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the interacademy partnership

Annual Report 2021

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Contents

INTERACADEMY PARTNERSHIP ANNUAL REPORT 2021

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A Message from the IAP Co-presidents

Recent years have seen much change in the way the world works. The COVID-19 pandemic marked a turning point not only for the scientific community, but for everyone. As a scientific organization, the InterAcademy Partnership (IAP) can be proud that science has made a huge contribution to dealing with the pandemic – from prevention to diagnosis to treatment – and COVID-19 vaccines are now playing a pivotal role in the global fight against the virus.

In 2021, the COVID-19 crisis has been central to the work of the IAP. We not only stepped up to urge world leaders to reduce the impact of the pandemic on higher education and to strengthen COVID-19 research. We also organised a highly successful event to highlight how academies – as trusted and credible voices – can counter vaccine hesitancy, tackle false and misleading claims about the safety and efficacy of vaccines, and promote a culture of trust in vaccines (see page 13).

But our efforts to promote health did not stop there. We supported the Sustainable Health Equity Movement (SHEM) to promote health equity as an ethical principle that guides all national and international economic, social and environmental policies. Furthermore, we fostered the IAP Young Physician Leaders (YPL) alumni network, a group of exceptional young medical professionals from around the world who work to improve health in their countries and globally (see page 17).

Unfortunately, during the pandemic, we have also witnessed a growing wave of anti-scientific beliefs. This highlights once again the importance for everyone, and especially for children, to develop rational thinking and scientific understanding of complex problems. This is why, among other activities, the IAP Science Education Programme (SEP) worked with its partners to develop a community response guide for youth on vaccines and supported the roll-out of a guide on COVID-19 in African countries (see page 21).

It is now clear that the scientific enterprise is crucial for human well-being. Yet it is menaced by predatory journals, publishers and conferences. In 2021, our project on Combatting Predatory Academic Journals and Conferences explored these practices in more depth than any study previously, and we are sure it will help guide the scientific community to tackle these pervasive and damaging practices (see page 24).

Meanwhile, conflicts, violence, human rights violations and climate change continue to

displace undisclosed numbers of people. Among them are scientists, medical professionals, engineers and others with technical training. 2021 saw the launch by UNESCO-TWAS, the International Science Council (ISC) and IAP of 'Science in Exile', an initiative which aims to create a network of like-minded organizations that work together to develop a global platform and roll out a coordinated advocacy campaign, in order to foster a cohesive response for the support and integration of refugee, displaced and at-risk scientists (see page 28).

Advances in science are key to solving today's most challenging problems and to achieving the Sustainable Development Goals (SDGs). But at a time when research capacity in the biosciences is increasing, and new technologies such as genome editing and synthetic biology are becoming accessible in more and more countries, we must promote a culture of responsibility and guard against any misuse. In 2021, our Biosecurity Working Group worked with colleagues at Tianjin University and Johns Hopkins Center for Health Security to produce the 'Tianjin Biosecurity Guidelines for Codes of Conduct for Scientists', a set of much-needed measures for managing bio-risks that we hope will be soon integrated into national and institutional biosecurity and biosafety codes of conduct (see page 32).

In 2021, IAP also supported 77 meetings and 35 publications. IAP outputs and activities would not have the global relevance they have without our regional networks in Africa (NASAC), Asia (AASSA), the Americas (IANAS) and Europe (EASAC). We would like to thank them once more for the outstanding work they carried on in these difficult times, including on the ongoing 'Climate Change and Health' project, and for making sure the voice of science is heard by policy-makers in their part of the world and globally (see pages 36-48).

Lastly, we thank former IAP Co-president Volker ter Meulen, who at the request of the IAP Steering Committee has been appointed as IAP Special Advisor. We are pleased that he will continue to contribute to IAP's mission of convening and empowering the world's academies of science, engineering and medicine to work collaboratively to address issues of global, regional, and national importance.

To protect this planet we call home, the need for concerted advice and input from the global academy community has never been higher. Looking back at 2021, we are proud to say IAP played its part by informing the public and policy-makers not only about challenges, but also evidence-based solutions for a better world. ■

Depei Liu
IAP Co-president

Richard Catlow
IAP Co-president

Vision, Mission and Structure

The InterAcademy Partnership (IAP) is a global network of over 140 academies of science, medicine and engineering that brings together many of the world's best scientific minds.

Individually and collectively, our member academies play a vital role in supporting, promoting and communicating science, influencing national and international policy on science-related matters, and fostering the next generation of young and talented scientists.

Reflecting the principles of its membership – independence and objectivity – IAP strives to be free from national or disciplinary bias to ensure that its actions and decisions are strictly merit-based and reflect the best scientific evidence available. Consequently, it is one of the leading organisations in the world with the intellectual capacity, credibility and independence to function as an authoritative and impartial adviser on scientific issues of regional and global importance.

IAP provides a platform for member academies to

- share good practice, learn from each other and build their capacity and visibility;
- develop common positions and agree to actions/interventions on regional and global issues of shared interest;
- build collaborations among academies and with key stakeholders in other networks and sectors;
- promote the importance of inclusive science for generating new knowledge, informing robust decision-making for good governance, and building the science literacy of global citizens; and
- facilitate science serving society as a global public good.

Thus, IAP has four main strategic priorities:

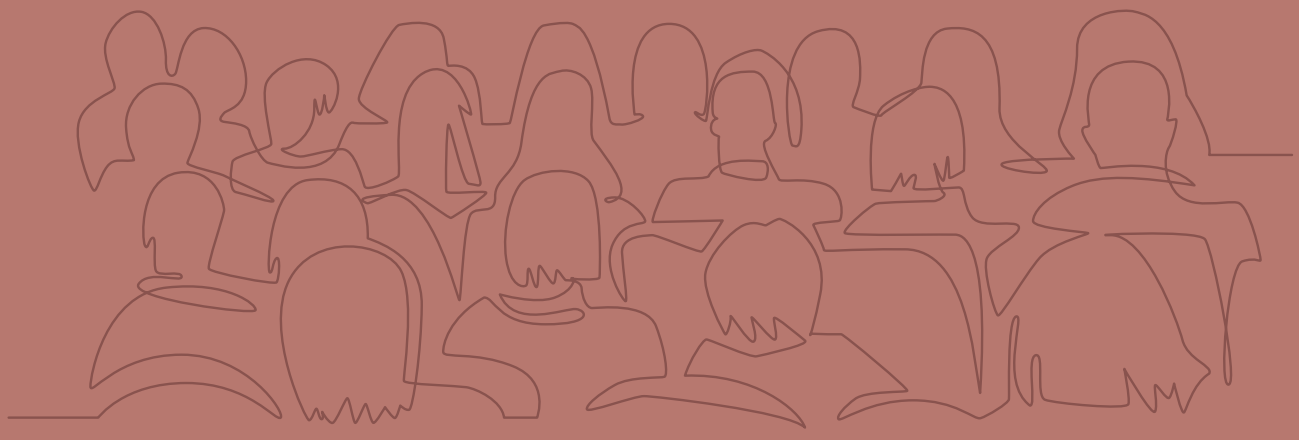
- build the capacity of, and empower, regional networks of academies and their national members;
- empower academies and regional academy networks to provide independent, evidence-based, authoritative advice on global, regional and national issues;
- promote the importance of science in research, education, and literacy; and
- build IAP as a progressive and more resilient global academies network.

IAP currently has three components: IAP Science and IAP Health, managed by the IAP Secretariat based in Trieste, Italy; and IAP Policy, managed by the IAP Secretariat based in Washington, DC, USA. This structure is being further streamlined to maximise the network's effectiveness.

Integral to IAP's operations are its four regional networks – the Association of Academies and Societies of Sciences in Asia (AASSA), the European Academies' Science Advisory Council (EASAC), the Inter-American Network of Academies of Science (IANAS), the Network of African Science Academies (NASAC) – and the Global Young Academy (GYA), which facilitates access to the perspectives of early career researchers.

By bringing its member academies together into regional and global networks, IAP serves to increase the visibility and impact of the academies as they work together, speaking with 'one voice' to governments, international organisations and other stakeholders. ■

Overview



Looking Back: An overview of IAP's goals and key activities in 2021

The ambition of IAP is for the world's academies to play a vital role in ensuring that science serves society inclusively and equitably, and underpins global sustainable development. To achieve these aims, IAP convenes and empowers its 140 member academies and four regional networks to work collaboratively on issues of global, regional and national importance.

The InterAcademy Partnership (IAP) provides a collective, supportive mechanism for academies to further strengthen their crucial roles as providers of evidence-based policy and advice. In 2021, following a two-year consultative process beginning with the IAP General Assembly in Songdo, Korea, IAP's member academies endorsed a new set of Statutes that will govern the organization for the foreseeable future.

Under the new Statutes, the governance structure has been streamlined to maximize the effectiveness, impact and inclusiveness of IAP. Among the more substantive changes made is a new Advisory Committee that will ensure representation across geographies, country income level, and the science, medical and engineering disciplines. Another change is the addition of 'Development and Programme Committees' that will play a critical role in identifying opportunities and helping develop and fundraise for IAP activities.

In April 2021, Richard Catlow, former Foreign Secretary of UK's Royal Society, became the new IAP Co-President. Catlow works alongside Co-president Depei Liu (China).

Catlow replaced Volker ter Meulen (German National Academy of Sciences, *Leopoldina*), who acted as IAP Co-president between 2017 and 2021 and, after completing his two terms, has been appointed as IAP Special Advisor.

As stated in the IAP Strategic Plan (2019-2023), IAP is uniquely placed to:

- Build the capacity of regional networks of academies and their national members, who represent excellence in science, engineering and medicine in their countries;
- Empower regional networks and academies to provide independent, authoritative advice on global, regional and national issues through synthesis reports, consensus statements, foresight studies, critiquing public policy processes and outputs, and convening key stakeholders;
- Communicate the importance of science, engineering and medicine in terms of research, education, literacy, public discourse, and outreach; and
- Build IAP as a progressive and more resilient global academies' network by strengthening governance, empowering the secretariat, and designing and implementing cohesive policies.

Strategic Priority 1: Capacity Building

IAP helps to build the capacity of its member academies at global, regional and national levels. At the global level, IAP is active in projects and activities that bring together the expertise present in the diversity of its membership on wide-ranging topical and/or urgent issues. Its consensus reports, statements and commentaries speak to the United Nations (UN) and its agencies, as well as other international bodies, and in doing so help build the capacity and understanding of academies on global governance systems while supporting evidence-based decision-making.

Since its inception in 1993, IAP has been pro-

ducing statements on issues of fundamental importance to humanity. These statements – which are released only when they have been endorsed by the majority of IAP members – are not only a reflection of the major issues that confront society but are also evidence of IAP's ongoing commitment to society.

In 2021 IAP published three statements: the 'IAP Statement on the Protection of Marine Environments' urges world leaders to improve ocean health by stopping habitat destruction and the spread of environmental contaminants, fighting climate change and overexploitation, and adopting evidence-based policies. The 'IAP Statement on Regenerative Medicine' highlights medical opportunities in addressing the causes of disease and warns against the misuse of regenerative medicine technologies – also when it comes to the proposed use of stem cells to tackle COVID-19. The IAP Statement 'Climate Change and Biodiversity: Interlinkages and policy options' stresses the fact that climate and biodiversity policies are currently insufficiently connected and addressing climate change and biodiversity decline together is central to achieving the Sustainable Development Goals (SDGs).

In 2019, IAP began using Communiqués to tackle issues of global relevance. These shorter documents, endorsed by the 6 IAP co-chairs, provide a quicker, yet still evidence-based and peer-reviewed, tool to reach out to the scientific community, policy-makers and the wider society. In 2021, IAP published three Communiqués: 'Reducing the Impact of COVID-19 on Inequalities in Higher Education: A call for action to the international community' (issued jointly with the Global Young Academy), 'Strengthening Research on COVID-19 during the Pandemic' and 'A Net Zero Climate-Resilient Future: Science, technology and the solutions for change'.

At the regional level, IAP worked closely with and through its four regional networks: the Association of Academies and Societies of Sciences in Asia (AASSA), the European Academies' Science Advisory Council (EASAC), the Inter-American Network of Academies of Sciences (IANAS) and the Network of African Science Academies (NASAC). These networks received grants from IAP to undertake regional activities, including workshops and studies of local relevance. The funds provided by IAP are typically used to leverage additional funds that help expand the activities and enhance their impact (see pages 36-48). IAP's inter-regional project on Climate Change and Health (CCH, see page 16) also helped to build capacity within and between regions.

At the national level, IAP encourages the engagement of all its member academies, including newly established and under-resourced academies, in its numerous global and regional activities. In contributing to working groups and their resulting consensus reports and statements, IAP provides member academies with a voice on urgent and topical issues that they can use to engage with their own national policy-makers, other key stakeholders and the wider society.

When feasible, capacity-building grants are also provided to individual academies to enhance their abilities to pursue strategic national initiatives.

Strategic Priority 2: Science Advice

IAP works on wide-ranging policy areas that are underpinned by science. In 2021, IAP continued its project on Climate Change and Health (CCH), engaging all four regional networks in a regional-to-global study. The report for Asia was launched in 2021 (see page 40); the other regional reports and global synthesis study from this project will be completed in 2022.

CCH has been modelled on the Food and Nutrition Security and Agriculture (FNSA) project that reported in 2018. At the request of the chairs of the United Nations Food Systems Summit (UN FSS) Scientific Group, IAP delivered four regional policy briefs based on the previous reports from its regional networks for the FNSA project, updated with more recent scientific evidence, policy development and assessment. These policy briefs cover issues for the transformation of food systems for improved health, nutrition, sustainable agriculture and the environment. In addition, there is a fifth global policy brief that draws on the four regional ones together with the global report from the FNSA project, also appropriately updated. The briefs were presented during 'Regional perspectives on the role of science, technology, and innovation for transforming food systems', a webinar organised by IAP as a side event at the UN FSS 'Science Days'.

IAP also continued its project on 'Combatting Predatory Academic Journals and Conferences'. Over the course of 2021, the project's expert Working Group met virtually many times. This study, preliminary results of which were presented via a series of webinars in late 2021, will help researchers practice due diligence and make more informed decisions about where they publish and present their work (see page 24).

Strategic Priority 3: Education and Outreach

IAP's education and outreach activities support inquiry-based science education (IBSE) and the professional development of young scientists and medical professionals. Among other activities, in 2021 IAP continued its collaboration with the Smithsonian Science Education Center (SSEC) and the World Health Organization (WHO) to develop 'Vaccines! How can we use science to help our community make decisions about vaccines?', a community response guide designed for children and teens between the ages of 8 and 17. IAP grants also supported the roll-out in four African countries of the 2020 guide 'COVID-19! How can I protect myself and others?' allowing hundreds of students to learn practical ways to stem the spread of this virus (see page 21).

IAP also continued nurturing its Young Physician Leaders (YPL) network of alumni. Due to the COVID-19 pandemic, IAP decided to postpone the 2021 event to 2022, but continued to support the IAP activities of the YPL Alumni Steering Committee and to use the IAP website to highlight the achievements of alumni (see page 19).

Strategic Priority 4: The Network

IAP continues to build a more progressive and resilient global academies network. IAP's Secretariat staff based in Italy, USA and Germany met virtually regularly and streamlined the organisation's work to ensure the smooth operation of IAP and its working groups during the pandemic.

In 2021, five new academies were accepted for IAP membership: the Australian Academy of Health and Medical Sciences, the Israeli National Academy of Science in Medicine, the Academy of Medicine Specialties of Nigeria, the Ivorian Academy of Sciences, Arts, Cultures of Africa and African Diasporas (ASCAD) and the National Academy of Medicine of Uruguay. In addition, thanks to a collaboration between NASAC and the UN Technology Bank focusing on Least Developed Countries, new academies were launched in Angola, the Democratic Republic of the Congo (DRC), Lesotho and Malawi.

Published in September 2021, 'Gender Equality in Science: Inclusion and Participation of Women in Global Science Organizations. Results of two global surveys', a study coordinated by GenderInSITE (Gender in Science, Innovation, Technology and Engineering), in partnership with IAP and the International Science Council (ISC), reported on the results of surveys conducted amongst science academies that are members of the IAP and ISC, as well as amongst international disciplinary unions and associations that are members of the ISC.

The survey results allow for comparisons with a previous study undertaken in 2015, and provide important baseline information for much-needed gender transformation in global science. The new study found that, although some progress has been made, women are still under-represented.

The report makes several key recommendations, for example, the establishment of a central repository of gender-related policies and actions to identify best practices and guide those academies and disciplinary unions seeking to implement changes.

The report also calls for the application of a regional lens and for the study partners to utilise their regional presence to gain insights and to advance the gender equality agenda, especially in countries/regions that are lagging.

IAP communication activities today can count on a rich, modern website (*www.interacademies.org*) and a growing audience on social media. In 2021, website sessions grew by 26% and users grew by 34%, and a new search engine optimisation (SEO) and content strategy assured that users who reached the IAP website via organic search (through unpaid search results on search engines such as Google) grew by 31%. IAP also produced in-house multi-lingual infographics on COVID-19 vaccines, on the IAP Statement on Marine Environments and on the Statement on Climate Change and Biodiversity, and many flyers, publications and images for social media. These have proved to be effective amplifiers of IAP's science-policy messages. For example, the webpage of the COVID-19 vaccines infographic was the best performing content of the IAP website created in 2021 and was mainly reached via Google, which means that IAP was attracting new visitors.

2021 also saw a 33% increase in IAP's follower base on Twitter (to 4643 followers) and a 280% increase on LinkedIn (to 1481 followers). The best performing tweet of 2021 was one featuring the Marine Statement infographic, which was seen more than 82,000 times.

The quarterly IAP newsletter – the best way to keep abreast of IAP activities – includes updates from IAP and its members, and its subscribers grew by more than 50% during 2021. ■

Global Activities

Academy Responses to COVID-19

IAP and its member academies are playing their own part in national or regional initiatives to fight against the pandemic – helping to ensure that trustworthy and credible information is reaching as many people as possible.

COVID-19 threatens to lead to a 'lost generation' of researchers

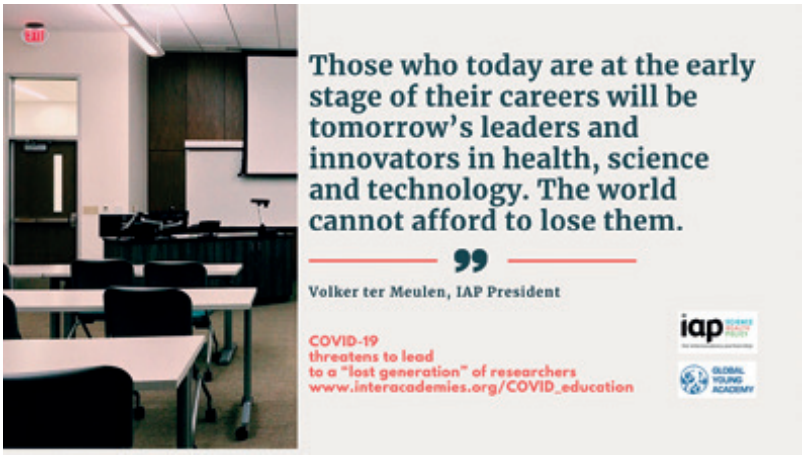
On 16 March 2020, the world started to shut down to curb the spread of COVID-19. One year later, existing societal inequities have been brought into sharp relief. In the higher education sector, in-person teaching, learning and research have faced severe interruptions or have been halted altogether. Faculty and student flexibility and mobility reduced, and university resources severely constrained.

The impacts on early-career researchers and faculty are especially alarming. In addition to lost research and student training opportunities, reports of retracted postdoctoral and faculty offers, hiring freezes, pay cuts, lost professional development opportunities, and many young scholars dropping out of the workforce all threaten to lead to a 'lost generation' of researchers unless rapid action is taken.

