The Technology Bank's goal is to help LDCs harness newly available technologies so that these countries can produce scientific research and inspire innovation at home. To do this, the bank offers a way to access and build on the tools of the information age, said Joshua Setipa, the bank's managing director.

"Least-Developed Countries have fallen through the cracks," Setipa explained. "And there's real danger for them unless a deliberate

effort is made to address their structural challenges to fully exploiting technology."

The bank's work includes policy advice, connecting LDCs to experts in countries that have overcome similar struggles, promoting women in science, building science academies and providing training on digital resources for scientists. TWAS is currently participating in discussions with the bank about potential collaborative projects to help on many of these fronts.

"Some of these communities live in such challenging locations that it is not possible to be reached by a fibre-optic network," said Setipa. "So what opportunities do we have today using technology to address that? We have made significant progress in wireless technology and satellite technology. Do they have to lay fibre-optic cable or can they leapfrog that to wireless solutions? These are the questions we investigate."

The global endorsement of the 2030 Sustainable Development Agenda, with a commitment that nobody is going to be left behind, makes the work of organizations like the Technology Bank that much more critical. The Technology Bank began its work in December 2018, and is already holding policy workshops and building important connections. Current U.N. Secretary-General António Guterres visited the bank in person in October 2019 to affirm his support for the bank and its role.

"I am extremely proud to see the work that colleagues have done here," Guterres said. "This Technology Bank was born 11 months ago and is already having a very important role in supporting Least-Developed Countries to have access to new technologies and to be able not to stay behind in the implementation of the Agenda 2030."



A ROADMAP TO TECHNOLOGICAL DEVELOPMENT

The bank was first conceived at the Fourth United Nations Conference on LDCs in 2011, which adopted a programme of action including a call for the establishment of the bank.

The plan emerged from a study by an 11-member high-level panel of experts in 2015. TWAS was deeply involved in the process, and the panel included five TWAS Fellows: Academy Executive Director Romain Murenzi, who chaired the panel; current TWAS President Mohamed H.A. Hassan; Firdausi Qadri of Bangladesh; Fang Xin of China; and Tebello Nyokong of South Africa. The panel's recommendations were then presented to then-U.N. Secretary-General Ban Ki-moon, and the U.N. General Assembly adopted a resolution for the bank's establishment directly under the Assembly in 2016.

Members of the bank's current 13-member Governing Council were appointed by the secretary-general in 2017, with Hassan named the chairman. Also in 2017, the governments of Turkey and Norway agreed to provide its funding.

TWAS, a long-time supporter of scientific development in LDCs, will continue to play a strong role in the bank's work. Hassan believes that it's a key focal point for collaboration.

"I think that TWAS should focus even more on the Least-Developed Countries," Hassan said. "I know that our priority at the moment is S&T-lagging countries, where all of the LDCs are included. But if we have a very specific programme on how to build capacities and how to generate, adapt and commercialise technologies to solve problems in collaboration with the U.N. Technology Bank, that might be a project worth pursuing."

The bank carries out a process in LDCs called a technology needs assessment to identify prioritized gaps for capacity building and technology transfer, said UNTB Programme Management Officer Yesim Baykal. The first assessment was carried out in Timor-Leste. Assessments are also under way in Gambia, Bhutan, Sudan, Haiti and Uganda.

The bank began its assessment in Timor-Leste in 2019 to guide a national workshop to help the country identify its technological needs in communication, computing, infrastructure

and education. The workshop was attended by the nation's ministries, universities, communities and businesses, as well as an expert consultant hired by the bank.

Once the report is finalized, the bank uses their networks in developed countries from Japan to Switzerland to get expertise that will help the LDC make strides. "If there's additional needs for funding, we'll look into that," Baykal said. "If they need training for the researchers in research methods, we will connect them to other institutions in our network."

UNIQUE TIMORESE CHALLENGES

Timor-Leste is a small Portuguese-speaking nation just north of Australia with a population of about 1.3 million. For centuries, it was a colony of Portugal until it was occupied by Indonesia in

“Least-Developed Countries have fallen through the cracks. And there's real danger for them unless a deliberate effort is made to address their structural challenges to fully exploiting technology.”

Joshua Setipa, U.N. Technology Bank



▲ Roberto de Sousa

▼ Joshua Setipa, left, speaks at the U.N. Technology Bank's assessment workshop in Timor-Leste. [Photo provided]





1975 and, after a long conflict that according to Amnesty International cost over 200,000 lives, won independence in 1999. It established a democratic government soon after.

Today, the top priority for Timor-Leste is to bring the nation fully into the digital age, with strong Internet connections and up-to-date computers.

Roberto de Sousa, the executive director of Timor-Leste's Information and Communication Technology (ICT) Agency and a participant in the workshop, said that high-speed Internet is an uncommon luxury in the country. Only about 0.1% of the population has broadband access – less than 10,000 people. Mobile Internet is more common, available to 30-40% of the population, but fixed broadband is key to reliably connecting the general public to needed services.

To resolve this problem, the government is considering buying submarine cable from Australia or Indonesia that will connect it to the world and likely cost approximately US\$30 million. Officials hope the submarine cable project will be done by 2022 and available for service in 2023. They will then need to connect the entire country together using existing terrestrial fibre-optic cables and a Wi-Fi array to

▲ A weaver works on a new design at the Tais market in Dili. Dili is located on the northern coast of Timor-Leste. [Photo: Asian Development Bank/Flickr]

ensure that more remote, mountainous regions of the country have broadband access, too.

"We are the only country left in the region that is not connected to submarine cables," de Sousa said. "We have more work that needs to be done, and our priority is by 2030, relying on fiber optic cables, to have enough high-speed connectivity to make a push for connected government, cloud computing, big data and smart cities."

The Timorese government established the ICT agency in 2017 in an effort to help the nation catch up on all matters related to technology and communication – including electronic services for the public, a standardized government-wide system across departments, and cybersecurity rules. The top priority has to be ICT infrastructure, because so many other developments would follow from it.

▼ Amitav Rath



AN IDEAL PILOT PROGRAMME

How does the Technology Bank work to solve this problem, among others? It hired Amitav Rath, an Indian-born policy consultant and president of Canada-based Policy Research International Inc. to attend the workshop and compose the report.



Rath said Timor-Leste is the ideal pilot test for the bank. The last time there was civil unrest of any serious nature was 14 years ago. Since then, the nation has seen impressive progress, and its young democratic government is facing tremendous challenges that technology would help provide solutions for.

Rath cited a simple but essential insight for the country: The technology Timor-Leste needs to grow and flourish already exists; the country just needs access to it. Just as the World Health Organization helped Timor-Leste achieve 100% vaccination against basic illnesses, the Technology Bank could serve a similar role for technological advancement.

How can Timor-Leste make use of existing technological solutions? “Implementing them means aligning with institutions, training and knowledge about what works in regions where political conflict won’t get in the way,” said Rath.

Rath said he’s recommending that Timorese leadership focus on policy coordination overall and especially as they improve their communications infrastructure and set up their

first council for science and technology. It will be up to Timorese Prime Minister Taur Matan Ruak to keep his departments focused on the goal. Rath said he’ll strongly endorse plans through which the government quickly enacts its priorities, such as expanding the physical infrastructure that could provide broadband to villages. He suggests connecting Timorese officials with similar organizations with experience, in not only its regional neighbours but also smaller countries such as Iceland, since it is also a small island country with a population of a similar size.

Another workshop participant, Jose Cornelio Guterres, is the executive president of Timor-Leste’s National Institute of Science and Technology, a new organization connecting scientists from the nation’s six academic institutes. It aims to train young Timorese scientists on research methods and other useful skills such as scientific writing.

He also said a major priority for the institute is data sovereignty – ensuring that data created and stored in the country is governed



▲ Jose Cornelio Guterres

▼ Participants at the workshop hosted by the U.N. Technology Bank in Timor-Leste. [Photo provided]



▼ A boy pushes a cart on the streets of Dili, Timor-Leste. (Photo: Asian Development Bank/Flickr)

by that country's laws, and available to that country's researchers. The institute wants to create a digital repository to preserve data researched by visiting scientists as property of the country. This way, Timorese researchers and policymakers will be able to take advantage of that data.



“Our political leaders have successfully struggled to fully obtain our territorial sovereignty from our neighbouring countries, but we still fail to struggle for sovereignty of data.”

