



World Science Forum 2013

“Young Scientists and Social Innovators Making
Science Sustainable for the Next Generation”

Report by:

World Association of Young Scientists (WAYS)

&

International Consortium of Research Staff Associations (ICoRSA)

Rio de Janeiro, Brazil

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WAYS/ICoRSA Members with UNESCO’s Lidia Brito and Nicole Webley. From left, Fernando Valiente-Echeverría (WAYS), Marga Gual Soler (WAYS), Linda Kamau (WAYS), Akhyar Farrukh (WAYS), Mandë Holford (WAYS), Lidia Brito (UNESCO), David Proctor (ICoRSA), Gordon Dalton (ICoRSA), Javier Santaolalla Camino (The Big Van Theory), Brazilian Participant, L. David Finger (ICoRSA), Nicole Webley (UNESCO) and Carlos G. Acevedo-Rocha (WAYS/ICoRSA).

I. WSF 2013 Program Description

Session:

16:00 - 17:30 PARALLEL THEMATIC SESSION III.

"Young Scientists and Social Innovators Making Science Sustainable for the Next Generation"

Venue:

Hotel Windsor Atlantica

Chairs:

Mandë Holford, WAYS (World Association of Young Scientists)

Gordon Dalton, ICoRSA (International Consortium of Research Staff Associations)

Speakers:

- Martin Hynes, President and Chief Executive Officer, European Science Foundation (ESF)
- Jacqueline Allan, Senior Policy Analyst for Science, Technology and Industry, Organization for Economic Co-operation and Development (OECD)
- Eduardo Viotti, Legislative Advisor for Science, Technology and Innovation, Brazilian Senate
- Claire McNulty, Director of Science, Education, and Society, British Council
- Kate Krontiris, Civic Researcher, Strategist, and Facilitator, US

Visual Scribes:

Kate Krontiris

Report Cover Image:

Linda Kamau

Report and Session Organizers:

[Mandë Holford](#), [Gordon Dalton](#) and [Carlos G. Acevedo-Rocha](#)

II. Executive Summary of WAYS/ICoRSA WSF2013 Session

The [WAYS/ICoRSA](#) session presented issues that young scientists worldwide are confronting in their careers in and outside the academic world, as well as addressed local and global issues of sustainability and social development. The need to support young scientists and social entrepreneurs is an important and urgent issue that has to be repeated often and backed up with tangible policy initiatives that foster innovation in research, such as recognizing researchers as professionals, in order to establish sustainable science and technology (S&T) development on a global scale. The structure of the WAYS/ICoRSA session consisted of a panel presentation followed by breakout group discussions with World Science Forum 2013 ([WSF2013](#)) session participants. The invited panel of Martin Hynes (ESF), Jacqueline Allan (OECD), Eduardo Viotti (Advisor to Brazilian Senate), Claire McNulty (British Council), and Kate Krontiris (Civic Researcher, U.S.A) presented on the status of researchers and initiatives for early career development at the international and regional levels, and provided examples of successful programs and policy initiatives for empowering researchers and enhancing sustainability and social development through technology and innovation that can serve as models in many nations and communities. Figure 1 was visually scribed during the session to summarize the panel presentation.