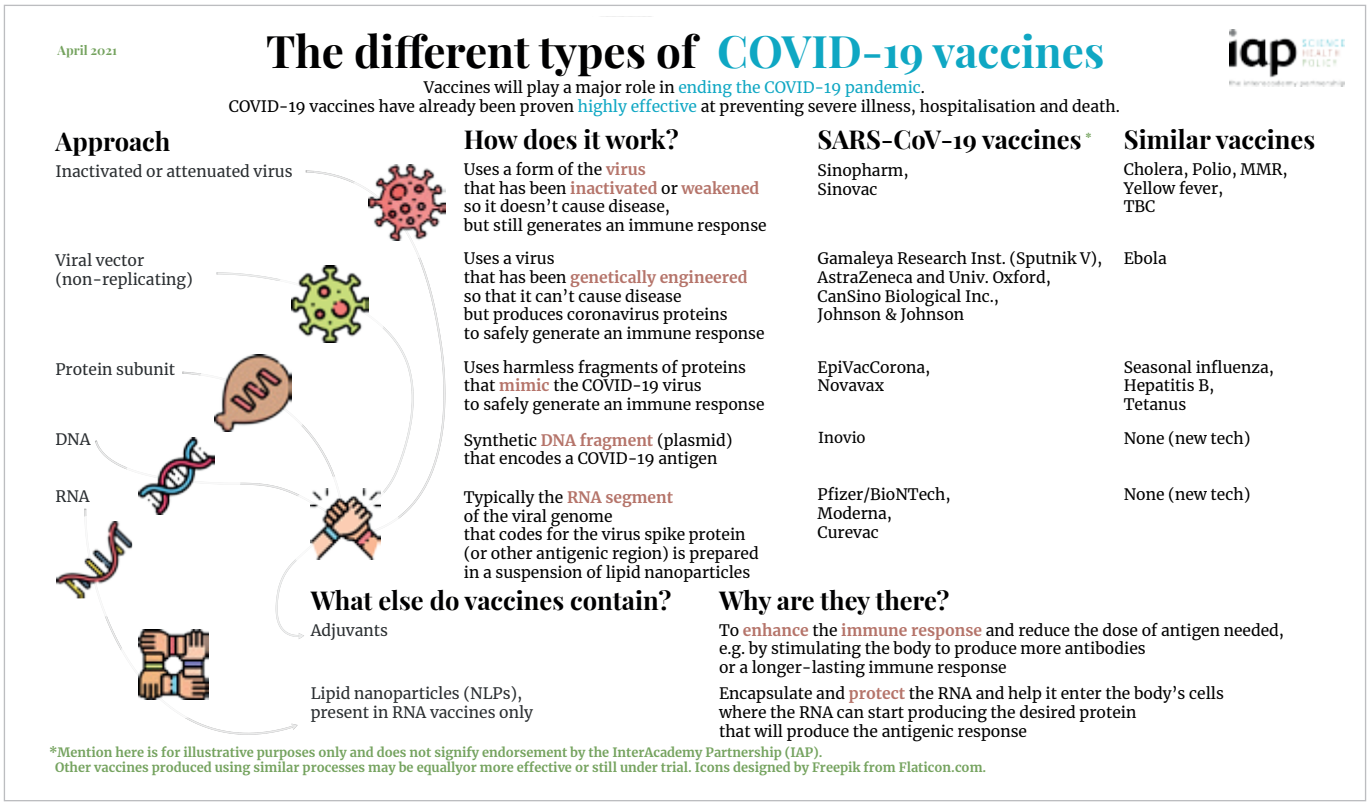
In March 2021, the InterAcademy Partnership (IAP) and the Global Young Academy (GYA), issued 'Reducing the impact of COVID-19 on inequalities in higher education: A call for action to the international community', a communiqué highlighting some of the most pressing challenges for higher education globally, and proposing solutions to mitigate the further entrenchment of inequalities.

"Those who today are at the early stage of their careers will be tomorrow's leaders and innovators in health, science and technology. They will be the ones to find solutions to some of the world's most pressing challenges, from the climate crisis to future emerging infectious diseases. The world cannot afford to lose them," said Volker ter Meulen, IAP's co-president at the time.

The main challenges in higher education highlighted in the communiqué are the reduction of flexibility and mobility, the interruption of research and career trajectories, the lack of access to fundamental learning resources, the increased complexity of students' digital and learning needs, and the loss of human interaction from excess digitisation in education delivery. Additionally, historically-disadvantaged groups, including women and those with childcare responsibilities, as well as early-career researchers, are those whose careers are suffering the most because of the pandemic.



Social media-friendly images released with the communiqué 'Reducing the impact of COVID-19 on inequalities in higher education: A call for action to the international community'.



IAP celebrated the 2021 World Immunization Week by releasing a new infographic to shed some light on the different types of COVID-19 vaccines, how they are developed, and how they work.

In the communiqué, IAP and the GYA provide a set of recommendations to university administrators, higher education policy-makers, research funding agencies, academies and scholars.

Countering vaccine hesitancy

The IAP Global Webinar on 'Countering Vaccine Hesitancy' took place on 23 March 2021 and was designed to help academies prepare for national vaccination efforts. This online event highlighted how academies – as trusted and credible voices – can counter vaccine hesitancy, tackle false and misleading claims about their safety and efficacy, and promote a culture of trust in the COVID-19 vaccines that are increasingly available.

"In any population, there are people who will accept any given vaccine, people who will strongly reject it, and those in the middle who are hesitant and perhaps need more information or gentle persuasion in order to accept the vaccine. It is these so-called vaccine hesitant people that we can hope to persuade to take the COVID-19 vaccine," explained Volker ter Meulen.

"Vaccination is the ultimate weapon against the pandemic and the road back to normal life," added IAP co-president Depei Liu, stressing the fact that in many countries vaccine hesitancy is a hurdle in the race against COVID-19 and academies must work to increase vaccine acceptance.

Some 100 academy leaders, Fellows and members of communications teams attended the webinar and discussed how to better interact with the public on this critical issue.

The webinar, moderated by Peter McGrath, IAP Coordinator, included presentations by technical experts Toni Gabaldón, Spanish Young Academy alumnus; Peggy Hamburg, IAP Health co-chair; Biljana Gjoneska, IAP Young Physician Leaders (YPL) Alumni Steering Committee member; Herman Wasserman, Academy of Science of South Africa (ASSAf) member; Gagandeep Kang, Indian National Science Academy (INSA) member; and Hak-Soo Kim, Korean Academy of Science and Technology (KAST) fellow.

IAP published a series of bite-size videos that present aspects of vaccine science, regulation and the 'infodemic' in manageable nuggets of information.

As a follow-up and to contribute to the communications activities of the 2021 World Immunization Week, IAP released an infographic (available in English and French) to shed some light on the different types of COVID-19 vaccines, how they are developed, and how they work, and five short videos that present aspects of vaccine science, regulation and the 'infodemic' in manageable nuggets of information.

How to strengthen COVID-19 research

The unprecedented coordination and scale of research during the COVID-19 pandemic has been of great importance in understanding the genetic structure and pathophysiology of the virus, as well as improving public health preparedness and response. Such knowledge has provided evidence to develop novel interventions. However, whilst there have been major advances in knowledge, it is apparent that not all COVID-19 research has been of a quality high enough to effectively inform understanding and action.

In the communiqué 'Strengthening Research on COVID-19 During the Pandemic', published in May 2021, IAP urged the scientific community to learn from research inadequacies and failures, particularly those pertaining to unproven interventions with consequences for medical practice and the research record.

In fact, there has been widespread use of interventions based on inadequate evidence, often used at large scale and attributable in some cases to vested commercial or political interests. In addition to generating concerns for patient safety, pursuing unvalidated approaches delays or prevents adequate evaluation in well-controlled studies and may also prevent patients from getting treatments that have proven value.

As highlighted in the communiqué, during the COVID-19 pandemic, there have also been significant failures associated with the clarity of the research question, poor quality study design and conduct, and in the review, reporting and use of outputs. This is important, stresses the communiqué, because – at a time of urgent need – poor quality research wastes resources, increases risks to patients, and can distort decision-making and public perceptions.

The communiqué includes examples of approaches where there is no convincing evidence for effectiveness from adequately powered trials and of those where the evidence is currently inadequate, e.g. chloroquine and hydroxychloroquine, remdesivir, ivermectin, convalescent plasma and stem cells.

Science outreach through drama

The University of Pretoria's (UP) drama students took science communication to the people by developing and participating in an interactive play on the use of hand sanitiser during the COVID-19 pandemic.

This event was a follow-up to the 2020 IAP Statement 'A Call to Action: Furthering the

The University of Pretoria's project focused mainly on the impact of hand sanitisers on the environment, food and healthcare systems.

The content of the University of Pretoria's play was centred around debunking myths surrounding the COVID-19 vaccines as well as communicating the importance of reading the labels of hand sanitisers.

fight against falsified and substandard medical products' and was the result of a partnership between UP's Faculty of Natural and Agricultural Science, Department of Plant and Soil Sciences; the School of Arts Drama Department; the UP UNICEF One Health for Change programme, and the Department of Science and Innovation/National Research Foundation (DSI-NRF) Centre of Excellence (CoE) in Food Security. The project, which received financial support from IAP, was spurred by the availability of sub-standard hand sanitiser in South Africa.

"The content of the play is centred around debunking myths about COVID-19 vaccines as well as communicating the importance of reading the labels of hand sanitisers (ingredients, alcohol percentage, instructions for use, expiry date and the full address of the manufacturer)," explained Teana Chiba, one of the performers.

The 40-minute play, performed by a group of students from the UP Drama Department, took place between 17 and 19 May 2021 at the UP community engagement site Moja Gabedi and was also filmed and disseminated online. ■

Promoting Global Health

IAP membership includes medical academies and academies of science and engineering with strong medical sections. The whole network is committed to improving health worldwide, with a special focus on low- and middle-income countries.

Climate Change and Health

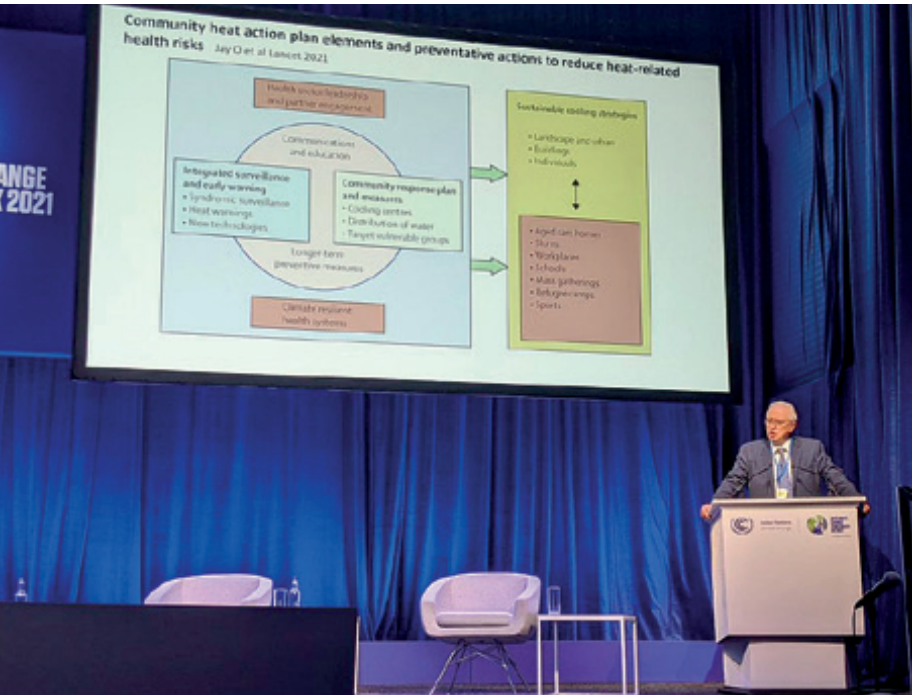
Climate change is a global health crisis. The scale, nature and timing of adverse effects on physical and mental health, via direct and indirect pathways, vary within and between regions. Yet, there are common challenges that must be tackled by better integrated solutions for mitigation (reducing greenhouse gas emissions) and adaptation (adjusting to what cannot be avoided).

In the three-year Climate Change and Health (CCH) global project that started in late 2019, IAP is working together with its regional networks in Africa (NASAC), Asia (AASSA) and the Americas (IANAS) to capture diversity in evaluating evidence from their own regions to inform policy for collective and customised action at national, regional and global levels.

Led by the German National Academy of Sciences, *Leopoldina*, and funded by the German Federal Ministry of Education and Research, the project has built on earlier work of IAP's regional network in Europe, EASAC. Its aim is to provide snapshots of the current situation and present science-based recommendations for Africa, the Asia/Pacific region and the Americas. Furthermore, a global synthesis report will highlight regional (including Europe) similarities and differences, and provide advice to decision makers for implementation at global, regional and national levels.

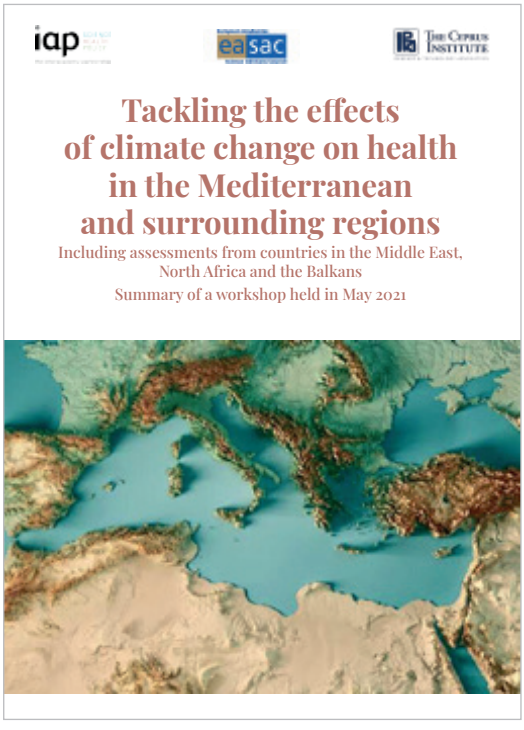
In 2021, the three regional working groups as well as the global core team continued to hold regular virtual working meetings. These replaced the physical meetings which were cancelled due to the COVID-19 pandemic. Despite

The presentaion of the IAP project on 'Climate Change and Health' at the UN Climate Summit COP26 in Glasgow, UK.



Andy Haines, Professor of Environmental Change and Public Health at London School of Hygiene & Tropical Medicine (LSHTM) and co-chair of the IAP project.

the change in working mode, all groups made great progress towards their final reports. The report prepared by the AASSA working group 'The imperative of climate action to promote and protect health in Asia' was ultimately launched in November 2021. Likewise, in April, EASAC and the Federation of European Academies of Medicine (FEAM) published a commentary on the decarbonisation of the health sector – work that complements the European input to the project's global synthesis report. During 2021, in parallel to the regional working groups, the global core team as well as an interregional editorial group took on the task of synthesising the regional outputs into a first draft of this global report.



The results of the virtual workshop on 'Climate Change and Health in the Eastern Mediterranean and MiddleEast Region' were summarized in a published report.

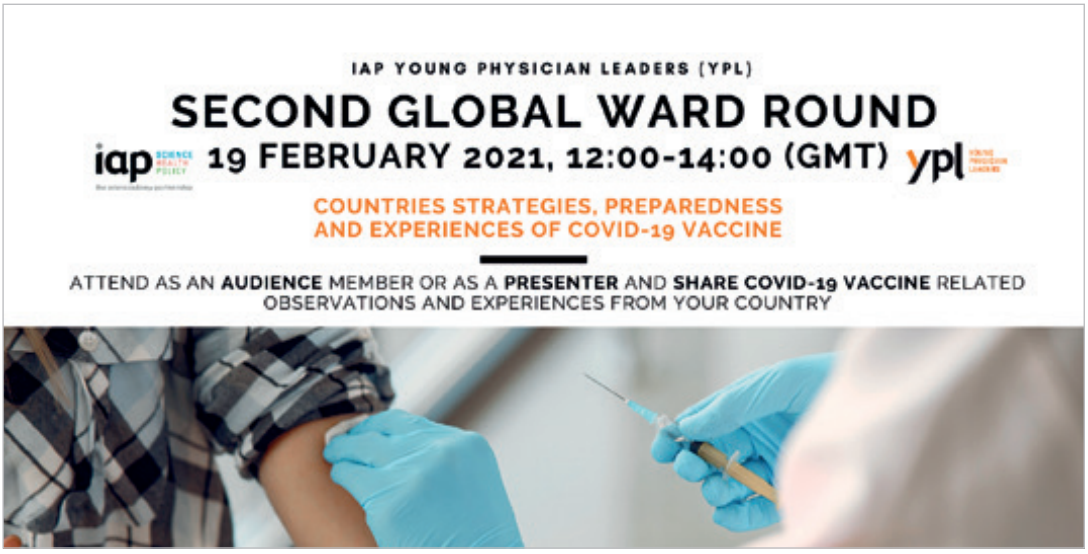
In addition to the regions and topics covered in the project up until the end of 2020, the year 2021 also saw the widening of the project's regional and thematic scope. As part of an initiative of the Cyprus government, IAP, together with the Cyprus Institute and EASAC, organized a virtual workshop on 'Climate Change and Health in the Eastern Mediterranean and Middle East Region' in May 2021. The results of this workshop were summarized in a published report.

Another important focus of the project has been to communicate the scientific findings to the public as well as policy-makers and other relevant stakeholders. Towards this goal, the project and initial findings were presented at various public events. In March 2021, IAP hosted a digital scientific session at the Annual Conference of the Consortium of Universities for Global Health; in May, members of the working group participated in a WHO Europe regional virtual consultation; and in September, NASAC hosted a virtual side event at the United Nations Framework Convention on Climate Change (UNFCCC) Climate Week Africa. Finally, in November, representatives of the project attended the UN Climate Summit COP26 in Glasgow, UK, in person and online, where they presented on IAP (newly granted observer status with the UNFCCC) and its work on 'Climate Change and Health' during several side events.

Young Physician Leaders

Since 2011, the IAP Young Physician Leader (YPL) programme has provided more than 200 outstanding young health professionals with the skills they need to promote health and strengthen health systems around the world. Twenty five young physicians, nominated by members of IAP and the 'M8 Alliance' of academic centres, were selected to participate in the 2021 programme.

Due to the COVID-19 pandemic and the interactive nature of the in-person training provided, IAP did not hold the regular leadership workshop at the World Health Summit (WHS) in Berlin, Germany, in October. Instead, the 2021 cohort met online for a meet-and-greet session on 18 October 2021 and attended the WHS virtually, and it will meet in person and undergo its leadership training workshop at the World Health Summit Regional Meeting in June 2022 in Rome, Italy.



The webinar included presentations by YPLs Jaifred Lopez (the Philippines), Helene Rossinot (France), Suraj Bhattarai (Nepal), Raymond Sarmiento (the Philippines), Nomathemba Chandiwana (South Africa) and a final Q&A session.

Typically, at the WHS, a conference session is set aside for the YPL to present on a leadership-related topic of their choice in the two to three days following their training workshop. This year, a group of members of the YPL Alumni Steering Committee stepped in to fill this void.

The session, titled 'Creating impact through young physician leadership: areas of action' featured Biljana Gjoneska (Macedonia), Dipendra Khatiwada (Nepal), Jaifred Christian Lopez (Philippines), Atiya Mosam (South Africa) and Juan Carlos Núñez-Enríquez (Mexico).