Jose Cornelio Guterres, executive president of Timor-Leste's National Institute of Science and Technology

“Our political leaders have successfully struggled to fully obtain our territorial sovereignty from our neighbouring countries, but we still fail to struggle for sovereignty of data,” Jose Cornelio Guterres said. “Most foreign researchers, they took away data from our country to their country without leaving any data with us.”

GREATER ACCESS, MORE ACADEMIES

Technology needs assessments are not the only work the UNTB is doing, said Simone Rose,

another programme management officer with the bank.

There is also an initiative to strengthen national academies of science – which provide a useful advisory resource to governments and communicate important scientific information to the public – in LDCs in Africa and Asia.

They have helped organize four regional consultations in Africa – in the north, south, east and west – bringing together representatives of academies, universities and governments.

“We are looking at strengthening the capacity of academies to engage in national discourse, but also looking at countries which do not yet have academies of science and working to establish academies,” Rose said. “Or to establish appropriate mechanisms to ensure the scientific community is organized, because in some cases academies have been tried and failed and aren't the best mechanism for those countries.”

The Technology Bank also raises awareness of a U.N. programme called Research4Life. Through it, over 2,600 researchers have been trained to access useful scientific journals.

“What they have done is negotiate free access to scientific journals for LDCs,” Rose said. “But in many cases these LDCs are unaware of this or don't make use of these materials.”

The bank, in its discussions with organisations such as the African Union, is also committed to supporting women in science to fully realise human potential in LDCs. The bank is also participating in discussions to begin a capacity-building programme in LDCs focused on remote-sensing technology – training people to analyze satellite images. There are also plans to establish four “technology innovation laboratories”, where local innovators can go to develop their ideas, including one in Lesotho.

All these programmes can make important contributions that will address the systemic issues holding back LDCs, said Setipa.

“The world has adopted the 2030 Sustainable Development Agenda, with a commitment that nobody is going to be left behind,” Setipa said. “But the reality is not going to be achieved as long as there is not a deliberate effort to leapfrog the digital divide.”



PLANTING THE SEEDS OF SCIENCE DIPLOMACY

The latest AAAS-TWAS course in science diplomacy worked to train a new cadre of science diplomats to meet future needs.

 by Cristina Serra

Ice is thawing and permafrost is melting across the Arctic region, and nations are exploring how to tap the new sources of natural resources such as gas and oil reservoirs. But the changes are disrupting the life and culture of indigenous communities throughout the polar region. Long considered distant and desolate, the Arctic suddenly seems like a geopolitical flashpoint, and the local communities are at risk.

The Arctic is just one of many examples where the future of a population and of a region needs attention at various levels by scientists, diplomats and policymakers. But there is a problem: scientists, diplomats and policymakers often come from different cultures and speak different languages.

At a course organised by the American Association for the Advancement of Science (AAAS) and TWAS, participants were trained in how to organize their own courses and educate future science diplomats in their home countries.

“I have some knowledge in science diplomacy, as my office works on science advice capacity building,” explained Oscar Reyes of El Salvador, a science officer for the International Science Council Regional Office for Latin America and the Caribbean. “But I still have a long way to go. So when I heard about this course I thought I should be here. I want to learn the best way to organize an online course on scientific advice. I want to be the go-to person.”

▼ Group discussions at the workshop.
[Photo: Paola Di Bella]





“ Science diplomacy works when there are practitioners of it – people who understand the value of international relations, foreign policy, and the scientific process and can apply the combination in their work. ” *Julia MacKenzie, AAAS*

The AAAS-TWAS science diplomacy programme is a globally respected initiative in the field of science diplomacy. Starting with the first course in 2014, the annual courses have hosted more than 350 scientists, diplomats and policy experts from more than 70 nations.

GLOBAL CHALLENGES, LOCAL LEARNING

This year, the “Train the Trainers” course, held from 26-28 August, was designed around a new setup, as a natural evolution of past editions. The focus was on training future science diplomacy ambassadors through hands-on activities. The goal was to offer them strategies and tools so that they could return home and, through courses and activities tailored for their home institutions and countries, forge a future class of science diplomats.

“With the explosive growth of science diplomacy courses we felt we needed to offer

▲ Group discussions at the workshop. (Photo: Paola Di Bella)

▼ From top: Oscar Reyes, El Salvador; Johana Cabrera, Chile (Photo: Paola Di Bella)



a new format,” explained Peter McGrath, the coordinator of science diplomacy/science policy programme. “Hopefully, this new formula will enable participants to develop their own quality course, locally tailored but inspired by global challenges.”

“Science diplomacy works when there are practitioners of it – people who understand the value of international relations, foreign policy, and the scientific process and can apply the combination in their work,” said Julia MacKenzie, senior director of international affairs at AAAS in Washington, D.C.

From the beginning, the AAAS-TWAS programme has received financial support from the Swedish International Development Cooperation Agency [Sida], while the current course also was sponsored by the Golden Family Foundation, which has provided sustained support to AAAS.

Over the years the initiative has brought to Italy illustrious experts, and as its visibility and credibility have increased, the TWAS science diplomacy programmes have grown. One new component is the Horizon 2020 S4D4C project [Using Science for/in Diplomacy for Addressing Global Challenges], aiming to support European science diplomacy. New initiatives with the Indian Department of Science and Technology and the Islamic Development Bank also include science diplomacy.

Thirty participants [52% women] were selected from hundreds of applications demonstrating the growing demand for science diplomacy training around the world. They were from 22 countries in Latin America, Asia, Middle East, Europe and Sub-Saharan Africa.

Many were alumni from previous AAAS-TWAS science diplomacy courses, seeking new collaborations and teaching tools to amplify their impact back in their home countries, institutions and communities. Others came to the course for the first time.

Johana Cabrera is a PhD candidate in psychology at the University of Santiago de Chile, but for nine years she was a Honduran diplomat stationed in Chile. “At that time,” Cabrera said, “I gained access to training in science diplomacy, and had the chance to write articles on science diplomacy, and to launch



actions in this field both in Honduras and Chile. There is great potential with this subject, but more tools are needed.”

The course was valuable because it focused on communication and other ways to make connections across disciplines and cultures, said Kebba Omar Jagne, the founder of Making Our Visions and Aspirations Reality (MOVAAR), an educational technology social enterprise start-up based in The Gambia.

“We often partner as consultants with ministries, policy makers and institutions, training audiences who need interdisciplinary

scientists should know about diplomacy, and diplomats about science. But also in the language that both parties use, the importance of boundary-spanning skills in communication is often ignored. And in laying the foundation of a course that offers work-tools, it is important to consider that a template structure works well, but that adjustments on local needs and culture are equally necessary.

“Organizing a successful course in India, Panama, South Africa or Brazil requires different approaches,” observed Marga Gual Soler, an AAAS Science Diplomacy consultant



skills in communication,” Jagne explained. “Learning how to establish a trustworthy relationship is important for the success of our activity.”

A CRITICAL SKILL: BUILDING TRUST

The course’s simulations and role-playing games were devised by Alastair Hay, an illustrious British toxicologist and long-time science diplomat with the Organisation for the Prohibition of Chemical Weapons (OPCW). The course’s hands-on approach pushed the participants into leadership roles from the very beginning. They practiced collaboration, negotiation, reciprocity and trust-building.

As it turned out, there is a gap to fill in what

who has helped to lead the AAAS-TWAS science diplomacy courses since 2015. “This is why we devised an event where participants would not only reinforce what they know, but also acquire new tools and build best practices by sharing their personal knowledge.”

Science diplomacy courses could be as many as there are challenges at the global level. For example: Because it has a worldwide impact, climate change calls for an approach involving various countries. Other targets, such as U.N. Sustainable Development Goals on transboundary conservation or land use, might be addressed between just a couple of countries.

But what would be the ideal target

▲ Group discussions at the workshop. [Photo: Paola Di Bella]



▲ From left: Kebsa Omar Jagne, Gambia; Marga Gual Soler, AAAS; Wei Liu, China. [Photos: Paola Di Bella]

community for a science diplomacy training event? Young diplomats, early-career scientists, policymakers or science advisors to governments? Again, the proposed targets would vary by issue and by urgency.