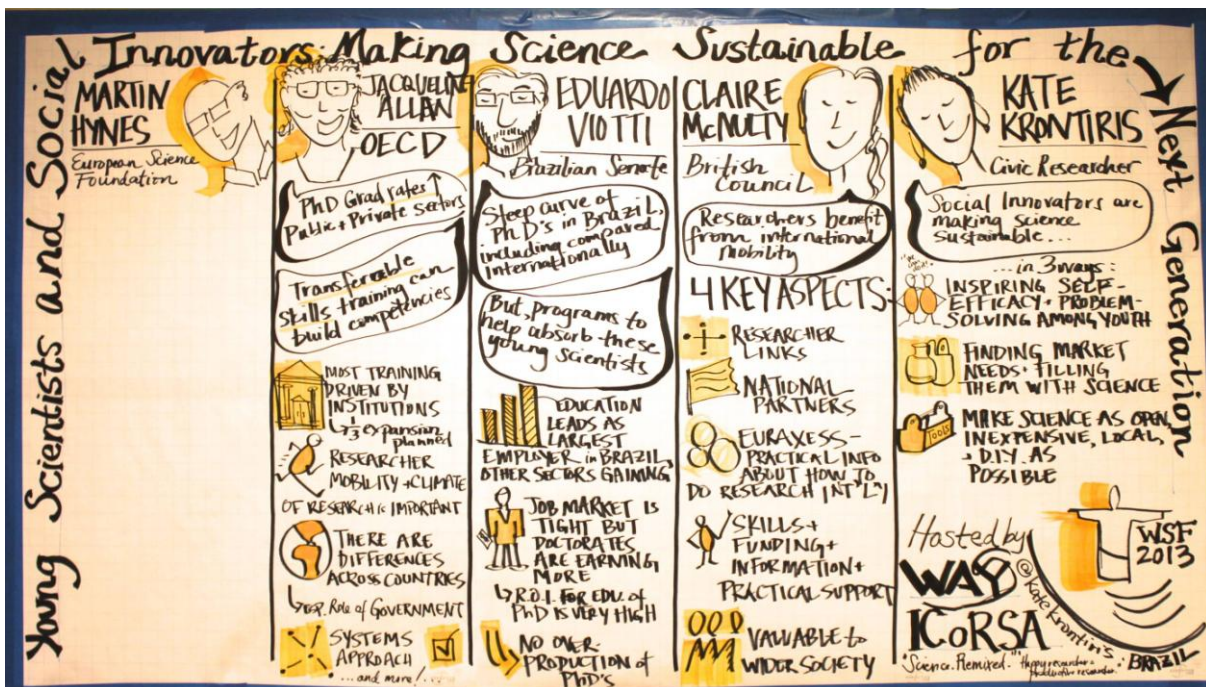


Figure 1. Summary of WAYS/ICoRSA panel discussion at WSF2013. Image by Kate Krontiris.

Breakout discussions during the session were divided into four working groups led by team members of WAYS/ICoRSA. Each group was composed of about ~twenty WSF2013 participants and centered on finding creative ideas in four thematic areas:

1. *How do we define success in scientific careers and how can we incentivize researchers to be more proactive to ensure the sustainability of their careers? Lead by Gordon Dalton (Ireland) and David Finger (U.S.A., living in UK)*
2. *How can science and technology practitioners interact more effectively with policy and decision makers to promote sustainable development? Lead by Marga Gual Soler (Spain) and David Proctor (U.S.A.)*
3. *DIY (Do-It-Yourself) science for next generation scientists: Encouraging young people to think about themselves as researchers/problem solvers. Lead by Michael Fischer (Germany) and Akyhar Farrukh (Pakistan)*
4. *Facilitating Science and Technology development in Low Income Countries (LICs). Lead by Linda Kamau (Kenya) and Javier Santaolalla Camino (Spain, working in Brazil)*

Several ongoing challenges were highlighted in the lively breakout discussions, such as the importance of including the voice of young scientists and social entrepreneurs at conferences and high-level S&T conversations, the need for politicians to be more scientifically literate, and for scientists to have policy training to enhance the efforts of communication between stakeholder groups to ensure effective policy decisions are made. Outlined below are the key recommendations that emerged from the WAYS/ICoRSA session:

1. *Programs that boost mobility and transferable skills serve the purpose of providing PhDs with a variety of career options. However, funding agencies and academic institutions should devise policies in the interest of the researcher and the research institution to avoid the “immigration scientist” effect, where researchers are forced to choose mobility and careers in order to find employment, and not as a true desire for change.*
2. *Universities and research institutions should experiment with novel models for inclusion of PhDs and doctoral candidates as staff members.*
3. *Academic and government Education, and Science and Technology institutions should encourage Do-It-Yourself (DIY) science projects as they are a means of facilitating Science, Technology, and Innovation (ST&I) development in a sustainable manner.*

4. *It is important to provide support and promote excellence early in the careers of young scientists. International science organizations and national science academies should survey and implement several models and mechanisms for identifying and supporting young scientists at various career stages. Waiting until someone has a Master's degree or equivalent is time wasted in fostering the mind of a future scientist.*

The WAYS/ICoRSA session ended with a dynamic performance by Javier Santaolalla Camino from The Big Van Theory ([link to video](#)) based on the FameLab concept, in which young scientists learn to communicate their research to society via an original performance art piece. The complementary efforts of WAYS and ICoRSA are united to ensure that the next generation of scientists across all disciplines have a collective voice, are integrated into the decision-making process, and contribute to the sustainable development of society, while being treated with equity to ensure their successful career developments.