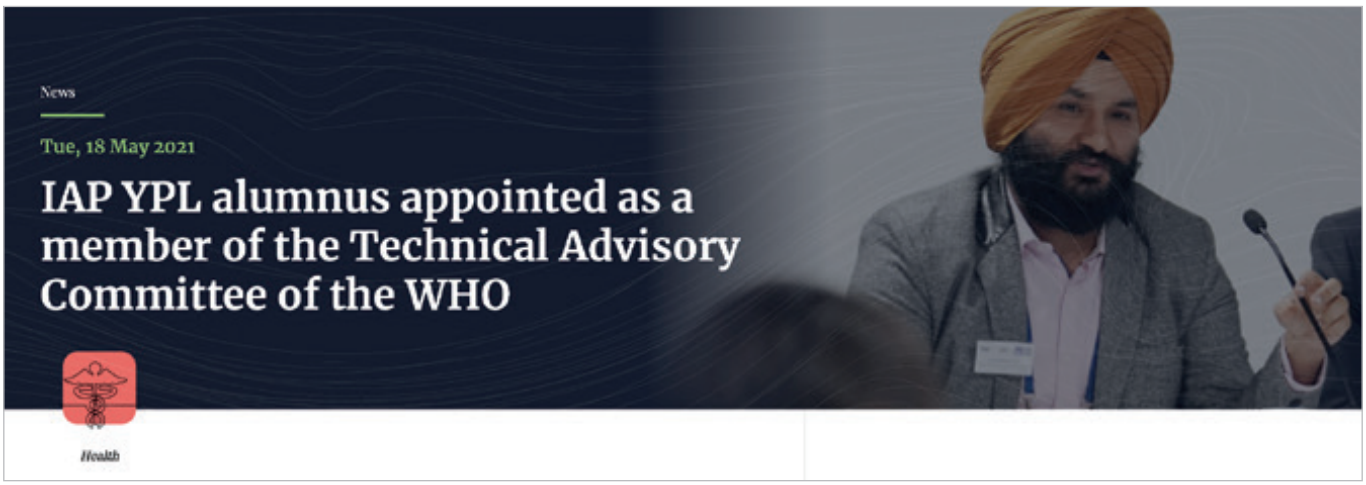
After an introduction by IAP Coordinator Peter McGrath, Gjoneska presented the IAP YPL programme, highlighting that in 10 years the programme helped train over 200 medical professionals under the age of 40 from around the globe. Subsequently, Lopez presented on 'Leadership in Education', Mosam discussed 'Leadership and the Social Impact' and Khatiwad highlighted the importance of 'Leadership in Public Health'.

The session was attended remotely by 90 participants from 33 countries (including many of the 2021 YPLs), and a lively Q&A session was moderated by Suraj Bhattarai (Nepal).

A key takeaway from the session, as reflected by the IAP YPL Alumni Steering Committee chair Atiya Mosam, is that "leadership is a deeply personal journey and physicians are expected to be leaders in so many facets of their personal and professional lives."

Young leaders therefore need a range of knowledge, skills and support (including mentors and peer mentors) to ensure that they are equipped for their formal and informal roles as leaders. This is one of the aims of the YPL programme and the focus of the Alumni Steering Committee in ensuring continuous engagement and mentorship.

Among the other activities organized by the YPL Alumni Steering Committee was a webinar on COVID-19 vaccine hesitancy (20 January 2021) that also fed into the IAP webinar on Countering Vaccine Hesitancy (see pages 13-14).



One of the achievements of a member of the IAP Young Physician Leaders (YPL) alumni network.

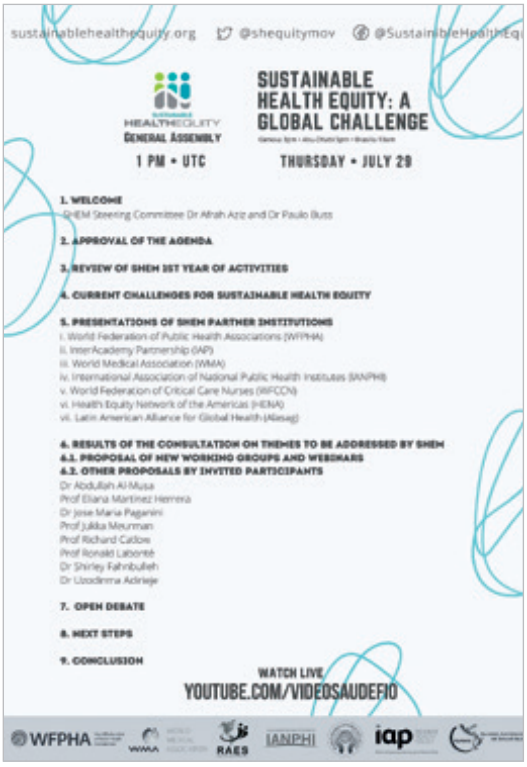
The General Assembly was s a critical moment in SHEM's collective quest for sustainable health equity.

Outstanding achievements by YPL alumni

The YPL section of the IAP website regularly hosts articles that put in the spotlight the achievements of the members of its alumni network.

In 2021, Raymond Francis Sarmiento, Director of the National Telehealth Center, National Institutes of Health, University of the Philippines, Manila, was cited as one of The Outstanding Young Men (TOYM) of 2020.

Paramdeep Singh, Associate Professor of Radiology at Guru Gobind Singh Medical College and Hospital, Faridkot, Punjab, India, was appointed as a member of the clinical diagnosis, imaging and microscopy cross-cutting subgroup of the World Health Organization (WHO) Diagnostic Technical Advisory Group (DTAG) for Neglected Tropical Diseases.



Fabien Vincent, a physician-scientist currently employed as a research fellow in the rheumatology group, centre for inflammatory diseases at Monash University, Australia, was among the researchers who received the 2021 Victorian Young Tall Poppy Science Award, an annual award that recognises the achievements of Australia's outstanding young scientific researchers and communicators.

Sustainable Health Equity Movement

The Sustainable Health Equity Movement (SHEM) gathers citizens, public health and healthcare professionals, scientists, academics and related institutions from all regions and cultures pursuing the universal right to health. The aim of the Movement is to promote sustainable health equity as an ethical principle that guides national and international economic, social and environmental policies. IAP joined the Movement at its launch in July 2020 and is represented on its Steering Committee.

On the occasion of the 74th World Health Assembly (24-31 May 2021), SHEM released 'Sustainable worldwide collaboration to respond to ongoing inequities and health emergencies', a statement that stresses the importance of recognising COVID-19 vaccines as a global public good and highlights the critical role the World Health Organization (WHO) can play in the global fight against the pandemic.

Among others, SHEM also delivered statements to Ambassador David Walker, chair of the General Council of the World Trade Organization (WTO), to COP26, to António Guterres, Secretary-General of the United Nations, to Boris Johnson, Prime Minister of the UK and president of the 2021 G7 Summit, and to the G20 Global Health Summit.

In July 2021, SHEM celebrated the movement's one-year anniversary. SHEM expanded through all regions, raised its voice in global meetings and grew in its collective commitment to stand for health equity. The SHEM General Assembly took place on 29 July 2021, and marked a critical moment for SHEM's collective quest for sustainable health equity. ■

Science Education and Science Literacy

Since 2003, IAP has been implementing a global Science Education Programme (SEP) which has the objective of improving science education and science literacy at the pre-university levels in all countries and regions of the world. The IAP SEP, led by a Global Council of experts, has specifically opted for the promotion of the inquiry-based science education (IBSE) approach.

Science centres in Africa

Progress has been made on the flagship initiative of the IAP SEP under the leadership of Global Council chair Wafa Skalli (Morocco). IAP is aiming to assist with the establishment of 'Centres of Science and Technology' in Africa – where they are absent in most countries. Such centres would provide space for hands-on science exhibits as well as FabLabs, multimedia displays, and workshop spaces for teacher training and the engagement of schoolchildren. A blueprint has been drawn up of what a 'standard' science centre might look like, but countries could adapt these designs to their own requirements.

A call for expressions of interest was sent out to academies in Africa, and from the positive responses, five academies/countries have been selected to participate in the first phase of the project: Benin, Ethiopia, Ghana, Morocco and Sudan.

In parallel, a consultant was hired to produce project brochures in English and in French. IAP will make small seed-funding grants available for the selected academies to develop their ideas – or further develop their fledgeling centres if they are more advanced in their implementation. In addition, fundraising efforts are ongoing to secure the financial resources to get these five centres off the ground.

Office for Climate Education

In 2021, the United Nations Educational, Scientific and Cultural Organization (UNESCO) signed an agreement with the French Ministry of Education to establish the Office for Climate Education (OCE) as a UNESCO Category 2 Centre.

Interactive science centres and museums are found in many countries around the world, especially in the global North. However, they are less common in low- and middle-income countries and especially absent from most Least Developed Countries and from most countries in Africa.

The OCE was created in 2018 by the foundation *La main à la pâte* (LAMAP) in order to promote a strong international cooperation between scientific organisations, education institutions and NGOs, with the aim of educating the young generations of today and tomorrow about climate change. Its establishment followed the release of the IAP Statement on 'Climate Change and Education' (led by the *Académie des sciences*, France), presented at the 'One Planet Summit' in Paris, France, in December 2017. OCE was founded in March 2018 and is now operative, producing resources for science teachers.

OCE promotes climate change education through four main functions: production of educational resources for primary and secondary school teachers that are aligned with the various outputs of the Intergovernmental Panel on Climate Change (IPCC); professional development of teachers through training sessions, structur-

ing and facilitating a community of practice on climate change education; and outreach and information exchange.

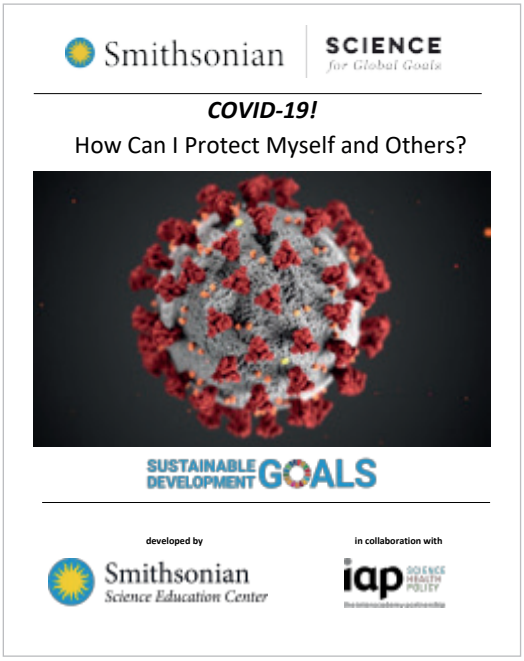
Students learn how to protect themselves and their communities from COVID-19

IAP provided four grants to support the roll-out of 'COVID-19! How can I protect myself and others?', a rapid-response educational guide for youth aged 8–17 developed by the Smithsonian Science Education Center (SSEC), in collaboration with the World Health Organization (WHO) and IAP. Of these four grants, two countries were able to implement their activities in 2021: Benin and Ethiopia.

Between 5 March and 5 April 2021, the Academy of Young Scientists of Benin and the Research Unit in Applied Microbiology and Pharmacology of Natural Substances of the Polytechnic School of Abomey-Calavi, organised a tour of several high schools and colleges, allowing more than 300 students to learn practical ways to stop the spread of this virus.

The team used the guide to help young people understand the science and social science of COVID-19 as well as help them take actions to keep themselves, their families and communities safe. The guide is based on the inquiry-based science education (IBSE) method, and encourages children and youth to understand the nature of the pandemic not only by explaining the science behind the novel coronavirus, but also by teaching how to properly wash hands, wear a mask and practice social distancing.

Students in Benin learn the proper technique for washing their hands.



"I learned that COVID-19 is a rampant disease and that we must protect ourselves from it. I also learned that washing our hands is very important," explained a young student in a video-report of the initiative.

"By engaging with the young, this initiative aims at having a great impact on our communities," said Victorien Dougnon, president of the Academy of Young Scientists of Benin.

"As microbiologists, that's what we want to achieve: to involve young schoolchildren and students in the fight against COVID-19," he added.

On 27 May and 26 November 2021, the headquarters of the Ethiopian Academy of Sciences in Addis Ababa, Ethiopia, hosted two events on 'COVID-19!'. Forty students and eight teachers from four different schools attended the first event; 44 students and ten teachers from five other schools attended the second one. As part of these activities, teachers were trained on how to use the module during an orientation session.

In 2021, another IAP grant for the roll-out of 'COVID-19!' was also awarded to the Sudanese National Academy of Science (SNAS), but due to the COVID-19 pandemic activities were postponed to 2022.

Vaccines! How can we use science to help our community make decisions about vaccines?

As part of the Smithsonian Science for Global Goals project, SSEC, in collaboration with the

WHO and IAP, developed 'Vaccines! How can we use science to help our community make decisions about vaccines?', another community response guide for schoolchildren. Through the guide, young people learn about the science behind vaccines and investigate the concerns of their community in order to communicate accurate, helpful and trusted information about vaccines.

The guide features eight tasks covering topics such as the science of vaccines throughout history; how vaccines work and are developed; and issues of equity, access and misinformation. Using the knowledge gained, students are encouraged to develop an action plan for addressing vaccine concerns within their communities.

"As youth around the globe engage with the activities in this guide, they will be able to share their knowledge with their community, create tangible ways to help their community make informed decisions in this challenging time and understand the best places to find additional information on the topic," said Carol O'Donnell, director of the SSEC.

Speaking at the launch of the guide, Soumya Swaminathan, chief scientist at WHO, said: "understanding the relationship between human beings and the environment will help us live in harmony and also prepare for future pandemics. With all the myths and misconceptions out there, it is important for children and youth to understand the nature of this pandemic and what can be done to prevent future pandemics from happening."

"It is so important for children—wherever they are in the world—to develop their scientific understanding and rational thinking," said Volker ter Meulen, former co-president of IAP. "Only by being able to make rational decisions based on the best science and evidence can any of us adjust our behavior to keep ourselves and our families safe from infections."

IAP Young Physician Leaders (YPL) alumnae Mary Ashinyo (Ghana) and Atiya Mosyam (South Africa) contributed to this guide as project advisors.

Science education in Central Asia

'Working with Big Ideas of Science Education', a book published by IAP in 2015, addresses concerns that the science curriculum in many countries is over-loaded and over-detailed. Teaching science in this out-moded way is frequently accompanied by assessment that requires memorising multiple facts, and deters the adoption of the widely advocated inquiry-based approach to teaching and learning.

The book provides a reasoned response to this situation by expressing the goals of science education in terms of a relatively small number of powerful ideas – called 'big ideas' because they explain a range of related phenomena and events. It sets out big ideas of science and about science in the form of narrative descriptions of

Participants of the 5th Teenagers Maker Camp in Chongqing, China.

IAP Science Education Programme (SEP) Global Council member Lazzat Kussainova meets a group of students in Tashkent, Uzbekistan.

progression in building an understanding of key ideas across the years from the start of primary to the end of secondary school.

IAP supported the translation of this book into Russian and the International Centre of Scientific Collaborations (ICSC), led by IAP Science Education Programme (SEP) Global Council member Lazzat Kussainova, has begun to introduce the concepts outlined in this IAP book into schools in Central Asia.

In May 2021, 85 teachers attended a course on 'Integration approaches that promote the interaction of general secondary and additional education for children' in Nur-Sultan, Kazakhstan, and during the event they had the chance to learn about the contents of the book and how to implement inquiry-based teaching.

Subsequently, on 22-27 November 2021, the National Office for Innovation and Technology Support of Uzbekistan invited Kussainova to attend the Innovation Week that took place in Tashkent, the capital of Uzbekistan. During the visit, Kussainova discussed the organisation of science education courses for Uzbek teachers with Mr. A. Tuichiev, Director General of the National Office.

Furthermore, Kussainova visited the boarding school of Ulugbek – a school for gifted children that focuses on mathematics, physics and astronomy – and met with schoolchildren and teachers. During the visit, she gave a lecture on 'Children in Science: Success stories', and highlighted how Kazakhstani schoolchildren, together with peers from other countries, participated in international science project competitions, winning many awards. Kussainova also discussed the right of children to study science.

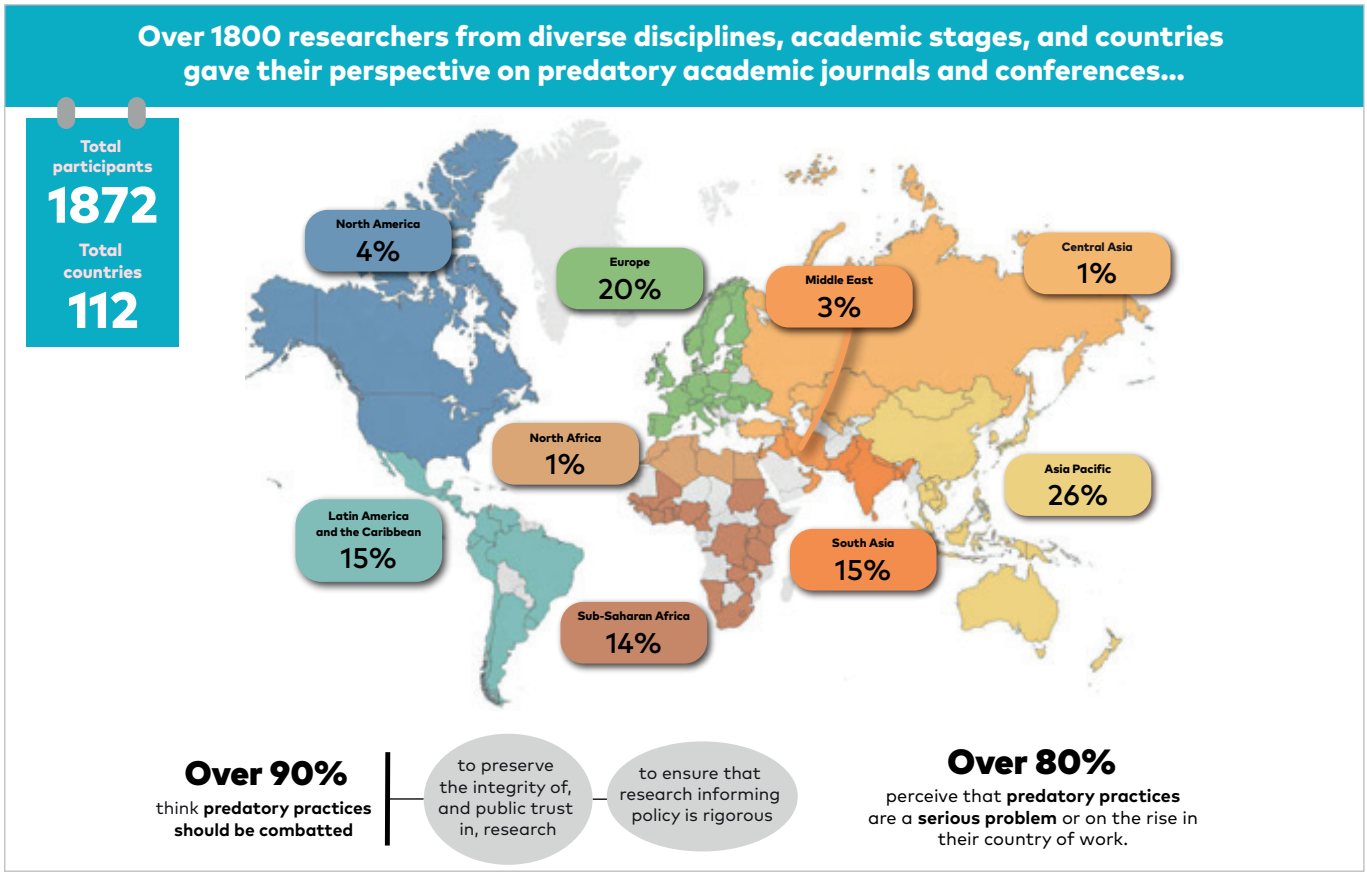
At the initiative of Kussainova and with the support of the China Association for Science and Technology (CAST), a team of three schoolchildren and one teacher from Ulugbek Boarding School in Uzbekistan together with teams of schoolchildren and teachers from Tokmok, Osh and Naryn in Kyrgyzstan, took part for the first time in the annual Teenager Maker Camp and Teacher workshop, which was held between September and November 2021 online and in Chongqing, China. ■

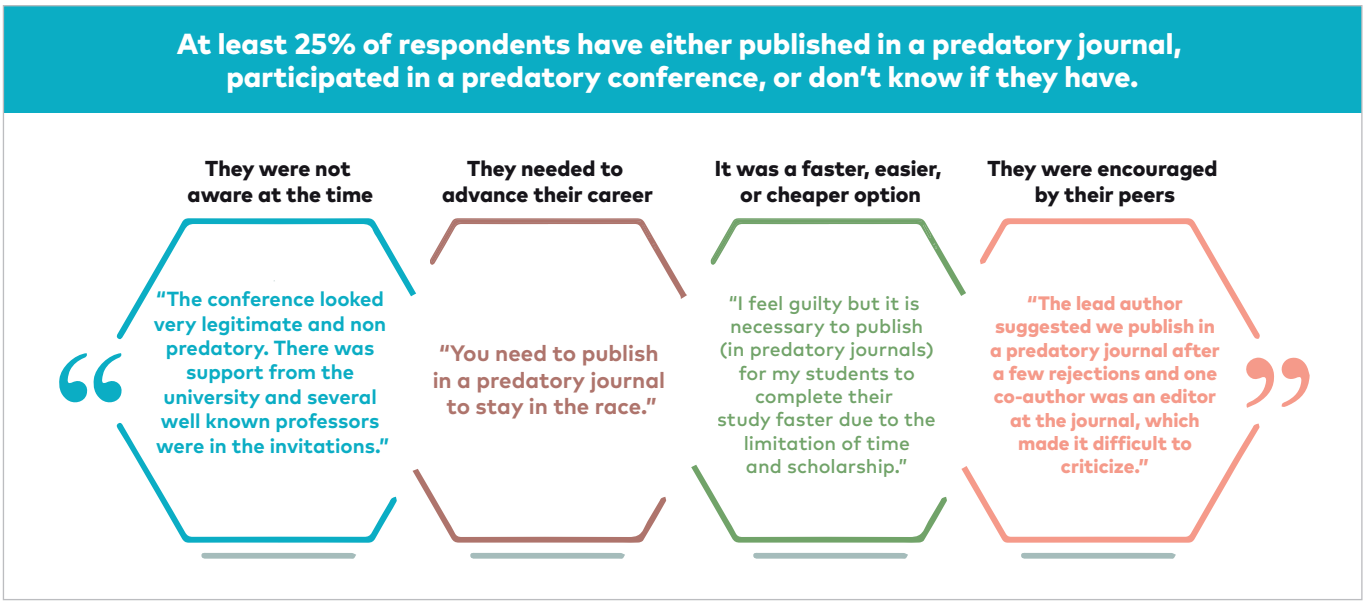
Combatting Predatory Academic Journals and Conferences

Launched in May 2020, IAP's two-year study 'Combatting predatory academic journals and conferences' continued in earnest during 2021. Funded by The Gordon and Betty Moore Foundation, the study explored predatory academic practices more inclusively and comprehensively than any previous study.