PUTTING NEW KNOWLEDGE TO WORK

In the final exercise of the course, participants were asked to form working groups and to devise training courses with various formats: from one-day to five-day intensive courses; courses targeted at university teams or diplomats; even an online course. And during the review session, they were asked to brief colleagues.

“Our group was made of six people from three distant areas of the world,” explained Wei Liu, the director of Division One of the International Cooperation Department at the Chinese Academy of Engineering. “Therefore we devised an intensive full-time course, for a

▼ British toxicologist Alastair Hay has a conversation with Elizabeth Njenga from Kenya. [Photo: Paola Di Bella]

“I came with great expectations, and I am leaving with much satisfaction, as I go home knowing how to proceed and draft a course with good content.”

Elizabeth W. Njenga, vice-chair of the Kenya National Chapter of the Organization for Women in Science for the Developing World [OWSD]

broad audience, aiming at creating awareness on science diplomacy.”

Early-career scientists but also students are also an important target, as they are potential future drivers in global policies. “What’s important is the quality of interaction with students. We need to know clearly what works well and what doesn’t, and what conversations best raises their attention,” added Bill Pan, an associate professor of global environmental health at Duke University in the United States.

“I came with great expectations, and I am leaving with much satisfaction, as I go home knowing how to proceed and draft a course with good content,” said Elizabeth W. Njenga, an associate professor of botany at the University of Eldoret in Kenya and the vice-chair of the Kenya National Chapter of the Organization for Women in Science for the Developing World [OWSD]. “Soon I will speak at an international conference on science diplomacy, and I will be able to tailor my content using the tools I learned here.”


Florencia Paoloni, the science and technology secretary at the Italian-Latin American International Organization [IILA], praised the richness of the educational tools she had received: “I have just attended a similar course targeted at diplomats. That course was theoretical and met an important need: offering educational tools framing what diplomats do every day. The AAAS-TWAS course is much more dynamic: I’m leaving here with a bag full of useful suggestions and ideas, which I’m eager to test in a course I plan to set up soon.”





ISDB, TWAS LAUNCH AMBITIOUS INITIATIVES

New grants and fellowships programmes, tailored for member countries of the Islamic Development Bank, aim to advance research in the fields of sustainability science.

 by Sean Treacy

The Islamic Development Bank (IsDB) and The World Academy of Sciences (TWAS) launched two ambitious new programmes to support researchers from IsDB member countries.

The IsDB-TWAS initiatives represent a major joint commitment to advance scientific research in the IsDB member countries, and especially the bank's Least Developed Member Countries (LDMCs). The focus will be on areas of the sustainability sciences needed to support the achievement of the U.N. Sustainable Development Goals (SDGs).

To achieve these objectives, IsDB has allocated a USD2.4 million technical assistance grant over four years, under which IsDB and TWAS are offering two programmes: One for research grants and one for postdoctoral fellowships.

The main goal is to help IsDB member countries across Asia, Africa, Europe and South America to develop scientific workforces that can support a sustainable future with shared benefits. The grant will also cover a science diplomacy workshop that is slated for later this year.

"IsDB is committed to building research and technological capacity, which we believe is essential for human and economic development of its member countries," said Dr. Hayat Sindi, senior advisor to the president, IsDB for STI.

"Partnering with TWAS will significantly enhance the IsDB's efforts in developing the scientific workforces in its member countries. Science, technology and innovation are

continuously recognized as strategic drivers of economic growth and for achieving the UN's Sustainable Development Goals, so I am extremely confident that, under the joint programme, the IsDB and TWAS will be able to produce a diverse group of scientists and help to build future leaders in LDMCs to champion development in all industrial and productive sectors relevant to "sustainability sciences."

"Our partnership with the Islamic Development Bank represents extraordinary potential to build scientific strength in the Global South," said TWAS Executive Director Romain Murenzi. "We have been active in the IsDB member countries for many years, but the new IsDB-TWAS programmes will improve our prospects for transformative impact in a number of important countries."

The 57 IsDB member countries represent nearly 1.8 billion people, almost a quarter of the world's population.



► From left: TWAS Executive Director Romain Murenzi; and Hayat Sindi, chief adviser to the IsDB president for science, technology and innovation.



“ IsDB is committed to building research and technological capacity, which we believe is essential for human and economic development of its member countries. ” Hayat Sindi

Among IsDB member countries, Saudi Arabia, Egypt, Turkey, Morocco, Iran, Malaysia, Indonesia, Nigeria and others have active and productive scientific sectors. However, of 47 nations globally ranked by the U.N. as Least Developed Countries, 21 are IsDB members countries. Thus, the two new programmes mainly focus on those LDMCs.

IsDB-TWAS Grants for Research Collaboration in Sustainability Sciences will support pairs of research groups that are collaborating on solving a common problem. The two groups must come from different IsDB member countries, and at least one of them must be an LDMC.

The grants, a maximum of USD100,000 each, will enable the collaborating groups to purchase equipment, improve their research facilities and

support travel between their institutions for training. One joint project will be approved each year.

IsDB-TWAS Postdoctoral Fellowships will be awarded to postdoctoral researchers from the 21 IsDB LDMCs. The programme provides three- to six-month postdoctoral fellowships at international centres of excellence in the developing world. Twenty-five fellowships will be awarded each year to researchers up to age 45.

These fellowships and grants programmes are focused on promoting expertise in the fields directly connected to the SDGs, including agriculture; education; climate change; energy; sustainable cities; responsible growth; waste management; population growth; green chemistry; biodiversity; plastic pollution and micro-plastics; and water and hygiene.

The Islamic Development Bank was founded in 1974 with the objective to foster economic development and social progress of member countries and Muslim communities in non-member countries, in accordance with the principles of Islamic Law. IsDB has made significant investments in the fields of science, technology and innovation, and in education as well as infrastructure and other development-related fields.

IsDB and TWAS have been developing these new initiatives since 2017. ◼



OPTIMISM – AND PRAGMATISM – IN NUCLEAR DIPLOMACY

A handful of nuclear-capable nations have prevented the global enforcement of the Comprehensive Nuclear-Test-Ban Treaty. But Lassina Zerbo, head of the Treaty Organisation, remains hopeful.

 by Edward W. Lempinen

It is work that requires both acute scientific knowledge and great diplomatic skill: monitoring the global environment for evidence of nuclear weapons tests, and working to persuade a last few nations to ratify a treaty that would ban such tests.

At a time of geopolitical tension between many of the world's nuclear powers, the work might lend itself to pessimism. But for Lassina Zerbo, the executive secretary of the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO), optimism is essential to the role – optimism, tempered by realism.

"We cannot decide just by words that we want to get nuclear weapons off the planet," Zerbo told an audience in Trieste, Italy, at the annual TWAS Paolo Budinich Science Diplomacy Lecture. "In the context of arms control and non-proliferation and nuclear disarmament, what is the easiest common denominator that we can achieve today, that we can grasp...and create the conditions of trust needed to build a world without nuclear weapons?"

The answer, he said, is the Comprehensive Nuclear-Test-Ban Treaty (CTBT), which would prohibit all nuclear explosions worldwide. In his lecture, and in a filmed interview with TWAS, Zerbo said that the Treaty, though not legally binding, has nonetheless had a powerful impact through its system that monitors the globe for

evidence of nuclear explosions. It is now a topic of global attention, and it plays a more visible role in formal and informal non-proliferation meetings. With the technology and diplomatic framework largely in place, he added, the current obstacles to final entry into force are now only political.

The Treaty was first adopted by the United Nations General Assembly in 1996. Since then, 184 nations have signed it and 168 have ratified it. For final approval, the treaty must be ratified by 44 nations that were included in Treaty negotiations between 1994 and 1996; at the time, all had nuclear power reactors or research reactors. Today, eight of those countries have not given final approval to the Treaty: India, Pakistan and the Democratic People's Republic of Korea (North Korea), all of which have nuclear weapons, have not signed the CTBT; China, Egypt, Iran, Israel and the United States have signed it, but not ratified it.

"So you have 90% to 95% percent of the planet saying 'no' and 'never' to nuclear testing, and only eight states remain to join the overall majority," Zerbo said. "Our job is to build trust and confidence for the others to be comfortable with the signature and ratification of the CTBT."

Zerbo delivered the Budinich Lecture 14 June, 2019, at the Abdus Salam International Centre for Theoretical Physics (ICTP) in Trieste, Italy.