III. Introduction to Session Organizers WAYS/ICoRSA

[WAYS](#) (World Association of Young Scientists) is an open-platform, grassroots initiative designed to empower early career scientists worldwide, promote scientific excellence and facilitate the contributions of young scientists toward decision making processes in science policy. The core of the content on the WAYS website comes from the over 20,000+ registered scientist members primarily in the developing countries. As a result, an organic grassroots community with a clear focus on science is emerging to form a cohesive and coherent entity that enables young and early career scientists to develop meaningful and communicative relationships with each other. WAYS facilitates a window to the world of contemporary science in less scientifically advanced nations. As the community of WAYS expands it will foster scientific excellence, inter- and transdisciplinary collaborations, offer access to career opportunities and events that promote and encourage young scientists to be involved in science policy and communication locally, regionally and internationally. WAYS has had the sustained support of UNESCO, ICSU, and recently, The Richard Lounsbery Foundation to participate in the World Science Forum.

[ICoRSA](#) (International Collaboration of Staff Research Associations) is a collaborative organization that links communities of researchers' organizations worldwide in order to address common challenges shared by an international research workforce. To that end, ICoRSA seeks to build a shared repository of effective and fair researcher working practices, inform international research policy and develop researcher communities worldwide, acting in particular as ambassadors to emerging national research environments. Thus far, ICoRSA has staff and postdoctoral associations from Ireland, UK, France, USA, Canada, Portugal, Spain, South Africa, and Australia, among other regional and international organizations.

IV. WAYS/ICoRSA Session Summary

The aim of the WAYS/ICoRSA session was to identify short, medium, and long-term innovative policy initiatives that will make science more sustainable for the next generation of young and early career scientists and social entrepreneurs. In doing so, WAYS and ICoRSA identified emerging global innovators pursuing solutions to sustain the future of young scientists across various career paths and invited them to lead discussion groups with the decision makers and policy practitioners that made up the 2013 World Science Forum (WSF2013) audience. The session presented issues that early career scientists are confronting in their career perspectives in and outside the academic world, and addressed local and global

issues of sustainability and human development. Four themes were explored in the breakout discussions involving WAYS/ICoRSA members and WSF2013 attendees of the session:

1. *How do we define success in scientific careers and how can we incentivize researchers to be more proactive to ensure the sustainability of their careers?*
2. *How can science and technology practitioners interact more effectively with policy and decision makers to promote sustainable development?*
3. *DIY (Do-It-Yourself) science for next generation scientists: Encouraging young people to think about themselves as researchers/problem solvers.*
4. *Facilitating Science and Technology development in Low Income Countries (LICs).*

Science and research are essential pillars for economic growth and sustainable development in modern societies. To achieve this goal and attract generations of young people into science, a strategy has been to increase the numbers of pre- and postdoctoral programs across the world. In the decade between 1998 and 2008, for instance, the number of science doctorates earned grew yearly to nearly 40% in countries belonging to the OECD (Organization for Economic Co-operation and Development) [1]. There has also been an increase in the number of postdoctoral positions documented from 2004 to 2010, particularly in the US alone [2], but with similar trends observed in other parts of the world [3]. An overproduction of both doctorates and post-doctorates has emerged in the Western hemispheres in the last years that has extremely widened the bottom of the academic pyramid, and narrowed its tip at the top [2]. Whereas this overproduction can be partially mitigated by industry, government or other non-academic instances in a few countries [1], this imbalance cannot be sustained, and in some cases is exacerbated due to the falling science funding rates owing to economical crisis.

While, the Western world has invested considerably amounts of their economic resources in scientific infrastructure and human capital, this level of investment has not been met in emerging-growth nations. As illustrated in several sessions at [WSF2013](#), and reinforced by Eduardo Viotti, Legislative Advisor for Science, Technology and Innovation, Brazilian Senate, the overproduction of PhDs is not a problem for emerging nations. Overarching policies to restrict the number of PhDs or to direct the production of discipline specific PhDs are misguided. As noted by Martin Hynes, CEO of the European Science Foundation, in answer to the question how many PhDs are necessary, the correct answer for society always has to be “more than sufficient”. Too few PhDs would have disastrous societal impacts. It is important to empower young people to follow their passion, to deploy their early

zeal to focus on becoming successful in a career of their choice. Encouraging young scientists and engineers of all disciplines breeds ST&I diversity and has potentially high returns, compared to playing a game of "science roulette" to bet on which PhD fields will succeed.