Predatory journals and conferences are those that solicit articles and abstracts from researchers through deceitful or misleading practices that exploit the pressure on researchers to publish and present their work. Motivated purely by profit rather than scholarship, their practices include rapid pay-to-publish models with little or no peer review, fake editorial boards falsely listing respected scientists, fraudulent impact factors, hijacked titles and aggressive spam invitations.

Over the course of 2021, the project's expert Working Group met virtually seven times, with its work focusing on an extensive literature review; development of a new identification tool ('a spectrum') to assist researchers choose an appropriate journal for their work; reporting on a unique global survey of researchers; hosting a





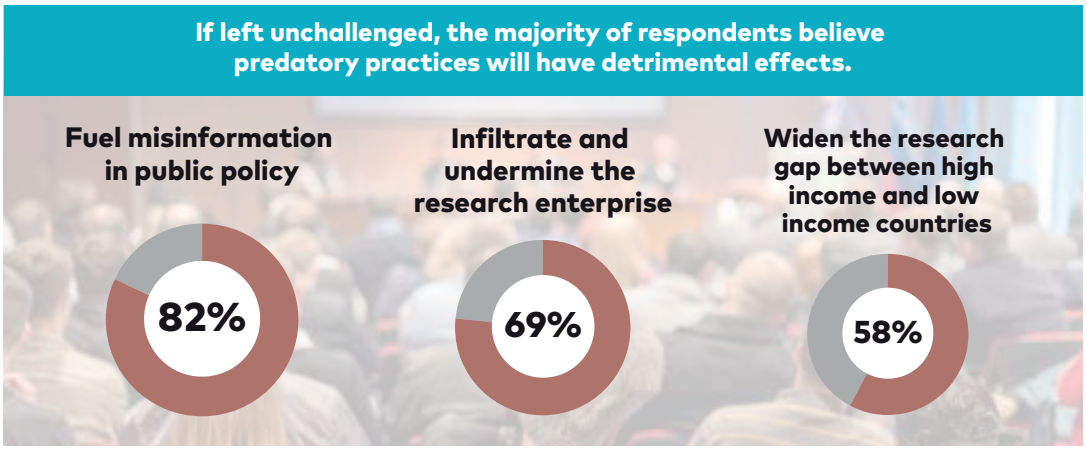
series of webinars to raise awareness and share what has been learnt; and running a competitive grants programme to support local awareness-raising and outreach. Cumulatively, it is anticipated that the study will help researchers practice due diligence and make more informed decisions about where they publish and present their work.

As explained by Susan Veldsman, member of the Academy of Science of South Africa (ASSAf) and Working Group co-chair, "predatory journals and conferences appear to be pervading all geographies, disciplines and academic career stages, with over 80% of respondents to our global survey indicating that they are already a problem or on the rise in their country of work."

"We estimate that over 1 million researchers are likely to have used predatory outlets (largely unknowingly) at a cost of billion of dollars of wasted research. This is largely due to a lack of awareness and not knowing how to recognise what is predatory and what is not. Training is both urgent and imperative."

Indeed, 2021 saw a period of intense outreach activities. Study findings were presented in regional online webinars in Europe (with EASAC, 19 November 2021), Africa (with NASAC, 24 November 2021) the Americas (with IANAS, 3 December 2021), Asia (with AASSA, 7 December 2021), and globally (with The World Academy of Sciences (UNESCO-TWAS), 14 December 2021). Video presentations with English, Spanish and French subtitles are all available on the IAP YouTube channel.

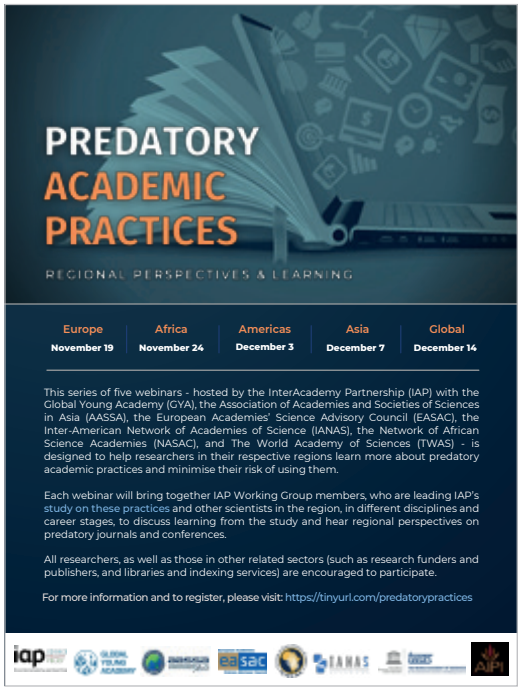
Numerous presentations were made throughout the year, for example: 'International webinar on digital scholarly communication' - 31 March 2021 (Jakarta with the Indonesian Academy of Sciences); Elsevier's Scopus Content Selection and Advisory Board (CSAB) meeting - 1 June 2021; 'Money for Nothing: Predatory practices in academic journals and conference', US National Academy of Science Government-University Roundtable webinar - 16 June 2021; Inter-American Institute for Global Change Research COP29 - 22-23 June 2021; Latindex panel



on predatory journals and editors - 22 September 2021; South Africa National Scholarly Editors' Forum (NSEF) - 11 November 2021; ISSN (International Standard Serial Number) Directors meeting - 19 November 2021; and Science Forum South Africa - 2 December 2021.

Under the study's competitive grants programme, academies in the Czech Republic, Guatemala, Nigeria and Sudan, and young academies in Bangladesh, Nepal and Nigeria led local outreach initiatives, such as hosting webinars and roundtables with researchers, policy-makers, and promotion boards and leaders of higher education institutions (HEIs); running researcher surveys and social media campaigns; and developing online teaching and training courses. To inspire other academies to take action, the results of their efforts are shared on the project's web page.

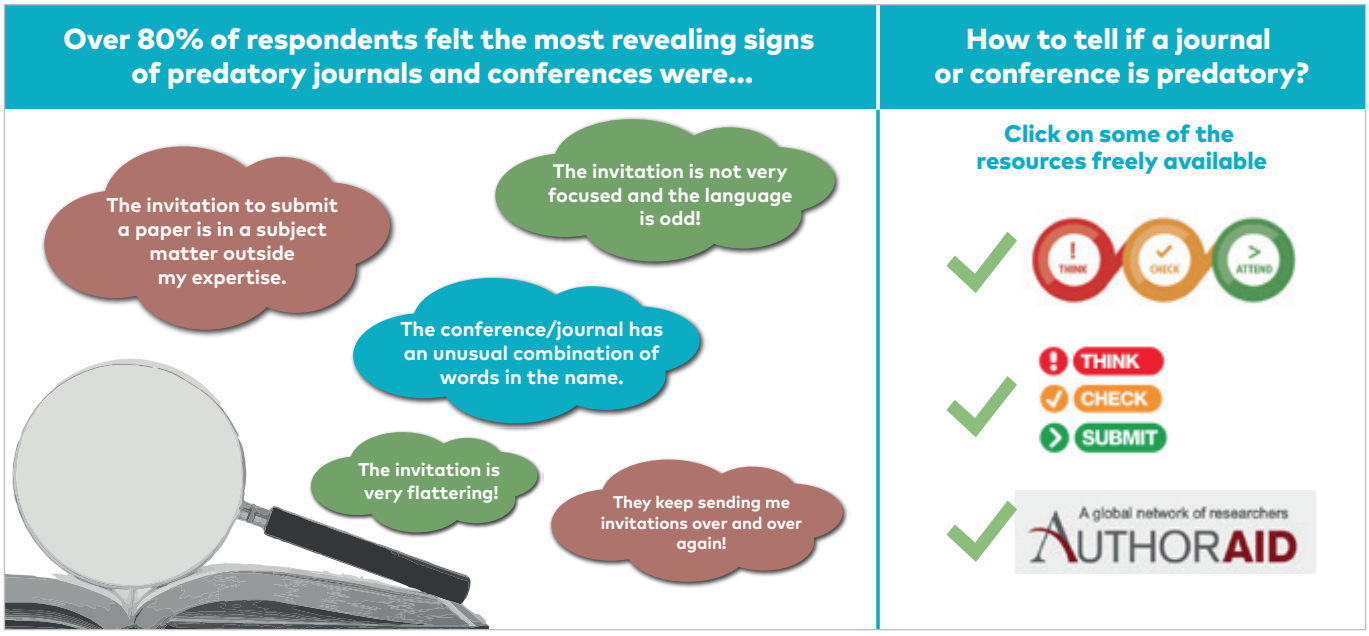
The final report, with publication date March 2022, sets out a coherent global strategy with recommendations for multiple stakeholders who can bring about real change: the research community, academies, research funders, HEIs, publishers, libraries and indexing services, and intergovernmental organisations (IGOs). As a key illustration of the study's impact, members of the InterAmerican Institute for Global Change Research (IAI) adopted a decision aimed at its Directorate and science policy advisory structures to work with national and international academies of science, scientific publishers, universities and other relevant partners to raise awareness and prevent the growth of fraudulent and predatory publishing in the Americas. This decision puts predatory academic practices on the radar of member governments and creates a platform for future cooperation.

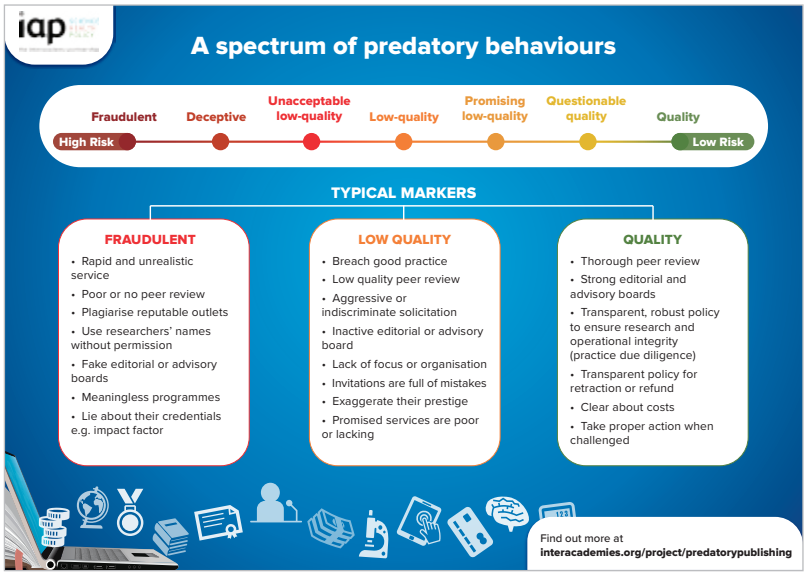


The flyer of one of the webinars organised in 2021.

Recommendations of the report are targeted at individuals, institutions and systems, at local, national, regional and global level. IAP member academies and regional networks are encouraged to familiarise themselves with the recommendations made to them and act on as many as practicable. Essentially, the recommendations fall into four categories.

The academies as advocates: implementing those recommendations that raise awareness of predatory academic practices in recognition that most academicians serve as mentors and supervisors of junior colleagues; leaders of





HEIs; board members of funding, publishing and other governance bodies; and advisers to policy-makers.

The academies as exemplars: implementing those recommendations that require an institutional culture change in (inter)academy business – refreshing their membership, awards, publishing and conferencing practices, and leading by example.

The academies as innovators: implementing those recommendations that encourage IAP and its member academies to help address the systemic drivers of predatory practices (curbing the commercialisation of research, reforming research evaluation and strengthening the peer review system).

The academies as collaborators: implementing those recommendations that require IAP to support already established campaigns for open science (being led by, for example, UNESCO), the future of scientific publishing (being led by, for example, the International Science Council, ISC) and the reform of research assessment (being led by multiple bodies such as the San Francisco Declaration on Research Assessment (DORA) and the European Union Commission).

"The author-pays model of open access is particularly open to abuse, allowing publishers to predate on researchers and driving many of them, especially in poorly resourced countries, into the arms of predatory outlets. This further exacerbates the already unacceptable systemic bias and research gap between researchers in low and high-income countries," said Abdullah Shams Bin Tariq, Associate Fellow of the Bangladesh Academy of Sciences (BAS) and Working Group co-chair.

Learning from this study is being used to scope a new initiative on research evaluation in 2022, which lies at the heart of many of the global research community's challenges and for which predatory practices are a symptom. To develop this follow-on project, IAP has entered into partnership with the Global Young Academy (GYA) and ISC. The aim of the new initiative is to complement projects led by other global institutions on related issues of open science and the future of scientific publishing. ■

Supporting Refugee and Displaced Scientists

In March 2021, The World Academy of Sciences (UNESCO-TWAS), the International Science Council (ISC) and IAP launched the Science in Exile initiative, the groundwork for which was laid back in 2017. The initiative aims to create a network of like-minded organizations that work together to develop a platform, and roll out an advocacy campaign to respond cohesively to the needs of at-risk, displaced and refugee scientists.

Science in Exile launch

The Science in Exile (SiE) initiative was officially launched in March 2021, via a three-day international virtual workshop with about 70 participants from around the world, including displaced scientists and organizations such as the United Nations, other international organizations, non-governmental organizations, universities, governments, scientific institutions and diaspora groups.

In addition, participants were linked to SiE organizing partners, including TWAS fellows, TWAS Young Affiliates, TWAS Regional Partners, IAP member academies, or scientific unions or other members of ISC.

Following a public call for nominations, the Science in Exile Steering Committee was established in June 2021, during the celebrations of the World Refugee Day.

The Committee comprises 12 members from academia, the scientific community and the non-governmental sector. 58% of them are women, and two-thirds come from the Global South.

As it stands, opportunities for refugee and displaced scientists are few and fragmented, mostly in the global North, with limited duration and great inconsistency among hosting countries and limited engagement by the scientific community.

The Science in Exile initiative brings together at-risk, displaced and refugee scientists along with like-minded organizations who work together to strengthen systems that support, protect and integrate such affected scientists.

Members are internationally renowned experts, professionals and/or scientists with exceptional knowledge and expertise in displacement/refugee/humanitarian issues, higher education and science, policy-making and/or advocacy. They are either at-risk, displaced or refugee scientists themselves, or work for organizations that support, protect and advocate for them at national, intergovernmental and/or global level.

The role of the Committee is to provide leadership to the Science in Exile initiative and oversee the implementation of its activities during an interim (one year) governance phase, and to encourage the growth of the initiative into an active international movement.

The Science in Exile interim governance structures includes four Task Teams: 'Preservation (and protection) of scientific systems, knowledge and culture', 'Advocacy campaign', 'Supporting at risk, displaced, and refugee scientists' and 'Mapping and research.'

Task Teams met once a month and reported periodically to the IAP Steering Committee.

Gender and displacement

On International Women's Day (8 March 2021), Gender in Science, Innovation, Technology and Engineering (GenderInSITE), UNESCO-TWAS and IAP representatives discussed the Gender Dimension of Refugee and Displaced Scientists at the World Forum for Women in Science, hosted by Women in Science Without Borders (WISWB). The session was co-moderated by Peter McGrath, IAP Coordinator.

Testimonies from two women scientists highlighted the challenges they faced in their home countries and in their 'foster' countries as both displaced scientists, and as wives and mothers.

"There is the need to link female scholars to funding organisations that can support them in host countries," said Ghanya Al-Naqeb, a researcher from Yemen now working at the University of Trento, Italy.

"Displaced scientists can contribute significantly to their host countries, they only need a helping hand," added Saja Al Zoubi, a gender and forced migration researcher from Syria based at the University of Glasgow, UK.

"Drawing attention to the predicament of displaced women scientists, places a responsibility on an initiative such as GenderInSITE, to work with established organisations, such as UNESCO-TWAS, IAP and ISC, that have already embarked on an initiative on refugee and dis-

placed scientists, to bring a gender lens to bear on the issue," added Roseanne Diab, Director of GenderInSITE, who co-moderated the panel.

Articles, podcasts and webinars

The UNESCO Science Report 'The Race against Time for Smarter Development' included the chapter 'The integration of refugee and displaced scientists creates a win-win situation', written by Peter McGrath and Edward W. Lempinen, a writer and media relations specialist at the University of California, Berkeley, USA, and former public information officer for UNESCO-TWAS. The article refers to the series of practical recommendations for different sectors of society published following a March 2017 workshop hosted by UNESCO-TWAS, the Euro-Mediterranean University and the Italian *Istituto nazionale di oceanografia e di geofisica sperimentale* (OGS).

In 2021, a series of webinars brought together displaced scientists and existing organizations that provide assistance to affected scientists, to exchange ideas and best practices, identify gaps in building practical support programmes across different world regions, and raise awareness of the issue among governments, international agencies and the broader scientific community.

These online events focused on 'The unfolding emergencies: Ethiopia and Myanmar' (22 June), 'Protracted situation of displacement: Afghanistan, Syria, Venezuela, Yemen' (28 July), 'Long-term support of refugee and displaced scientists: the power of mentorship' (30 September), and 'Return of scientific personnel and reconstruction of scientific system and infrastructure' (26 October).

Starting in September 2021, ISC launched a series of six podcasts on the Science in Exile theme. The podcasts feature interviews with refugee and displaced scientists who share their science, their stories of displacement and their hopes for the future. Giovanni Ortolani, IAP Communication Assistant, was part of the editorial oversight committee for this project.

The series featured members of the Science in Exile steering committee as well as other scholars involved in the initiative. The aim was to give a platform to displaced scientists to share their first-hand experiences, and to raise awareness of the issues faced by at-risk, displaced and refugee scholars.

The international community must ensure that those scholars' skills and training are put to good use and that they preserve and develop their expertise, both for their benefit, and for the benefit of their home and host countries.

The number of displaced and refugee scientists is unknown, but probably in the thousands and possibly exceeding 10,000.

Supporting Afghan scientists and scholars

After decades of conflict, Afghanistan's higher education and research sector saw a period of stability and growth. However, the 2021 takeover of the Afghan government by the Taliban left an uncertain and increasingly threatening situation for many Afghan citizens.

The joint IAP-ISC statement 'Action for Afghan scientists and scholars' expresses concern for Afghan scholars in Afghanistan and around the world, and calls for urgent action to preserve gains made in education and research in Afghanistan in recent decades.

IAP and ISC urge action to support affected Afghan scholars and students for the foreseeable future, for example through the establishment of dedicated fellowships, or through waiving any intent-to-return clauses that may affect current research or study opportunities for Afghan scholars.

"Only with international support can we retain a trained cadre of Afghani scientists ready to assist their country when it becomes possible to do so again," reads the statement.