▶ Lassina Zerbo, the executive secretary of the Comprehensive Nuclear-Test-Ban Treaty Organization.



The event was moderated by TWAS Executive Director Romain Murenzi.

SCIENCE AND DIPLOMACY: THE LONG VIEW

In his TWAS lecture, Zerbo described the technological power of the monitoring system. The CTBTO is a core component of the International Monitoring System, a network of 337 facilities in 92 countries with unparalleled sensitivity to evidence of nuclear test explosions through seismological, infrasound and other forms of analysis. Data are shared with all countries that have signed the Treaty.

Over 2,000 nuclear test explosions were conducted globally between 1945 and 1996 – but only ten since 1996. In the 21st century, only North Korea has conducted nuclear test explosions.

About 80% of the CTBTO's USD130 million annual budget goes toward verification and related science. But that's also an investment in diplomacy. For example, he acknowledged that some countries might consider pulling out of the Treaty, but remain because they want access to data from the monitoring system. Not only is the data useful for detecting nuclear explosions, but also for events such as volcanic eruptions, earthquakes, tsunamis and nuclear accidents.

In 2014, then-US Secretary of State John Kerry called the CTBTO's International Monitoring System “one of the great accomplishments of the modern world,” Zerbo recalled. “Kerry said that not because of the science, but because there is hardly a better place than this where science can serve policy and meet the aspirations of diplomacy in a multilateral setting.”


For Zerbo, that reflects a central challenge for science diplomacy: Use all means to maintain dialogue with the eight holdout nations, and

“Our job is to build trust and confidence for the others to be comfortable with the signature and ratification of the CTBT.”  *Lassina Zerbo*

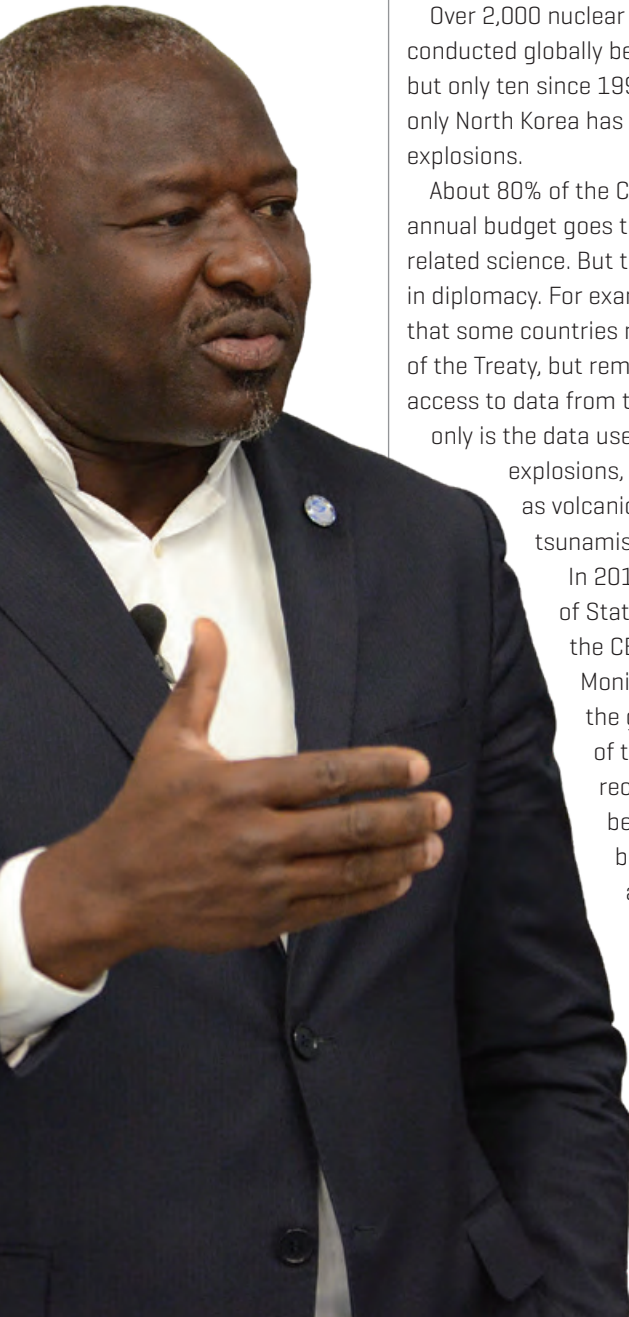
through patient diplomacy encourage them toward final ratification. And in the process, discourage further nuclear testing worldwide.

North Korea has tested six nuclear devices, but as its programme emerged there was a collective international disbelief that the small, isolated country had this capacity, Zerbo explained. Data from the CTBTO's nuclear-test-monitoring system was crucial in proving each successive advance in country's capacity – and in alerting the world to potential risk.

However, it seemed essential for the CTBTO to have channels of communication to North Korea. In advance of a 2016 meeting to mark the 20th anniversary of the Treaty's first signatures, he proposed to invite the North Koreans. Then, before a separate conference in Russia, he proposed to speak informally with North Koreans who would be there. Some advised against it, citing the political risks of news photos that might come from such a meeting.

“I said, ‘Ok, but look: What is our job? Our job is to get them on board. Let's try it!’ So of course I talked to them,” he recalled. “This is the kind of challenge we're dealing with.” 


Watch the filmed interview:
www.bit.do/ZerboFilm





SUSTAINABLE GROWTH THROUGH CHOCOLATE

Growing climate-smart cocoa in Central America favours small farmers and sustainable agriculture, says Nicaraguan TWAS Fellow Falguni Guharay.

 by Cristina Serra

Not all chocolate lovers know that some of the best cocoa in the world comes from Central America. But the commodity is rare and global demand is high: Guatemala, El Salvador, Honduras, Nicaragua and Costa Rica combined produce less than 1% of the world's total harvest.

Now the precious seeds of this tropical tree are in danger across the region. Rising temperatures and intense rainfall due to climate change pose a severe threat to cocoa crops. In addition, highly technological production systems introduced by international companies, consortia and private investors jeopardize smallholders who own as little as 2 or 3 hectares and practice a traditional form of agriculture.

"It's time to create a new strategy that combines knowledge development and cross-learning," said TWAS Fellow Falguni Guharay, a programme manager with Climate Smart Cocoa Central America and Caribbean. The programme was launched by the World Cocoa Foundation [WCF], based in Managua, Nicaragua, and it's funded by the United States Agency for International Development [USAID].

Guharay was elected to TWAS in 2019, and he's the first-ever from Nicaragua. After earning a PhD in zoology in 1982 from the University of Nottingham in the UK, he served as a professor and research director from 1985 to 1990 in the school of plant protection at the National Agricultural University in Nicaragua.

From 1991 to 2004, he worked with the Tropical Agronomic Center for Research and Education in Turrialba, Costa Rica – first as

an associate professor and then as a regional programme leader. Since 2016, Guharay has been working in wide-ranging projects under WCF, acting to protect the future of cocoa – and cocoa farmers – in Central America.

"I've been living in Nicaragua since 1984, but I'm a native of India, and my election to TWAS has been warmly supported by two Indian colleagues who are TWAS Fellows themselves," he explained in a recent interview. "As I am currently the only TWAS Fellow in Nicaragua, it is on me to make the best of this prestigious affiliation and reach out to scientists, private bodies and farmers through meetings, newsletters and personal contacts."

CHANGING SCENARIOS

Cocoa [*Theobroma cacao*] is native to the Amazon Basin but its domestication took place in Central America – in the so-called Central American Biological Corridor. This is a small area but it has gradually turned into a valuable source of the highest-grade cocoa, with agroforestry systems devised in a way that they were respectful of biodiversity.

Unfortunately, a rapidly expanding market is changing this scenario. In an earlier era, cocoa trees grew in the shade of the rainforest canopy surrounded by naturally growing trees. Recently, this old-fashioned system has been overtaken by more aggressive agricultural practices, such as cultivation in the full sun, which involve massive loss of tree cover.

In addition, cocoa has been promoted as a robust crop able to survive a wide range



▲ Falguni Guharay trains field technicians in the Dominican Republic.

of soil and climate conditions. For this reason, it has been planted everywhere, without precise knowledge of the soil and productivity of the plant. In fact, cocoa has a low capacity to adapt to adverse conditions, as it requires good organic soil and a lot of water. And in some varieties – due to genetic limitations – the male and female cells fail to fuse and produce a fruit.

“Planting seeds that could be incompatible from a genetic point of view has generated



“As I am currently the only TWAS Fellow in Nicaragua, it is on me to make the best of this prestigious affiliation and reach out to scientists, private bodies and farmers through meetings, newsletters and personal contacts.” *Falguni Guharay*

trees with little productivity, in the range of 350 kilogrammes per hectare,” Guharay explained. “This is a very modest yield for smallholders, which makes a farmer’s total net income of USD480 per hectare, well below survival standards. Companies’ open-sun fields produce instead an average of two to three tons per hectare.”

Read more:
www.twas.org/node/14845/

Ideally cocoa farmers should adopt smart-agriculture practices that make their fields more resilient towards climate change with improved cocoa productivity, and the private sector should increase investments and engagement, Guharay noted.

“CLIMATE-SMART COCOA”

To reverse the current trends, Guharay participated in the launch of two national cocoa programmes in Nicaragua, in 1998 and 2006, aimed at supporting small producers. In 2016, with some colleagues, he turned to implementing a programme by WCF and its partners, called Climate Smart Cocoa.

Climate Smart Cocoa aims to increase cocoa productivity, enhancing adaptive capacity and reducing greenhouse gas emissions. In addition, it also hopes to increase private sector engagement in long-term sustainability initiatives, in coordination with the public sector and farmers.

“A huge work we are doing now involves farmers’ education,” Guharay said. “We explain that there is easy access to information on climate change, with maps and data that can predict plausible situations on their future local plantations. We urge them to take local field data to implement practices based on the predictions. It is both a training and a future investment, because they are scared by novelty and by the idea that they should apply different methods.”

Improvement in cocoa farming is possible through integrated efforts of private-public investors, international donors and local farmers, Guharay explained. “People need to understand that innovation is not simply a technological process but a social process where ... all actors must work for a common good.

“I am a one-person team,” he added. “I do research, I bring stakeholders together on national and local level, I assist in preparing business plans working with more than 40 partner organizations. This is my strength: anything I propose to do, is actually done with a network of partners. And my recent election to TWAS will certainly help implement this strategy.”



CREATIVITY POWERS SCIENTIFIC SUCCESS

At a conference in Nepal, TWAS Research Grants awardees engaged in role-playing simulations and ingenuity exercises, learning how to increase scientific impact.

 by Cristina Serra

Struggling to win research grants, finding the right scientific journals for publications and avoiding the pitfalls of plagiarism take time and energy – often leaving scientists with little endurance to achieve high-impact results.

Unfortunately, these non-scientific skills are seldom taught at universities. And learning how to make the best out of these tools can propel scientific careers, said experts at a TWAS Research Grants conference held in Nepal from 4-6 June 2019.

“Building skills is an integral part of research and development worldwide,” maintained Vijaya Gopal, a 2001 TWAS grant awardee, and a former senior principal scientist from CSIR-Centre for Cellular and Molecular Biology in Hyderabad, India, speaking at the TWAS conference. “Initiatives such as TWAS’s to foster scientists and grantees from Nepal and other countries will inculcate the spirit of learning.”

The conference, titled “Building Skills for Scientific Research”, hosted past awardees of the TWAS Research Grants programme. It was organized by TWAS and funded by the Swedish International Development Cooperation Agency (Sida), which has provided support to the grants programme since 1991. It followed the pioneering event that TWAS organised in 2018, in Dar es Salaam, Tanzania. At that time, the focus was on helping scientists build new networks, and on learning about the impact of the TWAS Research Grants programme since its inception in 1986.

Choosing Nepal as the 2019 venue had strategic importance because Nepal is listed

by the United Nations as one of the 47 Least Developed Countries (LDCs), where the world’s poorest and most marginalized populations live.

EXPLORING NEW STRATEGIES

“Sharing ideas with people belonging to different cultural and scientific backgrounds is important in strengthening the community of scientists and researchers,” Gopal said in an interview before the conference. And, in fact, the conference offered an opportunity to exchange viewpoints and knowledge through a number of activities.

More than 40 participants from 11 developing countries in South Asia and Latin America had the chance to engage in exercises that are critically important, but which scientists don’t always learn at university.

▼ TWAS grant awardees during discussions and role-playing simulations.





▲ Indonesian photochemist and TWAS grantee Tatas Brotosudarmo was among the participants. He offered insight on research-industry collaborations.

One such action, for example, was based on role-playing simulations: experiential learning methods where participants improvise. They promote discussions, ease peer-to-peer interactions and offer a unique opportunity to establish new collaborative networks.

Other much-discussed themes were the importance of teaching and protection from plagiarism.

The prestige of publishing scientific results – and the pressure to publish – can lead some scientists to take the work or writing of colleagues and claim it as their own. “The joy of creating is experienced and fulfilled when one is original,” Gopal noted. “Plagiarism is often born out of pressure, and steps can be taken to ensure that it does not occur.”

Gopal is a strong advocate of initiatives like the Nepali conference. She mentioned the importance of encouraging openness and expression of thoughts at an early age. Performances, she said, need to be assessed based on creativity and individuality, rather than on numerical scores.

INDUSTRIAL PARTNERSHIPS MATTER

The Research Grants conference also examined the importance of establishing strong, innovative local partnerships with the private sector that allow scientists to translate their research into innovative – and profitable – products and services.

Among the speakers was Indonesian scientist Tatas Brotosudarmo, a 2012 TWAS research grant winner who is an expert in photosynthetic pigments – coloured molecules commonly found in nature that could be used to produce renewable bio-energy.

In a speech, Brotosudarmo noted the role that the TWAS grant played in his life, leading to the establishment of his own laboratory. It also served to convince the Board of Founders at Ma Chung University, where he works as a principal investigator, that his research was unique and distinctive internationally.

The grant was also instrumental in reshaping his vision of scientific research. He advocates linking basic science and industry, which may widen not only individual perspectives, but those of an entire nation.

“To attract industry, scientists need to create their own research uniqueness and research business, including the capacity to conduct research well.” **Tatas Brotosudarmo**

“In the past, research was mainly focused on the curiosity of what was happening in nature, which is what we may call a serendipity-driven innovation,” he said. “Recently, research has evolved moving towards targeted innovation, setting goals that we can measure through the return on innovation and, of course, the return on investment. Therefore, business strategy, innovation strategy, focused resources and innovative culture – all these are inputs for the current research process.”

Brotosudarmo urged colleagues in the audience to engage in partnerships with industry and big companies. Scientists need a strong entrepreneurial personality, he said, and they should be willing to take risks and work on challenges.

“To attract industry, scientists need to create their own research uniqueness and research business, including the capacity to conduct research well,” he observed. “And to ensure that partnership is fruitful, they need to prepare a clear contract and protect their work with patents.”

Most importantly, he said, scientists need to be selective towards partnership: they need to choose those aiming at a long-term, win-win collaboration. ■


Read more:
www.twas.org/node/14734/
www.twas.org/node/14737/





BRINGING BIG DATA SCIENCE TO AFRICA

Skills in artificial intelligence and machine learning can be hard to acquire in Africa. But an event organised by the TWAS Young Affiliates Network (TYAN) and supported by the Elsevier Foundation provided vital lessons to African researchers.

 by Sean Treacy

Moroccan researcher Chadia Ed-driouch studies gene selection and drug design. But knowledge about the machine learning and big data techniques important for bioinformatics – a field that combines biology, computer science, and mathematics – is not easily available in her home country. There are only two master’s programmes in the field, she said, so data researchers often rely on the Internet for the education they need.

This makes it difficult to both learn reliable information or make connections with other Africans in the field.

“I want to contribute to the development of scientific research at each level in my country,” said Ed-driouch. “I would like to broaden my horizons, and I wanted the chance to meet various groups to share information and to develop my skills so that we could perhaps work together in lab projects in the future.”

A recent event held in Akure, Nigeria, provided her with an uncommon but important source of education in this fast-growing, cutting-edge field. The event was organised by TWAS and the TWAS Young Affiliates Network [TYAN], with support from the Elsevier Foundation. It included a symposium with talks by several international experts, and finished with a workshop in which African researchers received hands-on training in big data and machine learning techniques.