"As an immediate priority, attention must turn towards assisting scientists that have successfully fled the country and who may now be seeking asylum elsewhere, and to those Afghan students and scholars currently pursuing their work and education in other countries around the world, especially women scientists and students, and who may not wish to return to Afghanistan."

SiE Fellowship Programme

Under the auspices of the SiE programme, UNESCO-TWAS entered into agreement with the Pakistan-based Ministerial Standing Committee on Scientific and Technological Cooperation (COMSTECH) of the OIC (Organization of Islamic Cooperation). On 15 December 2021, a call for the UNESCO-TWAS – COMSTECH Science in Exile Fellowship Programme for displaced and refugee scholars and scientists was published.

This activity aims to provide displaced and refugee scholars and scientists who have not yet found a safe and long-term host country to pursue doctoral and postdoctoral studies in Pakistan at institutions members of the COMSTECH Consortium of Excellence (CCoE), starting in 2022.

For additional information, visit: *www.scienceinexile.org.* ■

Biosecurity and Responsible Research

IAP has a long track record of promoting responsible research practices, dating back to the establishment in 2003 of a Biosecurity Working Group, designed especially to link with the Biological and Toxin Weapons Convention (BWC).

During 2021, IAP was invited to participate in two projects funded largely by the US Department of State and led by two US-based organisations: the Federation of American Scientists (FAS) and the Johns Hopkins Center for Health Security. Members of the IAP Biosecurity Working Group contributed to both projects.

Advisory Mechanism

Despite being an agreement that depends largely on scientific information, the Biological and Toxin Weapons Convention (BWC) currently does not include a formal mechanism by which science advice is presented to States Parties. The aim of the FAS-IAP project was to discuss with relevant experts how such a mechanism might work and to present options to BWC States Parties.

On 18 March 2021, FAS and IAP kicked off a multi-week 'Workshop on the Modalities of a Scientific Advisory Process for the Biological Weapons Convention (BWC)' involving 40 senior scientists, diplomats, academics and other key stakeholders around the world. The aim of the workshop was to prepare a recommendation to create an advisory mechanism to be considered at the Ninth Review Conference of the BWC.

In the second part of the Workshop (on 25 March) speakers made presentations about scientific advisory mechanisms in other multilateral forums, and about the recent proposals that have been made in BWC meetings. Discussions focused on the areas of agreement for a new process (e.g. independent, strictly technical, free from political considerations), and the areas of disagreement (size of the body, its composition, qualifications of its members, etc).

A project update was provided to the Meeting of Experts (MX2) of the BWC during a webinar on a 'Review of Developments in the Field of Science and Technology Related to the Convention' that took place on 29 June 2021.

A second Workshop reconvened the participants later in 2021 with the aim of resolving areas of disagreement and finalising a consensus proposal for consideration by BWC States Parties.

Biosecurity Guidelines

The need for an internationally coordinated set of measures for managing bio-risks has been at the forefront of the considerations of States Parties of the BWC for nearly two decades. China, together with Pakistan, officially submitted to the 2016 Eighth Review Conference of the BWC a working paper for 'A Model Code of Conduct for Biological Scientists' developed by scholars

The Tianjin Biosecurity Guidelines for Codes of Conduct for Scientists

Advances in the biological sciences bring about wellbeing for humanity, but the same advances could be misused, particularly for the development and proliferation of biological weapons. To promote a culture of responsibility and guard against such misuse, all scientists, research institutions, and governments are encouraged to incorporate elements from the **Tianjin Biosecurity Guidelines for Codes of Conduct for Scientists** in their national and institutional practices, protocols, and regulations. The ultimate aim is to prevent misuse of bioscience research without hindering beneficial outcomes, in accordance with the articles and norms of the Biological and Toxin Weapons Convention (BWC), and in advancement of progress towards achieving the UN Sustainable Development Goals.

1. Ethical Standards

Scientists* should respect human life and relevant social ethics. They have a special responsibility to use biosciences for peaceful purposes that benefit humankind, to promote a culture of responsible conduct in biosciences and to guard against the misuse of science for malicious purposes, including harm to the environment.

2. Laws and Norms

Scientists should be aware of and observe applicable domestic laws and regulations, international legal instruments, and norms relating to biological research, including those on the prohibition of biological weapons. Scientists and their professional bodies are encouraged to contribute to the establishment and further development and strengthening of relevant legislation.

3. Responsible Conduct of Research

Scientists should promote scientific integrity and strive to prevent misconduct in research. They should be aware of the multiple applications of biological sciences, including their potential use for developing biological weapons. Measures should be taken to prevent the misuse and negative impacts of biological products, data, expertise, or equipment.

* For purposes of this document, "scientists" are practitioners engaged in work that includes biological science, including those involved in funding, education, and training; research and development (in the public and private sectors); project planning, management, dissemination, and oversight.

The Tianjin Biosecurity Guidelines for Codes of Conduct for Scientists | 1

The IAP General Assembly agreed to establish a Biosecurity Working Group in 2003, designed especially to link with the Biological and Toxin Weapons Convention (BWC).

at Tianjin University's Center for Biosafety Research and Strategy, with a follow-up document submitted in 2018.

Since then, and especially since January 2021, Tianjin University and the Johns Hopkins Center for Health Security worked with IAP, also in close liaison with the US Department of State and the Chinese Ministry of Foreign Affairs, to adapt the China-Pakistan document into a set of guiding principles and standards of conduct, which both individual scientists and institutions active in biological research are expected to follow.

Within this collaboration, IAP assisted in organizing and hosting two online international workshops (on 8 April and 26 May 2021) designed to solicit the input of a group of about 20 international experts to review, revise and improve earlier drafts of the document as well as to advise on eventual dissemination strategies. M. Iqbal Parker, a member of the IAP Biosecurity Working Group from South Africa, also played an active role in drafting and reviewing the 'Tianjin Biosecurity Guidelines for Codes of Conduct for Scientists'. Other members of the IAP Biosecurity Working Group, including the chair, Ann Arvin (USA), participated in the two online discussion workshops.

The ten guiding principles and standards of conduct laid out in the 'Tianjin Biosecurity Guidelines for Codes of Conduct for Scientists' are designed to be fundamental and inherently adaptable to diverse contexts and thus may be used to develop new or enhance, supplement and update existing codes of conduct to fill the gaps in biosecurity governance at national and institutional levels.

At a time when research capacity in the biosciences is increasing, and new technologies such as genome editing and synthetic biology are becoming accessible in more and more countries, the publication of such a set of guidelines is timely. IAP's member academies and other scientific organizations are now encouraged to disseminate the Tianjin Guidelines and work to ensure their integration into national and institutional biosecurity and biosafety codes of conduct.

The Tianjin Biosecurity Guidelines for Codes of Conduct for Scientists were endorsed by IAP following a review by members of its Statements Governance Committee before sign-off by the

Advances in the biological sciences must bring about wellbeing for humanity and not be misused, particularly for the development of biological weapons.

Steering Committee. They are available in the six official UN languages (Arabic, Chinese, English, French, Russian and Spanish) and an infographic has been prepared to present the key messages in an easy, visual way.

Biological Weapons Convention (BWC) Meetings of Experts

The 2021 Biological Weapons Convention (BWC) Meetings of Experts was held in Geneva, Switzerland, from 30 August to 8 September. Within the dedicated session of the Meeting of Experts on Science and Technology (MX2), a key agenda item focused on the consideration of establishing a scientific advisory body.

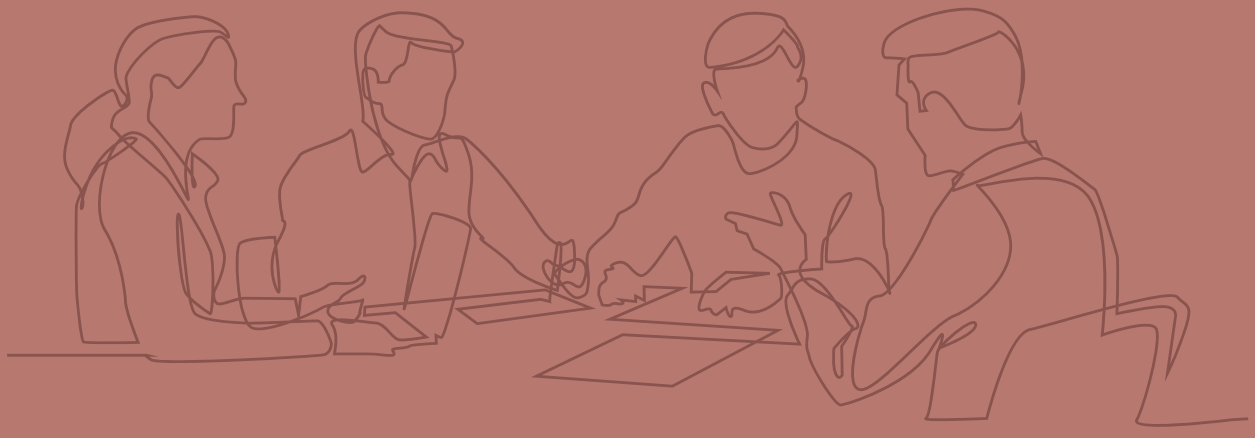
On the first day of the meeting, the US representative introduced 'Working Paper 7' and invited FAS's Senior Fellow for International Security, Jenifer Mackby, to present the 'Findings of the Workshops' paper. A number of delegations, as well as the Chair of MX2, made positive comments about the project's conclusions which were generally well received among the States Parties.

As highlighted in the FAS document, "[t]he Workshop discussions reinforced the assessment that there is broad support among BWC States Parties for a more structured scientific advisory process to help assess possible risks, as well as benefits, of scientific advances and to help States Parties adopt relevant national measures."

A study by the United Nations Institute for Disarmament Research (UNIDIR), Exploring Science and Technology Review Mechanisms under the Biological Weapons Convention, was also presented and together these two efforts have focused attention on the necessity of establishing a scientific advisory body for the BWC.

In addition, on 1 September, a short video by Tianjin University, the Johns Hopkins Center for Health Security and IAP introduced the Tianjin Biosecurity Guidelines for Codes of Conduct for Scientists to MX2 participants. ■

Regional Activities



Association of Academies and Societies of Science in Asia (AASSA)

The Association of Academies and Societies of Sciences in Asia (AASSA) is a non-profit international organization with science, technology and innovation (STI) interests. It consists of scientific and technological academies and science societies in Asia and Oceania.

In 2021, the Association of Academies and Societies of Science in Asia (AASSA), with the support and leadership of IAP, worked to enhance collaboration and cooperation among academies, science societies and scientists in Asia and Oceania. It also focused on ensuring that the voice of science was heard by the general public and policy-makers at local, national and international levels.

The COVID-19 pandemic forced AASSA to opt for virtual rather than physical meetings. This change in operations created many challenges, but it also allowed more scientists from around the region and the rest of the world to safely participate in AASSA's many webinars.

General Assembly

The triennial AASSA General Assembly was held on 15 October 2021 via Zoom. During the Assembly, participants reported on the organisation's activities from 2018 to 2021 and discussed its activity plan for 2021-2022. The Assembly also chose its new leadership and elected Dato' Dr. Khairul Anuar bin Abdullah (Academy of Sciences Malaysia) as President, Nuri Yurdusev (Turkish Academy of Sciences) as President-elect, and Satryo Soemantri Brodjonegoro (Indonesian Academy of Sciences), A.K. Azad Chowdhury (Bangladesh Academy of Sciences), Mooha Lee (Korean Academy of Science and Technology), Tasawar Hayat (Pakistan Academy of Science), Viktor Bogatov (Far Eastern Branch of the Russian Academy of Sciences) and Supawan Tantayanon (Science Society of Thailand under the Patronage of His Majesty the King) as Members-at-Large.

The gathering saw also the launch of the 'Prof. Yoo Hang Kim Young Woman Scientists Award', a new award programme that will be supported by Prof. Kim with a cash award of $10,000 per year for ten years.

Digital scholarly communication

AASSA and the Indonesian Academy of Sciences (AIPI), with financial support from IAP, jointly organised three webinars to share, discuss and brainstorm on issues related to digital scholarly communication: 'Regional Patterns of Digital Scholarly Communication and Publications' (31 March), 'Access to Digital Scholarly Publications: Strategies, Applications and Impacts' (28 April) and 'Publication and Dissemination of Digital Scholarly Communication' (19 May).

During the webinars, about 50 experts, including science communicators, policy-makers and scientists not only from Asia and Oceania, but also from other continents, met online. The keynote speakers were high level policy-makers either from the Indonesian Government or from the United Nations: Bambang Permadi Brodjonegoro (Minister for Research & Technology/ Head of the National Research and Innovation Agency (BRIN)), Ir Nizam, (Director General for Higher Education, Ministry of Education & Culture, Indonesia), and Armida Salsiah Alisjahbana (Under-Secretary-General of the United Nations and Executive Secretary of the Economic and Social Commission for Asia and the Pacific). In total, more than 1,800 people attended the webinars via Zoom and more than 1,300 followed on YouTube. The Indonesian Academy of Sciences published the proceedings of the workshop.

Plastic pollution

The Bangladesh Academy of Sciences (BAS) and AASSA, with the financial support of IAP, organ-

On-site participants at the BAS-AASSA webinar on 'Plastic Pollution: Causes, Effects and Solutions'.

ised the hybrid BAS-AASSA webinar 'Plastic Pollution: Causes, Effects and Solutions' on 29-30 May 2021.

The event attracted around 40 international and national experts, including Yafesh Osman, the Minister of Science & Technology of the Government of the People's Republic of Bangladesh who, in his keynote presentation, examined the status of plastic pollution, the major problems it causes and tackled its policy implications. The opening and the closing sessions also featured other addresses by high-level policy-makers from the Bangladesh Government, including Muhamad M. Chowdhury (Director General - Additional Secretary of the National Museum of Science & Technology) and M.A. Mannan (Minister of Planning).

The webinar included sessions on 'Burden and causes of plastic pollution', 'Update on policies and regulations related to plastic pollution', 'Plastic pollution and environment', 'Impact of plastic pollution on agriculture', 'Fisheries and livestock & poultries', 'Plastic pollution as a public health challenge', 'Integrated solutions for plastic pollution, 'Potential of jute as a solution for plastic pollution', and an interactive discussion with stakeholders, including policy-makers, administrators, entrepreneurs and activists.

Panellists and speakers mostly came from Bangladesh, but speakers joined the webinar also from Azerbaijan, China, Japan, Jordan, India, Pakistan, Russia, Republic of Korea, USA, and included panellists from academies and

The BAS-AASSA webinar took place in Dhaka, Bangladesh, and online.

organisations such as the United Nations Development Programme (UNDP) and the World Bank.

Workshop participants recognised that plastic pollution is now a major global problem that threatens not only the environment and its biodiversity, but also the economy and human health.

More than 500 participants joined this two-day event via Zoom and more than 150 streamed the event on YouTube.

Pandemic preparedness

The AASSA-PAS Webinar Series 2021 on 'Pandemic Preparedness: Science and Countermeasures' was organised jointly by the Pakistan Academy of Sciences (PAS) and AASSA, and completed the series of webinars to receive financial support from IAP. The series of four webinars took place from April to June 2021 and provided an opportunity to share lessons learnt from the COVID-19 pandemic and its relationship with the Sustainable Development Goals (SDGs). The online events also focused on the challenges posed by pandemics and preparedness strategies for future events.

To encourage the participation of young scientists, the organisers issued a call for posters and out of 22 proposals received, 11 were short-listed. Furthermore, a three-member evaluation committee composed by Masoom Yasinzai (Rector, International Islamic University, Islamabad), Shahid Mahmood Baig (Chair, Pakistan Science Foundation) and Riffat M. Qureshi (Director of Administration, PAS) selected the recipients of the AASSA President's Young Scientist Award: Tahir Usman, Fakhar ud Din and Sabah Farhat. The cash prize was personally donated by the President of AASSA Yoo Hang Kim, and the organisers of the workshop made available an additional contribution.

In total, more than 1,900 participants registered to participate in the webinar, which featured some 35 lectures: 14 presented by international speakers and 21 by speakers from Pakistan.

Keynote speeches and congratulatory addresses were given by high-level policy-makers from the Government of Pakistan, including Shibli Fasaz (Minister for Science and Technology), Zartaj Gul (Minister of State for Climate Change), Syed Fakhan Imam (Minister for National Food Security and Research) and Farah Hamid Khan (Minister for Education and Professional Training).

At the conclusion of the AASSA-PAS Webinar Series, participants worked together to develop a list of recommendations that will further help in creating a better and more robust pandemic response. The document, published in the Proceedings of the Pakistan Academy of Sciences, emphasizes the key role vaccines, awareness campaigns and research and development can play in the fight against COVID-19.

STEM Women Asia launched

In 2021, 'STEM Women Asia' – an online directory of women in Asia and Oceania working in science, technology, engineering and mathematics (STEM) – was launched. Led by the Aus-

Poster session organised during the AASSA-PAS Webinar Series on 'Pandemic Preparedness: Science and Countermeasures'.

A series of four webinars took place from April to June 2021 and provided an opportunity to share lessons learnt from the COVID-19 pandemic and its relationship with the Sustainable Development Goals (SDGs).

tralian Academy of Science (AAS), STEM Women Asia has been developed in partnership with AASSA and IAP.

Building on the success of the AAS's Australian version of the STEM Women platform which hosts 3,300 profiles of women, STEM Women Asia now extends the STEM Women platform to women in Asia and Oceania.

"STEM Women Asia aims to promote gender equity in STEM by showcasing the breadth of scientific talent in the region and by enabling a diverse range of women to connect with exciting opportunities to progress their careers and personal capabilities," said Emeritus Professor Cheryl Praeger, AAS Fellow and Chair of the Women in Science and Engineering Committee of AASSA, who oversaw the delivery of the project.

"IAP recognises that women face many barriers to building a STEM career. By creating a profile, STEM Women Asia can increase their visibility to the world and help them access career and development opportunities and join a growing community," said Krishan Lal, IAP co-chair (India).

Launched with 285 profiles of women from 30 countries across Asia and Oceania already listed on the directory, it is hoped that the exciting opportunity offered by STEM Women Asia will grow as a platform and act to increase the representation of all women at all stages of their STEM career.

For more information, visit: *www.stemwomen.asia.*

Climate Change and Health

As with the other IAP regional networks, AASSA continued to make progress on its report in this IAP regional-to-global project (see page 16).

AASSA released its regional report, 'The Imperative of Climate Action to Promote and Protect Healt in Asia', in November 2021. ■

European Academies' Science Advisory Council (EASAC)

EASAC is IAP's regional academy network for Europe, consisting of 28 national science academies from 25 European Union Member States plus Norway, Switzerland and the UK. The pan-European academy Academia Europaea and the association of all academies in geographical Europe, ALLEA, are represented in EASAC's governing body, the Council. The Federation of European Academies of Medicine (FEAM) has observer status at the Council.

European Academies easac Science Advisory Council

In the second year of the COVID-19 pandemic, EASAC, the regional network of IAP for Europe, exceeded the number of expert meetings held before 2020.

Over the course of the year, EASAC prepared, held and followed up on a total of 35 digital events. Of those, roughly half were meetings to keep up the functioning of EASAC as a source of high-level 'science-for-policy' advice for Europe: meetings of the EASAC General Assembly ('Council'), Presidium ('Bureau'), Steering Panels (for the three Programmes: Biosciences, Energy and Environment) and for different working groups that were active during 2021. The other half of EASAC's digital events consisted of outreach and communication activities on various topics, including climate change and health, decarbonisation of buildings and of the health system, international health data transfer, global food security, changes in the Atlantic Ocean and their impact on Europe, science communication on the COVID-19 vaccination campaign and on predatory academic journals and conferences.

Some of these activities were prepared in collaboration with partner organisations, such as IAP, the Federation of European Academies of Medicine (FEAM) and All European Academies (ALLEA). Others were EASAC contributions to high level conferences. For example, the regional network made several contributions to COP26 in Glasgow, UK; created a side event for the UN Food Systems Science Days; presented at the Regional Forum on Sustainable Development of the United Nations' Economic Commission for Europe (UN-ECE).

The 'Climate Action to Protect and Promote Health: Sharing knowledge among regions to focus on solutions' side-event at COP26.

Regarding publications, EASAC published and updated documents on several issues that have been of interest for many years, but also produced thorough studies in completely new science-policy areas.

Thus, 2021 saw the publication of three substantial reports - one each from EASAC's three programmatic areas. In April, the Biosciences Programme presented 'International Sharing of Personal Health Data for Research' (published jointly with FEAM and ALLEA). In June, the Energy Programme launched the report 'Decarbonisation of Buildings: For climate, health and jobs' and the Environment Programme presented 'A Sea of Change: Europe's future in the Atlantic realm'.

The three Programmes also contributed to the EASAC commentary 'Key Messages from the European Science Academies for UNFCCC COP26 and CBD COP15: The urgency of the climate and biodiversity crises requires closer coordination between UNFCCC and CBD'. This commentary built heavily on earlier work by all Programmes, but especially on studies by the Environment Programme about extreme weather events, negative emission technologies, ecosystem services, agriculture and neonicotinoids, bioenergy from woody biomass, sustainable soils, multi-functionality and sustainability of Europe's forests and regenerative agriculture.

2021 also saw the publication of a commentary led by the Biosciences Programme: 'Decarbonisation of the Health Sector', prepared jointly with FEAM. EASAC was also invited, along with the three other regional networks of IAP, to submit a policy brief for the UN Food Systems Summit and presented 'The Role of Science, Technology, and Innovation for Transforming Food Systems in Europe' (see page 9).

Based on outputs from 2020 and 2021, EASAC was able to publish eight articles in scientific and specialist journals, including *Nature Medicine*, *Lancet Oncology*, *PLOS Medicine and Economist Impact*.

2021 saw the launch of many EASAC publications.

Climate Change and Health

EASAC took the lead in coordinating the IAP regional-to-global Climate Change and Health project (see pages 16-17).

In addition, EASAC published the workshop report 'Tackling the Effects of Climate Change on Health in the Mediterranean and Surrounding Regions', produced jointly with IAP and the Cyprus Institute. This came about as an initiative on climate change and health in the Mediterranean region, led by the European Commissioner for Health and the government of Cyprus. For this activity, EASAC's contact with its newest member, the Academy of Cyprus, was instrumental.

Inter-American Network of Academies of Science (IANAS)

IANAS is a network of 21 academies of science and three scientific organisations. Its mission is to strengthen science communities in the Americas through capacity building and to provide an independent source of science policy advice to governments and the public on key challenges for the future of the region.

Capacity Building

IANAS is working with the US National Academy of Sciences (NAS) and the Academy of Sciences of Latin America (ACAL) on a two-part programme funded by the Lounsbery Foundation to foster capacity building in science, engineering and medicine in Latin America. The first component was the establishment of a website, ACALconecta, that provides online open access information on science courses, seminars, lectures, conferences and webinars for young people from different parts of the Americas. The second component, a series of frontiers-type workshops for young scholars, is currently being set up.

Nobel Prize Dialogue with Latin America and the Caribbean

IANAS' other capacity building activity in 2021 was the 'Nobel Prize Dialogue with Latin America and the Caribbean', organised in collaboration with the Brazilian Academy of Sciences (BAS) and Nobel Prize Outreach. Eighty students from 24 Latin American and Caribbean countries were selected to interact with Nobel Prize laureates to explore how science and scientists can most effectively make a positive impact on so-

The 'Nobel Prize Dialogue with Latin America and the Caribbean' event.

ciety. Participating Nobel Prize Laureates were Elizabeth Blackburn, Emmanuelle Charpentier, Bernard Feringa and May-Britt Moser. The webinar was broadcast on 16 November and the feedback from the students, the Laureates and Nobel Prize Outreach was extremely positive. Videos have been circulated to IANAS member academies, with a request that they select sections that are most appropriate for national distribution in schools and universities.

IANAS-IAP webinar on Predatory Practices.

The webinar entitled 'Predatory Academic Practices: Regional Perspectives and Learning', held on 3 December was designed to help researchers learn about predatory academic practices and minimize their risk of using them. Participating panellists were Ana Maria Cetto, IAP Working Group member (Mexico); Irene Torres, Science Policy Advisor, Inter-American Institute for Global Change Research (IAI); Graciela Raga Birmalis, Chief Editor of the journal 'Atmósfera' (Mexico); David Moher, Senior Scientist, Ottawa Hospital Research Institute (Canada), and Hernan Grecco, physicist, Co-chair of the Young Academy of Sciences of Argentina.

Climate Change and Health

As with the other IAP regional networks, IANAS continued to make progress on its report in this IAP regional-to-global project (see pages 16-17).

A steering committee was established with representatives from Argentina, Brazil, Canada, Costa Rica, Nicaragua and the United States to develop a framework for this report. The framework was circulated to all IANAS academies with a request to provide relevant national information and examples that might serve as case histories. This information was used to prepare the initial draft, spearheaded by Prof. Sherilee Harper (Canada), which was sent to the steering committee for feedback. Once all comments were integrated the text was sent out for external review, and the launch of the final report is scheduled for the spring of 2022.

Water Programme

The Water Programme group published the following policy briefs in 'Frontiers in Water' and the 'Brazilian Biology Journal': 'The importance of monitoring river water discharge', 'Climate variability and change in Central America: What does it mean for water managers?', and 'Urban waters; Eutrophication: a growing problem in the Americas and the Caribbean'. In addition, the following books were published: 'Water Quality in the Americas: A survey' and 'Water Quality: Ecosystems and human health' ('*Calidad del agua: salud de los ecosistemas y salud humana*'). The latter, a joint publication with the *Consejo Nacional de Ciencia, Tecnología e Innovación Tecnológica* (CONCYTEC) Perú Program, resulted from a series of seven webinars on eutrophication and contamination of marine and freshwater systems; water and mining; water and human health; water, health, innovations and public policies; and a final session on the multiple challenges of water quality.

Energy Programme

The Energy Programme group implemented a series of projects to map the future of urban de-

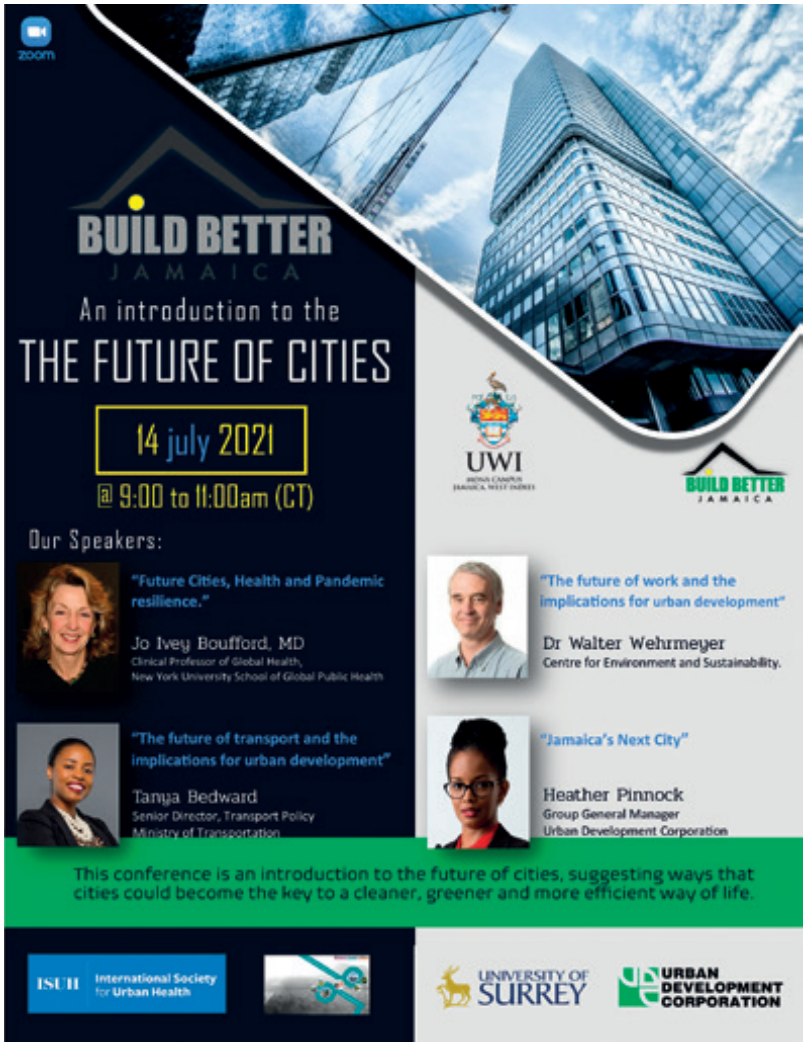
This publication provides the reader with an overarching assessment of the water quality problems of the Americas and some means for addressing them.

velopment. A 'Webinar on the Future of Cities' was held on 14 July with a focus on diverse topics including: how cities can adapt and evolve to accommodate an increase in population, new models of urban living required to deliver higher levels of energy and increase resource efficiency, and how to minimize environmental impacts, generate employment opportunities and encourage social integration and cohesion. The four speakers, Jo Ivey Boufford, Tanya Bedward, Walter Wehrmeyer and Heather Pinnock are all world-experts actively involved in developing the urban systems of the future.

Women for Science Programme

This group initiated a project that involved interviewing prominent women who received training in science but now have other careers. The resulting documents will be used to show young women that even if trained in science, there are many other career options and that many of the acquired skills have broad applicability.

Members also evaluated the applicants for the 2021 Anneke Levelt-Sengers Prize, an annual award given to an excellent young woman scientist from the region. This year it was awarded to Joana Laddo, a researcher from Uruguay working in the area of food and plant sciences.



IANAS' Energy Programme group organised the webinar on 'Future of cities'.

Science Education Programme

Several focal points worked with representatives from the Smithsonian Science Education Center (USA) and Let's Talk Science (Canada) to prepare a primer 'Catalyzing STEM Education and Public Engagement through the IANAS Science Education Program'. This has been distributed to all academies as a guideline to effectively increase STEM education and public engagement in their countries. The recommendations developed in this report include: strengthen scientific literacy by building critical thinking skills, fostering curiosity and catalyzing lifelong interest in STEM; build capacity across all levels of the formal education system (early childhood, primary, secondary and post-secondary education) by promoting inquiry-based-STEM education (IBSE); foster equality by improving equity, diversity, inclusion and accessibility across STEM fields; build career awareness and workforce development to support a changing global economy; and enhance STEM education for sustainable development.

IANAS Executive Committee

The IANAS Executive Committe Members met on 28 April to discuss the ongoing activities of the IANAS Programmes and projects, the budgetary situation, and the application of the Academy of Sciences of Haiti (ASH) to become a member of IANAS. ASH was invited to be an 'Observer Member' until their application is officially presented for consideration at the 2022 IANAS General Assembly, to be held in September 2022 in Córdoba, Argentina. ■

Network of African Science Academies (NASAC)

The Network of African Science Academies (NASAC) was established in 2001 in Nairobi, Kenya, and is the affiliate network for IAP in Africa. NASAC is a consortium of 28 merit-based science academies in Africa that aspires to make the 'voice of science' heard by policy and decision makers within Africa and worldwide. NASAC is dedicated to enhancing the capacity of existing national science academies and supports the creation of new academies in countries in Africa where none exist.

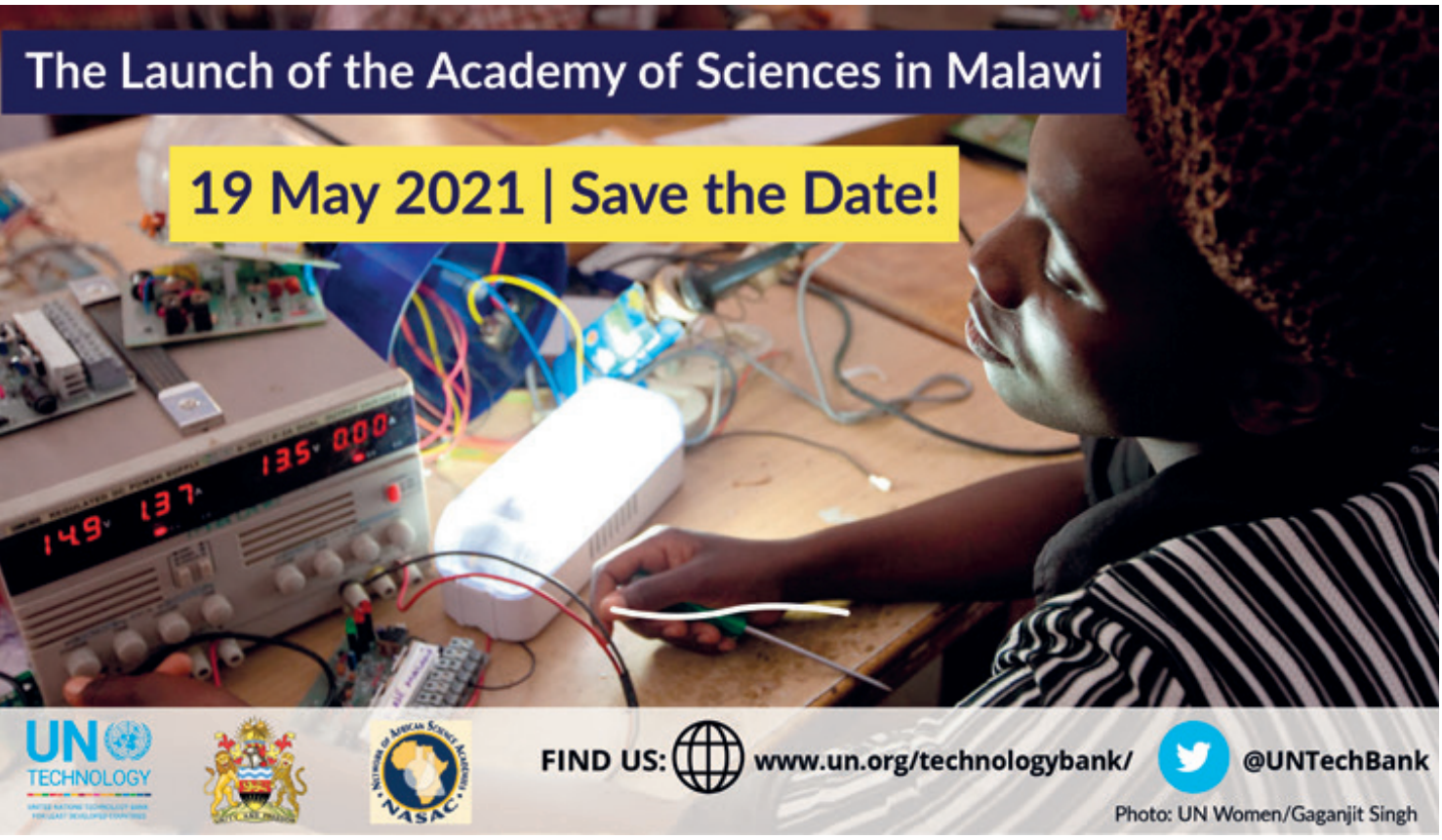
New science academies

The UN Technology Bank for Least Developed Countries in collaboration with the Network of African Science Academies (NASAC) developed a programme to support Least Developed Countries (LDCs) in establishing academies of science where none exist as well as supporting existing academies. Since 2020, the programme has worked with 12 LDCs in Africa.

Four academies were launched in 2021, namely Angola, Lesotho, the Democratic Republic of the Congo (DRC) and Malawi. Furthermore, IAP provided, through NASAC, seed funding of $5,000 to the recently-launched academies in order to assist them while they prepare to become NASAC members.

In addition, NASAC and the UN Technology Bank held a webinar on the academy development initiative on 29 July. The webinar provided an opportunity for both new and existing academies to network and identify areas of collaboration. Participants decided that these meetings should be held virtually every quarter and will offer participants the chance to share information on academies' forthcoming events and initiatives, as well as those of NASAC.

The Academy of Sciences in Malawi is an independent organization intended to promote science and engineering and strengthen their influence in Malawi.



Today, NASAC and the UN Technology Bank are working together to launch new academies in more African countries.

Gene Editing Technology Initiative

African scientists are using gene editing technology to improve major staple crops for increased productivity, enhanced nutrition and climate resilience. In 2021, Africa Harvest and NASAC partnered with CropLife International to implement a pioneering proof-of-concept initiative on gene editing technology.

African gene editing technology experts were invited to participate in the project and advocate for this technology and its practical applications. Recognising that communication and policy advocacy are key to changing the narrative on gene editing technology, the organisers established a Working Group of Gene Editing Technology Initiative (GETI) champions, identified knowledge gaps, and reinforced commitment to support food security processes through gene editing technology in Africa.

The Working Group formally adopted the name 'African Association of Genome Editing Professionals for Sustainable Agriculture'. The project will further expand the GETI champions Working Group in terms of expertise and geographic representation to cover 25 African countries, making it possible for the group to be recognized as the 'voice' of gene editing technology in Africa and beyond.

Gene editing technology has elicited interest across the globe because of the insights it may offer into fundamental biological processes and the advances it may bring to human health and food security. However, these advances still raise many unanswered questions about the technical aspects of achieving desired results while avoiding unwanted effects in target organisms. The Working Group will consider these questions among others, including the scientific, ethical, governance and social issues that the adoption of this technology raises.

General assembly

The 17th meeting of the NASAC general assembly was held virtually on 25 November 2021. More than 20 member academies participated in the meeting to review the activity reports of the year and plan the initiatives that will enhance NASAC's sustainability in the coming years.

AMASA and Predatory Practices

NASAC partnered with IAP to host the Annual Meeting of African Science Academies (AMASA) 2021, which was held online on 24 November. The main topic of the event was 'Predatory Ac-

This online workshop discussed urban planning and public transport considerations in the decarbonization of transport in Africa, including infrastructure, financing, and policy considerations.

ademic Practices', and was open to young and senior academics, the private and public sectors as well as policy-makers.

NASAC/ISC-SIDA-funded LIRA project (2016-2020/21)

NASAC in collaboration with the International Science Council (ISC) continues to implement the 'Leading Integrated Research for Agenda 2030 in Africa (LIRA 2030 Africa)'. A series of three webinars were held on 8-10 December to discuss the LIRA programme and the projects' achievements.

Decarbonization of Transport in Africa

Though Africa currently has one of the lowest motorization rates globally, it is poised to become a major new player in the transport sector in the near future, with the potential to become a leader in the decarbonization of transport movement.

NASAC, in partnership with IAP, established an expert working group and organised a virtual workshop on 'Decarbonization of Transport in Africa' on 15-17 November. The event brought together technical experts, policy-makers and other stakeholders in the transport industry to discuss urban planning and public transport considerations for decarbonization in regard to infrastructure, financing and policy. A workshop report will follow and will be used as a basis for expanding the project.

Climate Change and Health

As with the other IAP regional networks, NASAC continued to make progress on its report in this IAP regional-to-global project (see pages 16-17).