The 4th TYAN International Thematic Workshop and 1st African Symposium on Big Data, Analytics and Machine Intelligence for



▲ TYAN Executive Committee member and event co-organizer Bolanle Ojokoh speaks during the event. [Photo provided]

Financial, Health and Environmental Inclusion in Developing Countries took place 10-14 June 2019 in Akure, Nigeria. It brought these powerful tools to a new generation of African scientists. Taking part were over 70 researchers from 14 different countries – eight of them African.

“Researchers in Africa can contribute greatly to the data science revolution, which is rapidly accelerating contributions to the U.N. Sustainable Development Goals – but it is essential that they are part of this conversation and global research journey,” said Elsevier Foundation Director Ylann Schemm. “The Elsevier Foundation is proud to support the TYAN/TWAS symposium in big data, analytics, and machine intelligence co-hosted by the Nigerian Young Academy.”





“ The idea behind this event is to gather young scientists together and help them to increase their knowledge and amass their strength. ” Bolanle Djokoh

▲ The 4th TYAN International Thematic Workshop and 1st African Symposium on Big Data, Analytics and Machine Intelligence for Financial, Health and Environmental Inclusion in Developing Countries took place 10-14 June in Akure, Nigeria. [Photo provided]

◀ Olumide Adewale (left), an engineering professor at The Federal University of Technology Akure, Nigeria, speaks with TWAS Programme Coordinator Max Paoli at the event. [Photo provided]

Event organizer Bolanle Djokoh, a data scientist who serves on the TYAN Executive Committee, said that with more data comes more complexity, so it’s difficult to get more meaningful information from the data unless scientists have the right tools. Information from mobile devices, she said, is especially important because that’s where so much of the new data is coming from.

She said the concept for the workshop was conceived by TYAN at its executive meeting in Turkey in April 2018. Network leaders felt that the area of big data was critical to advancements in the developing world – and especially in Africa.

“The idea behind this event is to gather young scientists together and help them to increase their knowledge and amass their strength,” Djokoh said. “This will help the developing world by providing a means to use this big data and find meaningful patterns (in the data) to solve some problems.”

Ross D. King, an expert in machine learning from the University of Manchester, U.K., was a keynote speaker at the event. Machine learning is the branch of artificial intelligence that

develops systems that learn from experience, and it’s the core technology of Google, Amazon, Facebook and other global tech companies. That, said King, arguably makes it the hottest technology on the planet.

“It’s very generic technology, so you can apply it to many different types of fields,” he said. “From advertising to crops, it’s basically the same technology. You could see its role in designing better drugs for Africa, or for better crops.”

Another area where machine learning is valuable is surgical robotics, said Olatunji Mumini Omisore, a workshop attendee and a Nigerian working at the Shenzhen Institutes of Advanced Technology, part of the Chinese Academy of Sciences.


The highly precise movements of today’s flexible robotic systems are governed by advanced mathematical models, Omisore said, but those models can be time consuming and hard to come by in Africa. By using machine intelligence, they can not only get stronger models for robotic models, but also create programmes to maneuver robotic tools that aren’t reliant on models.

“In almost every field there is an abundance of data, and when there’s an abundance of data, you can find regular patterns to extract,” said Omisore. “In robotics, it’s about motion control. We can work on flexible surgical robots with distinct joints and unique rotational axes. So we are always developing motion control models that can be used to coordinate or control the robot’s movements.” ◼



VIETNAM: A VISION FOR PUBLIC HEALTH

A grassroots effort to evaluate and improve the public health system of Vietnam has yielded good progress, with potential for long-term impact.

 by Klaus Krickeberg

Few people, and even few policymakers, are aware of the difference between medicine and public health. Generally, a doctor of medicine treats individual patients. Public health is concerned with groups of people, and whole populations. Its work ranges from health education and hygiene to mass vaccinations, health screening and health planning. It studies environmental, nutritional and socio-economic risk factors for diseases, as well as preventive, diagnostic and therapeutic medical practice. During the last two centuries public health has been more efficient than medicine in improving the health of a population and in raising life expectancy.

The challenge of how to best organise public health in Vietnam is fundamental to its evolution. Today, hundreds of Vietnamese faculty members are working together on ambitious research to help guide improvements in the system.

In Vietnam, public health permeates all levels of health care, from primary care up to central hospitals and university institutions. But the Vietnamese public health system differs from that of most developed countries. It is supported and guided by faculties of public health, and these exist in every university in which medicine is present. All of them work in training, practice and research. They do not only train future practitioners of public health; every student of medicine attends several modules on public health topics during his or her six years of basic study.

By contrast, public health in developed countries is confined to particular institutions, which may or may not be linked to a university. Most physicians have never attended a course on public health.

I had already had many experiences with public health in Vietnam when the Thai Binh University of Medicine and Pharmacy asked me in 2005 to help develop its training programme in public health. I was convinced, and still am, that the structure of the public health system in Vietnam was much superior to that in developed countries. However, I soon discovered that its content was of uneven quality. That's understandable. When the public health faculties within the universities were established, their lecturers were still inexperienced and they had few suitable documents on which to base their courses. Hence they produced their own texts on the basis of foreign ones that were not adapted to the Vietnamese context.

BIOGRAPHICAL STATEMENT

Klaus Krickeberg, a citizen of Germany and France, studied mathematics at the Humboldt University of Berlin and served as a professor in various universities. He has been working extensively on public health in addition to mathematics. He was elected a TWAS Fellow in 1994. In 2018, Vietnamese President Trần Đại Quang awarded him the Friend of Vietnam medal for "positive essential contributions to the development of the Vietnamese health sector". Read his related article, "Maths and Public Health: a Natural Partnership", at www.twas.org/node/14960/.



▲ TWAS Fellow Klaus Krickeberg receives the Friend of Vietnam medal for "positive essential contributions to the development of the Vietnamese health sector" in 2018. [Photo provided]



“ Today, hundreds of Vietnamese faculty members are working together on ambitious research to help guide improvements in the system. ” Klaus Krickeberg

A year later, in 2006, the Thái Bình Public Health Faculty and I started a project initially called “Teaching Clear Ideas in a Practical Context”. It was soon expanded to all medical universities and faculties in Vietnam except those in Hanoi and Ho Chi Minh City. However, we rapidly left the narrow frame of teaching and started the present research project, which we may call “Optimal Use of the Vietnamese Public Health Structure”.

Given the existing structure in Vietnam, we initially emphasised the role of the universities. In order to reform the content of the teaching modules and to guide the lecturers to practice and research, we founded in the Medical Publishing House of Hanoi a series of Vietnamese-English texts on the essential subject areas of public health which present the whole field in a coherent way. Six volumes have appeared and a seventh is being written. The first, entitled “Epidemiology – Key to Public Health”, was also published in English by Springer Nature; it is quite innovative.

Regarding the curricula, we developed proposals for many drastic changes. For instance, epidemiology is to be taught right in the beginning as a main topic and not at the end as a minor subject. Many superfluous modules must be discarded and a few new ones inserted.

There were other research problems. Where and how should public health practitioners do their work? What is their role in primary health care? What is the best health information system? What should be the social and financial status of lecturers of public health, compared for example with that of lecturers of medicine? How should a direly needed institute on non-infective diseases look?

Our way of working was not conventional. From 2006 to 2016, we organised ten workshops in universities where all Vietnamese lecturers of public health were invited. There we formed work groups for every issue in question. They did much of the research. Between the workshops and after 2016, we exchanged our ideas by e-mail. In addition, we have a specific work group for every text to be written. It consists of all lecturers in the subject area being treated.

Everything has been done on a *pro bono* basis. At each step we defined the various research topics to be studied. No organization or administration was involved.

We have not reached all of our goals, but we have made great progress. We are fortunate that the Faculties of Public Health and the Ministry of Health are ready to consider our recommendations. ▣



A YEAR OF ADVANCEMENT FOR TWAS

by Sean Treacy

The 2018 Annual Report details the Academy's achievements as its reach and strong reputation continued to spread, benefiting research enterprise and careers across the developing world.

TWAS has released its 2018 Annual Report, using powerful infographics and images to bring the Academy's 35th year to life.

The report shows that TWAS's global presence, programmes for developing

world scientists, and impact on all fields are growing. It summarises many of the Academy's specialized programmes and events on key global issues, such as the increasingly popular field of science diplomacy and efforts to help scientists displaced by war. It also details TWAS's extensive network of partners and continually evolving membership.