In particular, during Africa Climate Week 2021, NASAC joined IAP to organise the side-event 'Developing and Using the Scientific Evidence Base for Tackling Challenges of Climate Change for Human Health'. The webinar was held on 26 September and its aim was to focus on the priorities needed to be addressed in order to find climate change transformational solutions for mitigation and adaptation strategies that can deliver for resilient health systems. ■

Appendices

Members of the InterAcademy Partnership

1. Afghanistan Academy of Sciences
2. Albanian Academy of Sciences
3. Algerian Academy of Sciences and Technology
4. *Academia Nacional de Ciencias Exactas, Fiscas y Naturales de la Republica Argentina*
5. *Academia National de Ciencas*, Cordoba, Argentina
6. *Academia Nacional de Medicina de Buenos Aires*, Argentina
7. National Academy of Sciences of Armenia
8. Academy of Medical Sciences of Armenia
9. Australian Academy of Health and Medical Sciences
10. Australian Academy of Science
11. Austrian Academy of Sciences
12. Bangladesh Academy of Sciences
13. National Academy of Sciences of Belarus
14. Royal Academies for Science and the Arts of Belgium
15. Belgian Royal Academy of Medicine
16. *Koninklije Academie voor Geneeskunde van Belgie*
17. Benin National Academy of Sciences and Arts
18. *Academia Nacional de Ciencias de Bolivia*
19. *Academia Boliviana de Medicina*
20. Academy of Sciences and Arts of Bosnia and Herzegovina
21. Brazilian Academy of Sciences
22. *Academia Nacional de Medicina*, Brazil
23. Bulgarian Academy of Sciences
24. National Academy of Sciences of Burkina Faso
25. Cameroon Academy of Sciences
26. Royal Society of Canada
27. Canadian Academy of Health Sciences
28. *Academia Chilena de Ciencias*
29. *Academia Chilena de Medicina*
30. Chinese Academy of Sciences
31. Chinese Academy of Engineering
32. *Academia Sinica*, Taiwan, China
33. Colombian Academy of Exact, Physical & Natural Sciences
34. *Academia Nacional de Medicina de Colombia*
35. Croatian Academy of Arts and Sciences
36. Croatian Academy of Medical Sciences
37. Cuban Academy of Sciences
38. Czech Academy of Sciences
39. Royal Danish Academy of Sciences and Letters
40. *Academia de Ciencias de la Republica Dominicana*
41. Academy of Sciences of Ecuador
42. Academy of Scientific Research and Technology, Egypt
43. Estonian Academy of Sciences
44. Ethiopian Academy of Sciences
45. Council of Finnish Academies
46. *Académie des Sciences, Institut de France*
47. *Académie Nationale de Médecine*, France
48. *Académie des Technologies*, France
49. Georgian National Academy of Sciences
50. Georgian Academy of Medical Sciences
51. Union of German Academies of Sciences and Humanities
52. German National Academy of Sciences, *Leopoldina*
53. Ghana Academy of Arts and Sciences
54. Academy of Athens, Greece
55. *Academia de Ciencias Medicas, Fisicas y Naturales de Guatemala*
56. National Academy of Sciences of Honduras
57. Hungarian Academy of Sciences
58. Indian National Science Academy
59. National Academy of Medical Sciences, India
60. Indonesian Academy of Sciences
61. Academy of Sciences of the Islamic Republic of Iran
62. Iranian Academy of Medical Sciences
63. Royal Irish Academy
64. Israel Academy of Sciences and Humanities
65. Israeli National Academy of Science in Medicine
66. *Accademia Nazionale dei Lincei*, Italy
67. *Accademia Nazionale di Medicina*, Italy
68. Ivorian Academy of Sciences, Arts, Cultures of Africa and African Diasporas (ASCAD)
69. Science Council of Japan
70. Royal Scientific Society, Jordan
71. National Academy of Sciences of the Republic of Kazakhstan
72. Kenya National Academy of Sciences
73. Korean Academy of Science and Technology
74. National Academy of Medicine of Korea
75. National Academy of Sciences, Republic of Korea

76. Kosova Academy of Sciences and Arts
77. National Academy of Sciences of the Kyrgyz Republic
78. Latvian Academy of Sciences
79. Lebanese Academy of Sciences
80. Lithuanian Academy of Sciences
81. Macedonian Academy of Sciences and Arts
82. Madagascar's National Academy of Arts, Letters and Sciences
83. Academy of Sciences Malaysia
84. Mauritius Academy of Science and Technology
85. Mexican Academy of Sciences
86. National Academy of Medicine of Mexico
87. Academy of Sciences of Moldova
88. Mongolian Academy of Sciences
89. Montenegrin Academy of Sciences and Arts
90. Hassan II Academy of Science and Technology, Morocco
91. Academy of Science of Mozambique
92. Nepal Academy of Science and Technology
93. Royal Netherlands Academy of Arts and Sciences
94. Royal Society of New Zealand - *Te Apārangi*
95. Nicaraguan Academy of Sciences
96. Academy of Medicine Specialties of Nigeria
97. Nigerian Academy of Science
98. Norwegian Academy of Sciences and Letters
99. Pakistan Academy of Sciences
100. Palestine Academy for Science and Technology
101. *Academia Nacional de Ciencias del Perú*
102. *Academia Nacional de Medicina del Perú*
103. National Academy of Science and Technology, Philippines
104. Polish Academy of Sciences
105. *Academia das Ciencias de Lisboa*, Portugal
106. Romanian Academy
107. Academy of Medical Sciences of Romania
108. Russian Academy of Medical Sciences
109. Russian Academy of Sciences
110. Rwanda Academy of Sciences
111. *Académie des Sciences et Techniques du Sénégal*
112. Serbian Academy of Sciences and Arts
113. Singapore National Academy of Sciences
114. Slovak Academy of Sciences
115. Slovenian Academy of Sciences and Arts
116. Academy of Science of South Africa
117. *Real Academia de Ciencias Exactas, Fisicas y Naturales*, Spain
118. National Academy of Sciences, Sri Lanka
119. Sudanese National Academy of Sciences
120. Royal Swedish Academy of Sciences
121. Swiss Academies of Arts and Sciences
122. Academy of Sciences of the Republic of Tajikistan
123. Tanzania Academy of Sciences
124. Thai Academy of Science and Technology
125. Tunisian Academy of Sciences, Letters and Arts *Beit al Hikma*
126. Turkish Academy of Sciences
127. Uganda National Academy of Sciences
128. National Academy of Sciences of Ukraine
129. Academy of Medical Sciences, UK
130. Royal Society, UK
131. National Academy of Medicine of Uruguay
132. US National Academy of Sciences
133. US National Academy of Medicine
134. National Academy of Medicine of Uruguay
135. National Academy of Sciences of Uruguay
136. Uzbekistan Academy of Sciences
137. *Pontificia Academia Scientiarvm*, Vatican
138. *Academia de Ciencias Fisicas, Matematicas y Naturales de Venezuela*
139. *Academia Nacional de Medicina de Venezuela*
140. Zambia Academy of Sciences
141. Zimbabwe Academy of Sciences
142. African Academy of Sciences
143. Caribbean Academy of Sciences
144. European Academy of Sciences and Arts
145. Federation of European Academies of Medicine
146. Global Young Academy
147. Islamic World Academy of Sciences
148. Latin American Academy of Sciences
149. The World Academy of Sciences (UNESCO-TWAS)
150. World Academy of Art and Science

IAP Financial Summary, 2021

From 2020, funds received (including interest) by IAP Science and IAP Health (via the Trieste secretariat) and administered by UNESCO are reported based on UNESCO biennia periods (in this case 2020-2021).

In 2021, the main contribution was from the Italian Ministry of Foreign Affairs (USD 802,438), adding to the USD 726,267 received in 2020 (the difference due to fluctuation in exchange rates). Together with funds carried forward, this gave an operating budget for the biennium of USD 2,277,725.

With regard to expenditures, savings on travel and meetings during the COVID-19 pandemic allowed for the redistribution of some funds for activities, e.g. in science education (line 1.1.2).

The total amount of funds received by IAP Policy (via the Washington DC secretariat) in 2021 was USD 357,126. Income primarily came from the US National Academies of Sciences, Engineering and Medicine (NASEM) as host of the IAP Policy secretariat, and a grant from the Gordon and Betty Moore Foundation for the 'Combating Predatory Journals and Conferences' study.

In addition, it is estimated that member academies and regional affiliated networks contributed a significant amount by providing in-kind support for the organization and hosting of (mostly online) conferences and workshops, the publication of reports, as well as the provision of staff time. They also succeeded to leverage additional funds from various other donors.

IAP Science and IAP Health Financial Summary, 2021

INCOME[1] 2020 (in USD)	
Balance brought forward 01.01.2020	**726,381.40**
1) Ministry of Foreign Affairs, Italy	1,528,705.08
2) International Science Council, France	4,280.00
3) Contribution from IAP member academies	2,000
4) Interest	16,359.00
TOTAL INCOME	**2,277,725.48**

EXPENDITURE 2020-2021 biennium (in USD)	Approved budget	Revised budget	Expenditure 1.1.-31.12.2020
1) Scientific Projects			
1.1) New projects	320,000	313,874	103,468.02
1.1.1) *Competitive grants*	237,000	224,874	15,034.34
1.1.2) *Support to Science Education Programme*	53,000	89,000	88,433.68
1.1.3) *Support to Global Young Academy*	30,000		
1.2) Regional Network programmes	554,393	559,393	557,726.60
1.3) Collaboration with IAP Policy	88,000	128,000	88,000.00
1.4) Fundraising for new activities	62,172	62,172	11,845.50
Sub-total for (1)	**1,024,565**	**1,063,439**	**761,040.12**
2) Meetings and conferences			
2.1) Executive Committee meetings/ GA conference/ Travels	60,000	45,000	16,667.99
2.2) Conference for Young Scientists	15,000		
2.3) Young Physician Leaders	167,107	167,107	74,127.40
2.3.1) *World Health Summit workshop*	29,611	29,611	21,690.70
2.3.2) *World Health Assembly alumni mtg*	44,670	44,670	
2.3.3) *Web networking*	15,000	15,000	
2.3.4) *Communication costs*	69,999	69,999	52,436.70
2.3.5) *Staff cost*	7,827	7,827	
Sub-total for (2)	**242,107**	**212,107**	**90,795.39**
3) Publications	**30,000**	**30,000**	**24,523.40**
4) Operational Expenses			
4.1) Staff and Consultant costs	795,000	795,000	654,988.39
4.1.1) *General staff costs*	560,000	560,000	550,664.47
4.1.2) *Strengthening staff cost*	235,000	235,000	104,323.92
4.2) Staff travels	6,500	6,500	2,139.89
4.3) Communications	10,000	10,000	2,805.26
4.4) Office and other supplies	10,000	10,000	8,043.86
4.5) ICTP services	50,000	45,000	42,000
Sub-total for (4)	**871,500**	**866,500**	**709,977.40**
Management costs	**151,773**	**152,043**	**111,043.49**
TOTAL EXPENDITURE	**2,319,945**	**2,324,089**	**1,697,379.80**

Savings on prior years' obligations	**41,610.24**
Excess (shortfall) of income over expenditure	**621,955.92**

Reserve Fund[2]	
Amount available at the beginning of period	177,301.51
End of service entitlements	0.00
Reserve Fund balance end of period	**177,301.51**

[1] All contributions are expressed in US dollars and have been converted using the official UN exchange rate in effect at the time the contributions were received.

[2] The purpose of the Reserve Fund is to cover the end of service entitlements of IAP staff.

IAP Policy Financial Summary, 2021

The total amount of funds received by IAP Policy in 2021 was USD $357,126. Income came from the US National Academies of Sciences, Engineering, and Medicine (NASEM) as host of the IAP Policy secretariat, the Gordon and Betty Moore Foundation for the 'Combatting Predatory Journals and Conferences' project, IAP Science's contribution for the costs of the Inter-Academy Partnership website, and IAP Policy indirect charges.

INCOME (in USD)	
Beginning Balance	752,304.00
US NASEM contribution	292,177.00
Projects and administration	64,921.00
Book royalties	0.00
Other Income	28.00
TOTAL INCOME	**1,109,430.00**

EXPENDITURES (in USD)	
Project expenses	362,487.00
Operational expenses	
1) Staff salaries	154,640.00
2) Website and public information	3,947.00
3) Non-project travel	0.00
4) Professional fees	33,602.00
5) Miscellaneous	1,125.00
6) Administration	142,904.00
TOTAL EXPENDITURE	**698,705.00**
Excess (shortfall) of income over expenditure	**410,725.00**

Member Contributions

Member Contributions to IAP's Fundraising Campaign and Voluntary Membership Dues (2013-present)

- Australian Academy of Science
- Bangladesh Academy of Sciences
- Council of Finnish Academies
- Georgian National Academy of Sciences (GAS)
- Union of German Academies of Sciences and Humanities
- *Deutsche Akademie der Naturforscher Leopoldina*
- Academy of Athens, Greece
- Israel Academy of Sciences and Humanities
- Korean Academy of Science and Technology (KAST)
- National Academy of Science and Technology, Korea (NAST)
- Hassan II Academy of Science and Technology, Morocco
- Academy of Medical Sciences of Romania
- *Académie National des Sciences et Techniques du Senegal*
- Turkish Academy of Sciences (TÜBA)
- Uganda National Academy of Sciences (UNAS)
- Royal Society, UK
- US National Academy of Sciences (NAS)
- *Academia Nacional de Ciencias del Uruguay*

Project Support

IAP projects are also being implemented by various partners.

The German National Science Academy, *Leopoldina*, for example, manages funds from the German Federal Ministry of Education and Research for the IAP 'Climate Change and Health' project (see page 16).

In-kind Support

IAP would like to thank its many member academies that have contributed to its fundraising campaign, have provided voluntary membership contributions, or that have provided in-kind support. Without this buy-in from the members, IAP activities would not have the same visibility and impact around the globe.

Standing Committees

InterAcademy Partnership Steering Committee

- Depei Liu, China (IAP President and co-chair IAP Health)
- Richard Catlow, UK (IAP President and co-chair IAP Policy)
- Margaret (Peggy) A. Hamburg, USA (co-chair IAP Health)
- Krishan Lal, India (co-chair IAP Science)
- Cherry Murray, USA (co-chair IAP Science)
- Masresha Fetene, Ethiopia (co-chair IAP Policy)

IAP Treasurer:

- Michael T. Clegg, USA

In addition to the Steering Committee members, the following individuals, representing the IAP regional networks, make up the InterAcademy Partnership Board

- Yoo Hang Kim, South Korea (Association of Academies and Societies of Sciences in Asia, AASSA)
- Christina Moberg, Sweden (European Academies' Science Advisory Council, EASAC)
- Helena Bonciani Nader, Brazil (Inter-American Network of Academies of Science, IANAS)
- Mahouton Hounkonnou, Benin (Network of African Science Academies, NASAC)

IAP Science Executive Committee

- Krishan Lal, India (co-chair)
- Cherry Murray, USA (co-chair)
- *Academia Chilena de Ciencias*, Juan A. Asenjo
- *Académie des Sciences*, France, Olivier Pironneau
- Academy of the Islamic Republic of Iran, Jafar Towfighi Darian
- *Accademia Nazionale dei Lincei*, Italy, Gianfranco Pacchioni
- African Academy of Sciences, Felix Dapare Dakora
- Australian Academy of Science, Elaine Sadler
- Ethiopian Academy of Science, Tsige Gebre-Mariam
- German National Academy of Sciences, *Leopoldina*, Bärbel Friedrich
- Korean Academy of Science and Technology, Min-Koo Han
- Nigerian Academy of Science, Mosto Onuoha
- Royal Scientific Society of Jordan, Wejdan Abu Alhija

Ex-officio member:

- The World Academy of Sciences (UNESCO-TWAS), Mohamed H. A. Hassan

IAP Health Executive Committee

- Margaret (Peggy) A. Hamburg, USA (co-chair)
- Depei Liu, China (co-chair)
- *Academia Nacional de Medicina*, Argentina, Jorge Alberto Neira
- *Accademia Nazionale dei Lincei*, Italy, Guido Forni
- Academy of Sciences Malaysia, Lai-Meng Looi
- Brazilian Academy of Sciences, Helena Bonciani Nader
- Council of Finnish Academies, Jukka H. Meurman
- German National Academy of Sciences, *Leopoldina*, Wolfgang Holzgreve
- *Académie Nationale de Médecine*, France, Patrice Debré
- Hassan II Academy of Science & Technology, Morocco, Rajae El Aouad
- Nigerian Academy of Science, Sonny Folorunso Kuku

Ex-officio member:

- The World Academy of Sciences (UNESCO-TWAS), Mohamed H. A. Hassan

IAP Policy Board

- Richard Catlow, UK (co-chair)
- Masresha Fetene, Ethiopia (co-chair)
- African Academy of Sciences, Felix Dapare Dakora
- Australian Academy of Science, John Shine
- Brazilian Academy of Sciences, Luiz Davidovich
- Chinese Academy of Sciences, Tao Zhang
- *Académie des Sciences*, France, Pierre Corvol
- German National Academy of Sciences, *Leopoldina*, Gerald Haug
- Indian National Science Academy, Ajay K. Sood
- *Accademia Nazionale dei Lincei*, Italy, Giorgio Parisi
- Science Council of Japan, Juichi Yamagiwa
- Royal Scientific Society of Jordan, HRH Princess Sumaya bint El Hassan
- Mexican Academy of Sciences, Susana Estela Lizano Soberón
- Royal Netherlands Academy of Arts and Sciences, Wim Van Saarloos
- Nigerian Academy of Science, Mosto Onuoha
- National Academy of Sciences, Sri Lanka, Ranjith Mahindapala
- The World Academy of Sciences (UNESCO-TWAS), Mohamed H. A. Hassan

Ex-Officio Member:
- International Council of Academies of Engineering and Technological Sciences (CAETS), Ruth David

Observers:
- U.S. National Academy of Sciences, Marcia McNutt
- International Science Council (ISC), Heide Hackmann

Science Education Programme (SEP) Global Council

- Wafa Skalli, Morocco (chair)
- Dato Lee Yee Cheong, Malaysia (immediate past chair)
- Carlos Bosch, Mexico
- Edgar González, Colombia
- Aphiya Hathayatham, Thailand
- Norbert Hounkonnou, Benin
- R. Indarjani, Indonesia
- Lena Kjellén, Sweden
- Lazzat Kussainova, Kazakhstan
- Carol O'Donnell, USA
- Daniel Rouan, France
- Manzoor H. Soomro, Pakistan

IAP Biosecurity Working Group

- Ann Arvin, USA (chair),
- Walter Sandow Alhassan, Ghana
- Neela Badrie, Trinidad and Tobago
- Lela Bakanidze, Georgia
- Flerida A. Cariño, Philippines
- Susana Goldstein Fink, Argentina
- Roderick Flower, UK
- Thomas Lengauer, Germany
- Arnaldo Lopes Colombo, Brazil
- Felix Moronta, Italy
- Sergey Victorovich Netesov, Russia
- Iqbal Parker, South Africa
- Bert Rima, UK
- Zabta Khan Shinwari, Pakistan
- Yuan Zhiming, China
- Menat Zanaty, Egypt
- Kavita Berger, USA (ex-officio)
- Katherine Bowman, USA (ex-officio)

Combatting Predatory Academic Journals and Conferences Working Group Members

- Abdullah Shams bin Tariq, Bangladesh (co-Chair)
- Susan Veldsman, South Africa (co-Chair)
- Asfawossen Asrat Kassaye, Ethiopia
- Enrico M. Bucci, Italy
- Ana Maria Cetto, Mexico
- Victorien Dougnon, Benin
- Stefan Eriksson, Sweden
- Lai-Meng Looi, Malaysia
- Shaher Momani, Jordan
- Diane Negra, Ireland
- Rabab Ahmed Rashwan, Egypt
- Marcos Regis da Silva, Uruguay

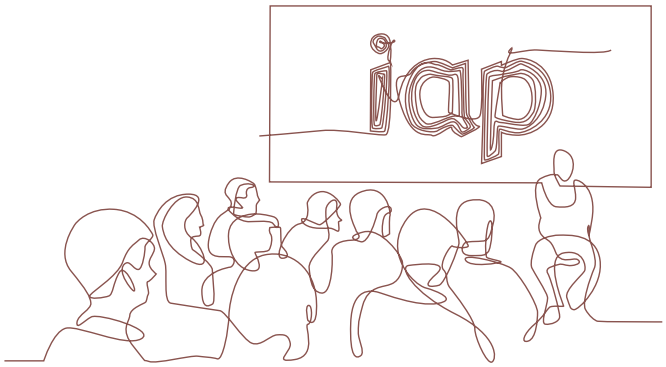
Science in Exile (SiE) Steering Committee

- Saja Al Zoubi, Syria
- Amal Amin Ibrahim Shendi, Egypt
- Emily Borzcik, USA
- Kebede Kassa Tsegaye, Ethiopia
- Karly Kehoe, USA
- Stanley Maphosa, South Africa
- Robin Perutz, UK
- Alain Prochiantz, France
- Karina Sarmiento, Ecuador
- Seteney Shami, Jordan
- Phyu Phyu Thin Zaw, Myanmar
- Radwan Ziadeh, Syria

Meetings Supported in 2021

January

- Online, IAP Young Physician Leaders (YPL) webinar on COVID-19 vaccine hesitancy, 20 January 2021
- Online, EASAC Energy Steering Panel Meeting, 21 January 2021
- Online, EASAC Bureau Meeting, 22 January 2021
- Online, EASAC-FEAM-SAPEA webinar on 'Climate Change and Health', 26 January 2021
- Online, M8 Alliance Expert Meeting – Webinar on 'The Impact of COVID-19 on Migrant and Refugee Health', 28 January 2021