"All of these accomplishments are a great source of pride for our Academy, for the Council, for our Fellows and Young Affiliates, for our many partners, and for our Secretariat in Trieste and our colleagues in the five Regional Partnerships," TWAS President Bai Chunli says in the report's Foreword.

Among the Academy's other central accomplishments in 2018:



- TWAS elected its first members from five countries: Bolivia, Laos, Libya, Nicaragua and Zambia.
- The Academy hosted its first regional research grants conference in August in Dar es Salaam, Tanzania, convening 28 past TWAS research grant winners from 17 African countries.
- TWAS launched its new Online Directory of Fellows and Young Affiliates, offering a comprehensive view of the strength and impact of its global membership of about 1,200 elected lifetime Fellows and nearly 100 Young Affiliates.
- A record 1,111 young scientists were actively working toward their PhDs in TWAS programmes.

The Annual Report details further facets of TWAS's work, such as its many awards and programmes oriented toward developing scientific expertise in the South. It also explores the Academy's efforts to support women in science, advance science diplomacy and expand the growing connections between science academies worldwide. ◻

[Download the 2018 Annual Report: www.bit.do/TWASar2018](http://www.bit.do/TWASar2018)

TWAS ANNUAL REPORT 2018

A YEAR OF IMPACT

1 For TWAS, 2018 was a year of significant expansion in programmes, networks and the reach of its communication. The Academy continues to provide important opportunities to researchers from the developing world, and it is increasingly influential globally as a centre for science policy and diplomacy. Among the Academy's central accomplishments:

- **Trieste hosts 28th General Meeting**
The Academy's strong partnership with Italy has long been essential for its work around the globe. In 2018, TWAS held its 28th General Conference and 28th General Meeting in Trieste, Italy, its headquarters city. The meeting drew some 200 scientists, policymakers and educators from more than 80 nations. At the meeting, such subjects as the use of stem cells to restore sight and the promise and problems posed by artificial intelligence were explored by experts in those fields. (For more on the General Meeting, see page 14)
- **Initiatives for displaced researchers**
The Academy took part in several initiatives designed to assist scientists displaced by conflict. Among them was a gathering under the banner of Science International of four organizations, including TWAS and the InterAcademy Partnership (IAP), to explore policy and programmes for at-risk scientists. Science institutions in Trieste and Pinar del Rio, Cuba signed an agreement to support researchers displaced by war. Finally, TWAS's film on the subject, "Science in Exile," was shown in two dozen countries on six continents. (For more on science diplomacy, please see page 24)

2 Bringing grantees together in Africa
TWAS held its first regional research grants conference in August in Dar es Salaam, Tanzania, convening 28 past TWAS research grant winners from 17 African countries. The aim: provide African scientists with tools to sharpen their skills, increase their competitiveness and improve scientific outcomes and stewardship. The conference was underwritten by the Swedish International Development Cooperation Agency (Sida). (For more on TWAS Research Grants, see page 20)

3 An online directory of TWAS scientists
The new TWAS Online Directory of Fellows and Young Affiliates for the first time offered the public a view of the strength and impact of the Academy's global membership. The Directory provides profiles of some 1,200 elected lifetime Fellows and nearly 100 Young Affiliates. Replacing the printed TWAS Yearbook, the directory is a highly interactive digital advancement that anyone can access. (For more on the TWAS communication, see page 2)

4 Hassan elected TWAS president
Mohamed A. Hassan, the founding executive director who helped to build TWAS into a global voice for science in the developing world, is retiring as its president in January 2019. Hassan (far right in photo) will succeed TWAS President Bai Chunli of China, who took office in 2013 and served two three-year terms. Hassan is a prominent and influential leader in international science and science policy. (For more on science and policy, see page 22)

8 9

PEOPLE, PLACES & EVENTS

SEBSEBE DEMISSEW ELECTED TO ROYAL SOCIETY

Sebsebe Demissew, a professor of plants systematics and biodiversity in the College of Natural and Computational Sciences at Ethiopia's Addis Ababa University, is the first African foreign member elected to the Royal Society [UK] in 2018, in recognition of his efforts to promote Ethiopian biodiversity. Sebsebe earned his PhD in 1985

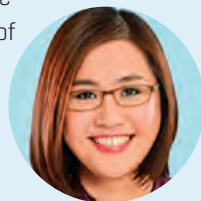


from Institute of Systematic Botany, Uppsala University in Sweden, and was the 1993 national winner of the TWAS Prize for Young Scientists. He was elected to the Ethiopian Biological Society in 1990, and served as president from 1996-2000. From 1996 to 2009, he led the Ethiopian Flora Project, which aimed to describe the flora of Ethiopia and Eritrea including the ecology and distribution of both native and introduced plants. The project involved 91 scientists from 17 countries. Sebsebe, a charismatic scholar, is a leader in botanical science: He has published the discovery of over 50 new plant taxa [species and subspecies] such as *Aloe weloensis Sebsebe* and *Euphorbia sebsebei* M. Gilbert, named in his honour. He is a 2012 TWAS Fellow and served as the executive director of the Gullele Botanic Garden in Addis Ababa. He has also participated in biodiversity studies in other African countries such as Cameroon, Ghana, Kenya, Namibia, South Africa, Tanzania and Uganda. In 2017 he received the Kew International Medal for work aimed at "building an understanding of the world's plants and fungi, upon which all life depends."

THREE TYAN MEMBERS ELECTED TO ACADEMY OF SCIENCES MALAYSIA

Malaysian scientists Sok Ching Cheong, Kok Keong Chong and Chin Ping Tan – all members of the TWAS Young Affiliates Network [TYAN] – have been elected to the Academy of Sciences Malaysia. They represent the TWAS East and South-East Asia and the Pacific Regional Partner [TWAS-SAPREP].

Sok Ching Cheong, elected to TWAS's Young Affiliates in 2012 and now a TWAS Alumnus, is the senior group leader of the head and neck cancer research programme at Cancer Research Malaysia. Her results

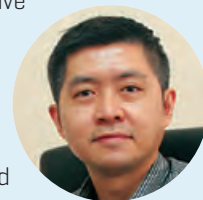


have won her prestigious awards such as the L'Oréal UNESCO for Women in Science in 2008, the Norman-Rowe Educational Trust, and the Top Research Scientist Malaysia. She is currently the co-chair of TYAN, a professor at University of Malaya and a fellow of the Union for International Cancer Control.

Kok Keong Chong, elected as a TWAS Young Affiliate in 2011 and currently an Alumnus, is an expert in solar energy. His scientific interests focus on solar power, including solar cell technology, photovoltaic systems and solar thermal systems. In 2014, he was elected to the Global Young Academy. In 2017, he received the Malaysia Toray Science Foundation Science & Technology Award. In 2018, he was elected a Fellow of ASEAN Academy of Engineering & Technology.



Chin Ping Tan, a professor in the department of food technology at Universiti Putra Malaysia and a TWAS Young Affiliate from 2010 to 2014, is an expert in palm oil, food nanotechnology, food emulsions and extraction of bioactive compounds from various agricultural by-products. He has received more than 40 national and international research awards including the ProSPER.Net Scopus Young Scientist Award, the German S&T Fellowship and the Top Research Scientist Malaysia. He is now a TYAN member.



EUGENIA DEL PINO RECEIVES THE LASDB PRIZE

Eugenia M. del Pino Veintimilla, a developmental biologist from Ecuador and a 1989 TWAS Fellow, has been awarded the Latin American Society for Developmental Biology [LASDB] 2019 Prize for her contribution to developmental biology in Latin America, and to research and science in Ecuador. She received the prize at the 10th congress of the LASDB in Buenos Aires, in October 2019, where she gave a plenary lecture. Del Pino started her career in the 1970s, a time when women scientists had to cope with many obstacles. But through the establishment of partnerships with scientists from the U.S., Japan, U.K. and Germany, she helped advance science and research in Ecuador. Among her scientific achievements: The discovery of new development





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processes in tropical frogs, useful for comparative studies. She is founding member of the Ecuadorian Society of Biology and the Academy of Sciences of Ecuador, and collaborated for about 25 years with the Charles Darwin Foundation for the Galapagos Islands in research and conservation.

IN MEMORIAM

TWAS Fellow **Bhaskar Dattatraya Kulkarni** passed away on 14 January 2019. A native of Nagpur, India, he earned his degree in chemical engineering from Laxminarayan Institute of Technology, Nagpur, in 1972. Then he joined the National Chemical Laboratory in Pune, where he spent the rest of his 45-year career. Kulkarni was a chemical engineer renowned for the development and application of mathematical modelling to chemical reactions. He was elected to TWAS in 2001. Kulkarni mastered mathematics as a language, to unify and produce contributions in physics, chemistry, biology and engineering, with important implications in industry. He was a member of the Indian National Science Academy, the Indian Academy of Sciences, Bangalore, and the Indian National Academy of Engineering. He was awarded the Shanti Swarup Bhatnagar Prize for science and technology (SSB), a science Indian award given annually by the Council of Scientific and Industrial Research (CSIR) for notable and outstanding research. During his career he mentored 66 PhD students, 10 postdocs, and



over 150 summer students. He has authored more than 350 peer-reviewed publications, signed 26 U.S. and Indian patents, authored three books and edited four books.

IN MEMORIAM

Eduardo Charreau, a 1999 TWAS Fellow and esteemed endocrinologist, passed away in March 2019. He earned a PhD in chemical sciences at the University of Buenos Aires and worked as an instructor, assistant, associate and full professor in the department of biological chemistry at Buenos Aires University from 1960 to 2006. His research focused on the regulation and function of cellular receptors, both during normal conditions and pathological states. Charreau served as the president of the Institute of Biology and Experimental Medicine Foundation. He was emeritus senior researcher and past president of CONICET (2002-2008), the Argentine National Council for Science and Technological Research. In addition, he was past president of the Argentine Academy of Exact, Physical and Natural Sciences (2008-2012). He was also president of the Panamerican Federation of Associations for the Advancement of Sciences. He was awarded, among others, the 1997 TWAS Prize in basic medical sciences for his fundamental research in the molecular events that stimulate the development of experimental mammary tumours by hormonal agents, through studies of the expression of growth factors and their receptors.



IN MEMORIAM

Erik Thulstrup, a 1996 TWAS Fellow and a professor of chemistry at Roskilde University in Denmark, passed away in September 2019. Thulstrup obtained his PhD in 1970 from Aarhus University, Denmark, where he then served as an associate professor from 1972-1981. Later he was appointed professor at Danish Pedagogical University (1981-89) and Roskilde University (1993). He also served as a senior S&T specialist in the World Bank and headed the Bank's Science and Technology for Development programme (1990-1993). He was a member of the EU Task Force on research evaluation, heading evaluations of research capacity building projects, primarily in developing countries, including Tanzania. He provided science policy advice to several developing countries. In the 1990s he was president of the Danish National Commission for UNESCO. He was a fellow of the Norwegian Academy of Sciences, Mongolian Academy of Sciences and of the African Academy of Sciences.

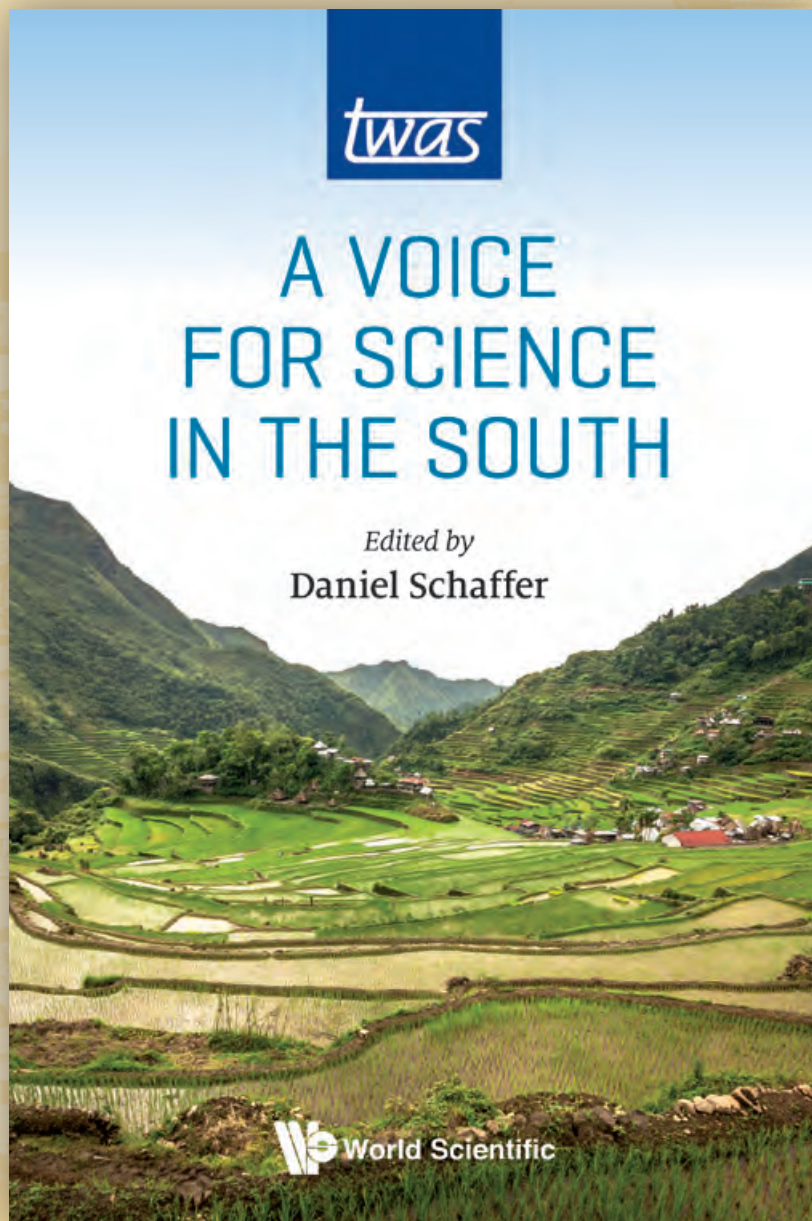


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Please send an email to Cristina Serra [cserra@twas.org] with a brief explanation, links to more details, and contact information.

In 11 inspiring essays, **TWAS** leaders detail the **Academy's triumphs and challenges** in advancing science for the developing world.



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The World Academy of Sciences for the advancement of science in developing countries – TWAS – works to support sustainable prosperity through research, education, policy and diplomacy.

TWAS was founded in 1983 by a distinguished group of scientists from the developing world, under the leadership of Abdus Salam, the Pakistani physicist and Nobel Prize winner. Today, TWAS has about 1,250 elected Fellows from about 100 countries; 14 of them are Nobel laureates. It is based in Trieste, Italy, on the campus of the **Abdus Salam International Centre for Theoretical Physics (ICTP)**.

Through more than three decades, the Academy's mission has remained consistent:

- Recognize, support and promote excellence in scientific research in the developing world;
- Respond to the needs of young scientists in countries that are lagging in science and technology;
- Promote South-South and South-North cooperation in science, technology and innovation;
- Encourage scientific and engineering research and sharing of experiences in solving major problems facing developing countries.

TWAS and its partners offer over 490 fellowships per year to scientists in the developing world for PhD studies and post-doctoral research. TWAS prizes and awards are among the most prestigious given for scientific work in the developing world. The Academy distributes more than USD1 million in research grants every year to individual scientists and research groups. It supports

visiting scientists and provides funding for regional and international science meetings.

TWAS hosts and works in association with two allied organizations on the ICTP campus:

The Organization for Women in Science for the Developing World (OWSD). At its founding in 1989, OWSD was the first international forum uniting women scientists from the developing and developed worlds. Today, OWSD has more than 8,200 members. Their objective is to strengthen the role of women in the development process and promote their representation in scientific and technological leadership.

The InterAcademy Partnership (IAP) represents more than 130 academies worldwide. IAP provides high-quality analysis and advice on science, health and development to national and international policymakers and the public; supports programmes on scientific capacity-building, education and communication; leads efforts to expand international science cooperation; and promotes the involvement of women and young scientists in all its activities.

TWAS receives core funding from the Italian Ministry of Foreign Affairs and International Cooperation, and key programmatic funding from the Swedish International Development Cooperation Agency [Sida]. It is a programme unit of UNESCO.

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