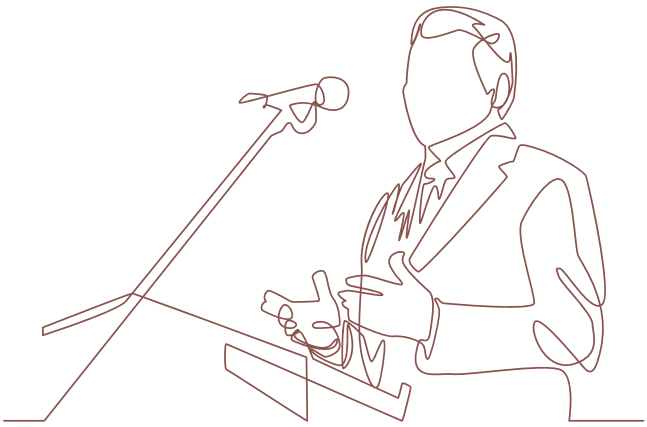


February

- Online, Open Meeting of the EASAC Press and Communications Group (PCG) on 'Science Communication on COVID-19 Vaccination', 9 February 2021
- Online, NASAC-Africa Harvest webinar on 'Gene Editing Technology Initiative (GETI)', 10 February 2021
- Online, IAP Young Physician Leaders (YPL) Second Global Ward Round, 19 February 2021

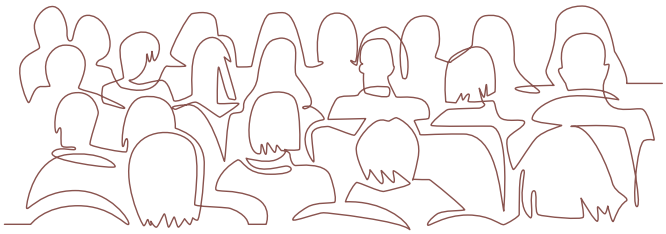
March

- Online, 'Regional and Global Perspectives on Climate Change and Health: Focusing on solutions' session at the 2021 Conference of the Consortium of Universities for Global Health, 3 March 2021
- Online, Health Equity in Latin America and the Caribbean, 3 March 2021
- Online, EASAC Environment Steering Panel Meeting, 5 March 2021
- Online, 'Gender Dimension of Refugee and Displaced Scientists' session at the World Forum for Women in Science, 8 March 2021
- Online, EASAC presentation during the Regional Forum on Sustainable Development for the UNECE Region, 10 March 2021
- Maseru, Lesotho, Launch of Lesotho Academy of Science and Technology, 15 March 2021
- Online, EASAC Bureau Meeting, 16 March 2021
- Online, IAP Global Webinar on Countering Vaccine Hesitancy, 23 March 2021
- Islamabad, Pakistan, AASSA-PAS Workshop on 'Pandemic Preparedness: Science and Countermeasures', 24-26 March 2021
- Kinshasa, Democratic Republic of the Congo, and online, Launch of Congolese Academy of Science, 26 March 2021
- Online, EASAC Energy Steering Panel Meeting, 27 April 2021
- Online, Meeting of the EASAC Working Group on 'Regenerative Agriculture', 30 March 2021
- Online, Second Refugee and Displaced Scientists Workshop, 30 March-1 April 2021
- Jakarta, Indonesia, AASSA-AIPI International Webinar on 'Regional Patterns of Digital Scholarly Communication and Publications', 31 March 2021



April

- Islamabad, Pakistan, and online, AASSA-PAS Webinar on 'SDGs and Pandemics', 27 April 2021
- Jakarta, Indonesia, and online, AASSA-AIPI International Webinar on 'Access to Digital Scholarly Publications: Strategies, Applications and Impacts', 28 April 2021

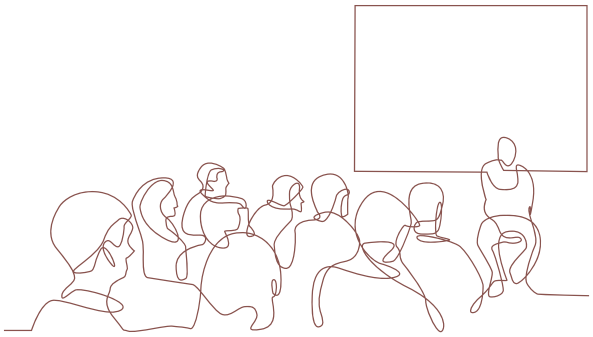


May

- Islamabad, Pakistan, and online, AASSA-PAS Webinar on 'Pandemic Preparedness, One Health: Lessons learnt', 4 May 2021
- Online, EASAC-Cyprus Institute workshop on 'Climate Change and Health in the Eastern Mediterranean and Middle East Region', 6 May 2021
- Online, EASAC-FEAM webinar on 'Decarbonisation of the Health Sector', 10 May 2021
- Online, EASAC Bureau Meeting, 18 May 2021
- Jakarta, Indonesia, and online, AASSA-AIPI International Webinar on 'Publication and Dissemination of Digital Scholarly Communication', 19 May 2021
- Online, Launch of the Academy of Sciences in Malawi, 19 May 2021
- Islamabad, Pakistan, and online, AASSA-PAS Webinar on 'Pandemic Preparedness: Science and countermeasures', 25 May 2021
- Online, Open EASAC Press and Communications Meeting Webinar on 'Science Communications Campaign on COVID-19 Vaccination', 27 May 2021
- Dhaka, Bangladesh, and online, AASSA-BAS Webinar on 'Plastic Pollution: Causes, effects and solutions', 29-30 May 2021

June

- Online, Launch Webinar of EASAC Report on 'Decarbonisation of Buildings', 2 June 2021
- Online, Discussion event for the launch of the ALLEA-EASAC-FEAM report on 'International Health Data Transfer', 3 June 2021
- Online, EASAC Bureau Meeting, 16 June 2021
- Online, EASAC Council Meeting, 17-18 June 2021
- Online, EASAC webinar on 'Global Food Security Challenges (Science, Health and Engineering Policy and Diplomacy Initiative (SPDI)', 22 June 2021
- Online, Science in Exile webinar 'Unfolding Emergencies: Ethiopia and Myanmar', 22 June 2022
- Online, Launch event of the EASAC Report 'A sea of change: Europe's future in the Atlantic realm', 23 June 2021
- Islamabad, Pakistan, and online, AASSA-PAS Webinar on 'COVID-19 and Higher Education: Addressing food insecurity through policy support and research', June 24 2021
- Online, EASAC Biosciences Steering Panel Meeting, 24 June 2021
- Online, Global Food Security Solutions, 25 June 2021
- Online, Meeting of the EASAC Working Group on 'Regenerative Agriculture', 30 June-1 July 2021



July

- Online, 'Regional Perspectives on the Role of Science, Technology and Innovation for Transforming Food Systems' side-event at the Science Days of the United Nations Food Systems Summit (UN FSS), 07 July 2021
- Online, IAP – IANAS Webinar on the Future of Cities, 14 July 2021
- Online, Science in Exile webinar 'Protracted situation of displacement: Afghanistan, Syria, Venezuela, Yemen', 28 July 2021
- Online, NASAC - United Nations Technology Bank For Least Developed Countries (UNTBLCs) Academy Development Initiative Webinar, 29 July 2021
- Online, Sustainable Health Equity Movement (SHEM) General Assembly, 29 July 2021

September

- Online, Meeting of the EASAC Working Group on 'Regenerative Agriculture', 13-14 September 2021

- Online, side-event on 'Developing and Using the Scientific Evidence Base for Tackling Challenges of Climate Change for Human Health' at the Africa Climate Week 2021, 26 September 2021
- Online, STEM Women Asia launch, 30 September 2021
- Online, Science in Exile webinar 'Long-term Support of Refugee and Displaced Scientists: The power of mentorship', 30 September 2021
- Online, EASAC Environment Steering Panel Meeting, 30 September - 1 October 2021

October

- Online, EASAC Energy Steering Panel Meeting, 5 October 2021
- Online, Meeting of the EASAC Working Group on 'Regenerative Agriculture', 14-15 October 2021
- Online, 5th AASSA General Assembly and AASSA Executive Board Meeting, 15 October 2021
- Online, EASAC Team and Strategy Meeting, 19 October 2021
- Online, 'Empowering Young Global Health Leadership: The leadership we want' session at the 2021 World Health Summit, 26 October 2021
- Online, Science in Exile webinar 'Return of Scientific Personnel and Reconstruction of Scientific System and Infrastructure', 26 October 2021
- Online, 2021 IAP Joint Meeting, 27-29 October 2021

November

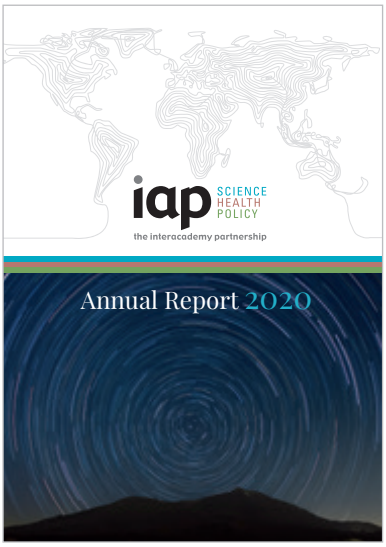
- Glasgow, UK, and online, 'Climate Change and Health in Europe' EASAC side-event at COP26, 1 November 2021
- Glasgow, UK, and online, 'The Role of Academies of Science in Climate Change Policy Actions' side-event at COP26, 5 November 2021
- Glasgow, UK, 'Climate Action to Protect and Promote Health: Sharing knowledge among regions to focus on solutions' side-event at COP26, 10 November 2021
- Online, 'Decarbonisation of Road Transport' EASAC-EU side-event at COP26, 12 November 2021
- Online, Decarbonization of Transport in Africa: A transport planning perspective, 15-17 November 2021
- Online, United by Science - Nobel Prize Dialogue Latin America and the Caribbean, 16 November 2021
- Online, Predatory Academic Practices: Regional perspectives and learning (Europe), 19 November 2021
- Online, EASAC Biosciences Steering Panel Meeting, 24 November 2021
- Online, Predatory Academic Practices: Regional perspectives and learning (Africa), 24 November 2021
- Online, 17th meeting of the NASAC General Assembly, 25 November 2021

December

- Online, EASAC Bureau Meeting, 1 December 2021
- Online, EASAC Council Meeting, 2-3 December 2021
- Online, Predatory Academic Practices: Regional perspectives and learning (Americas), 3 December 2021
- Online, Predatory Academic Practices: Regional perspectives and learning (Asia), 7 December 2021
- Online, NASAC – International Science Council (ISC) webinars on 'Leading Integrated Research for Agenda 2030 in Africa (LIRA 2030 Africa)', 8-10 December 2021
- Online, Predatory Academic Practices: Regional perspectives and learning (Global), 14 December 2021

Publications Supported in 2021

IAP Annual Report 2020
Published by: IAP
• www.interacademies.org/publication/2020-iap-annual-report



Action for Afghan Scientists and Scholars
Published by: IAP
• www.interacademies.org/publication/action-afghan-scientists-and-scholars

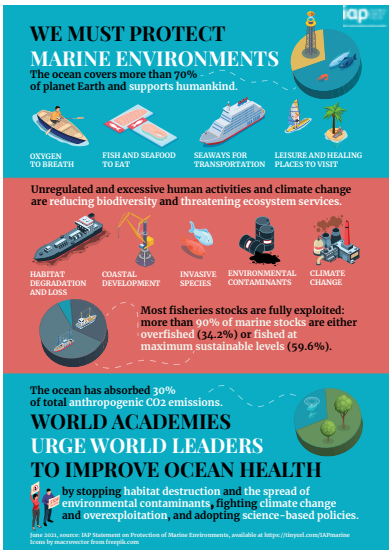
A Net Zero Climate-Resilient Future: Science, technology and the solutions for change
Published by: IAP
• www.interacademies.org/publication/net-zero-climate-resilient-future-science-technology-and-solutions-change-0

Climate Change and Biodiversity: 'How to support climate action and biodiversity' infographic
Published by: IAP
• www.interacademies.org/publication/climate-change-and-biodiversity

IAP Food Systems Summit Briefs
Published by: IAP
• www.interacademies.org/publication/iap-food-systems-summit-briefs

IAP letter on the Food Systems Summit to the UN DG Guterres
Published by: IAP
• www.interacademies.org/publication/iap-letter-food-systems-summit-un-dg-guterres

Protection of Marine Environments Infographic
Published by: IAP
• www.interacademies.org/publication/ocean-infographic

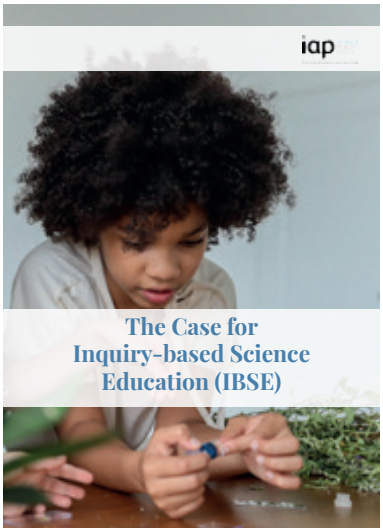


Reducing the Impact of COVID-19 on Inequalities in Higher Education: A call for action to the international community
Published by: IAP
• www.interacademies.org/COVID_education

Reduciendo el Impacto de la COVID-19 Sobre las Inequidades en la Educación Superior: Llamado a la acción a la comunidad internacional
Published by: IAP
• www.interacademies.org/COVID_educacion_superior

Strengthening Research on COVID-19 During the Pandemic
Published by: IAP
• www.interacademies.org/publication/strengthening-research-covid-19-during-pandemic

The Case for Inquiry-based Science Education – IBSE
Published by: IAP
• www.interacademies.org/publication/case-inquiry-based-science-education-ibse-0



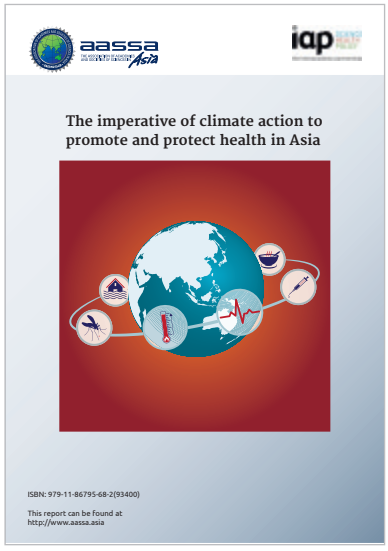
The Different Types of COVID-19 Vaccines Infographic
Published by: IAP
• www.interacademies.org/publication/different-types-covid-19-vaccines

Les Différents Types de Vaccins COVID-19 Infographic
Published by: IAP
• www.interacademies.org/publication/les-differents-types-de-vaccins-covid-19

The Tianjin Biosecurity Guidelines for Codes of Conduct for Scientists
Published by: IAP, Johns Hopkins Center for Health Security and Tianjin University
• www.interacademies.org/publication/tianjin-biosecurity-guidelines-codes-conduct-scientists

AASSA-PAS Webinar Series 2021 on Pandemic Preparedness: Science and countermeasures
Published by: Association of Academies and Societies of Sciences in Asia (AASSA)
• www.interacademies.org/publication/aassa-pas-webinar-series-2021-pandemic-preparedness-science-and-countermeasures

The imperative of Climate Action to Promote and Protect Health in Asia
Published by: AASSA
• www.interacademies.org/publication/imperative-climate-action-promote-and-protect-health-asia



A Sea of Change: Europe's future in the Atlantic realm
Published by: EASAC
• www.interacademies.org/publication/sea-change-europes-future-atlantic-realm

Decarbonisation of Buildings: For climate, health and jobs
Published by: EASAC
• www.interacademies.org/publication/decarbonisation-buildings-climate-health-and-jobs

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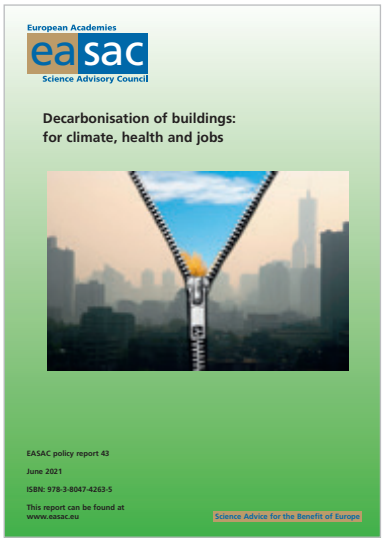
Published by: EASAC and FEAM
• www.interacademies.org/publication/decarbonisation-health-sector-commentary-easac-and-feam



International Sharing of Personal Health Data for Research
Published by: EASAC
• www.interacademies.org/publication/international-sharing-personal-health-data-research-0

Tackling the Effects of Climate Change on Health in the Mediterranean and Surrounding Regions. Including assessments from countries in the Middle East, North Africa and the Balkans
Published by: EASAC
• www.interacademies.org/publication/tackling-effects-climate-change-health-mediterranean-and-surrounding-regions-including

Calidad del Agua: Salud de los ecosistemas y salud humana
Published by: IANAS
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Published by: IANAS
• www.interacademies.org/publication/catalyzing-stem-education-and-public-engagement-through-ianas-science-education-program

Report Overview: Taking action against climate change will benefit health & improve health equity in the Americas

Published by: IANAS
• www.interacademies.org/publication/report-overview-taking-action-against-climate-change-will-benefit-health-improve-health

Neonicotinoid Insecticides: Use and effects in African agriculture. A review and recommendations to policymakers
Published by: Academy of Science of South Africa (ASSAf)
• www.interacademies.org/publication/neonicotinoid-insecticidesuse-and-effects-african-agriculturea-review-and

Gender Equality in Science: Inclusion and participation of women in global science organizations. Results of two global surveys
Published by: GenderInSITE with IAP and ISC
• www.interacademies.org/publication/gender-equality-science-inclusion-and-participation-women-global-science-organizations

Digital Scholarly Communication International Webinar Series Proceedings
Published by: Indonesian Academy of Sciences
• www.interacademies.org/publication/digital-scholarly-communication-international-webinar-series-proceeding

Proceedings of AASSA-PAS Webinar series on 'Pandemic Preparedness: Science and Countermeasures'.
Published by: Pakistan Academy of Sciences (PAS)
• www.interacademies.org/publication/proceedings-aassa-pas-webinar-series-pandemic-preparedness-science-and-countermeasures

Evidence-informed Policy for Tackling Adverse Climate Change Effects on Health: Linking regional and global assessments of science to catalyse action
Published by: PLOS Medicine
• www.interacademies.org/publication/evidence-informed-policy-tackling-adverse-climate-change-effects-health-linking

Fast and Slow Issues in Science Diplomacy: Towards an equitable global metis of science diplomacy
Published by: Science Diplomacy, India's Global Digest of Multidisciplinary Science
• www.interacademies.org/publication/fast-and-slow-issues-science-diplomacy-towards-equitable-global-metis-science-diplomacy

From Ideas to Action: Transforming learning to inspire action on critical global issues
Published by: The Smithsonian Science Education Center (SSEC)
• www.interacademies.org/publication/ideas-action-transforming-learning-inspire-action-critical-global-issues

Sustainable Communities! How will we help our community thrive?
Published by: The Smithsonian Science Education Center (SSEC) and IAP
• www.interacademies.org/publication/sustainable-communities-how-will-we-help-our-community-thrive

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Published by: The Smithsonian Science Education Center (SSEC) and IAP
• www.interacademies.org/publication/vaccines-how-can-we-use-science-help-our-community-make-decisions-about-vaccines

Inclusivity and Diversity: Integrating international perspectives on stem cell challenges and potential
Published by: Stem Cell Reports
• www.interacademies.org/publication/inclusivity-and-diversity-integrating-international-perspectives-stem-cell-challenges

The Integration of Refugee and Displaced Scientists Creates a win-win Situation
Published by: United Nations Educational, Scientific and Cultural Organization (UNESCO)
• www.interacademies.org/publication/integration-refugee-and-displaced-scientists-creates-win-win-situation

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The InterAcademy Partnership secretariat is hosted by The World Academy of Sciences (UNESCO-TWAS) in Trieste, Italy, and by the US National Academies of Sciences, Engineering, and Medicine in Washington, DC, USA.

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iap SCIENCE HEALTH POLICY
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