Careers in research diverge dramatically across the globe, and are dependent on many factors such as maturity of research fields in respective countries, cultural norms, geographic locations and demographics. Although emerging economies may not have the problems associated with the overproduction of doctorates, PhDs and postdoctoral researchers worldwide have expressed disappointment with their career prospects in a traditional academic setting. Academic culture has, until recently, only encouraged researchers to pursue academic careers despite the grim statistics of obtaining such a position. There is a need to change the academic culture to define success in a manner that reflects the languishing job market. As suggested by Jacqueline Allan, Senior Policy Analyst for Science, Technology and Industry, Organization for Economic Co-operation and Development (OECD), one mechanism for addressing PhD overproduction in some nations, and career satisfaction globally, is to provide programs that incentivize researchers to take control of their careers and explore the acquisition of transferable skills. Scientists acquire various skills in the course of their studies, laboratory, and fieldwork, but require more systematic and quality-consistent training to identify the proficiencies acquired during their PhD and successfully apply these abilities in other professional disciplines. Early and late stage researchers need to have greater mobility and flexibility in their career paths. Transition points leading to careers in policy, industry, law, business, and other enterprises should be developed and the ease with which researchers can travel with their skills should be enhanced. Governments play a secondary role to that of universities, research institutions and other organizations, who are the main actors in terms of transferable skills training. Initiatives such as the ESFs Research Development Framework (Vitae RDF), and the British Council's EURAXESS program are examples of policies to enhance skills training and mobility of researchers. However, most initiatives are fairly recent and have not yet been evaluated, so it is difficult to comment on their impact, e.g. the enhancement in skill levels due to the participation in the programs.

While programs that promote mobility and career transitioning are useful, we have to avoid creating "*immigration scientists*," who are hopping from position to position like tourists getting visas at an immigration office to travel, and finally, out of frustration, decide to stay home, which equates with abandoning their scientific careers. WAYS member [Marga Gual Soler](#) is a self-described scientist without borders, who successfully transitioned her cell biology PhD training and skills to the international policy and development realm with an

internship at the United Nations Economic and Social Council (UN-ECOSOC). She is the first biomedical scientist to be awarded a Global Competitiveness Leadership Fellowship from the Latin American Board at Georgetown University in the United States. Marga is primarily interested in innovative science diplomacy mechanisms and will use her fellowship to examine the S&T policy, education, and development in Ibero-American countries. Marga's experience emphasize that skills learned as a researcher can be applied to many non-traditional careers including industry, business, finance, non-profit organizations and scientific administration. However, policies that encourage professional development to acquire skills that can be transferred to a non-traditional career should be smartly applied and not be blanket treatments to quell fires of unemployment or career dissatisfaction. Gordon Dalton, Chair of ICoRSA and past president of the Irish Research Staff Association and [David Finger](#), ICoRSA Treasurer, member on the Board of Directors for the [U.S. National Postdoctoral Association](#), and member of the standing committee of the UK Research Staff Association, are pursuing initiatives that will address employment issues for PhDs and how to improve career dissatisfaction.

To create sustainable S&T initiatives and avoid creating "immigration scientists," science and technology practitioners need to communicate more effectively with policy and decision makers to provide mechanisms that speak to S&T development and training needs. Several breakout discussion participants observed that researcher and policy-making communities must understand their respective perspectives, time horizons, approaches, and goals. This challenge is increased by the need to promote culture change by individuals as well as communities, and to gather input from a variety of stakeholders. Programs such as the American Association for the Advancement of Science ([AAAS Science & Technology Policy Fellowship](#)) allow PhDs to enter policy environments and contribute to the conversation by formulating public policy affecting science and engineering research. [David Proctor](#), ICoRSA Secretary and AAAS Science & Technology Policy Fellow at the US National Science Foundation, assists in the coordination of cyber-infrastructure activities. David is using the knowledge and skills he acquired during his PhD to inform programs and policies that impact the S&T community. Communicating the perspectives of the S&T community to policy-makers requires ongoing Forums where ideas can be exchanged. David co-organizes a [Science Diplomacy lecture](#) series that enables active discussions of emerging topics at the intersection of science and foreign policy. The AAAS S&T Fellowship and the Science Diplomacy Forums facilitated by David illustrate the importance of engaging researchers and

S&T practitioners in collective dialogue to enhance their responsibilities in building a sustainable society.

Increasing the effectiveness of science communication is paramount to enhancing the public's interest in science to the level where they can become advocates for science and influence politicians and other decision makers to invest more in ST&I to build sustainable science capacity. Additional solutions to improve communication between scientists and policy makers suggested engaging techniques from the humanities. The [FameLab](#) International program is one initiative that combines the humanities and natural sciences to tackle how science is communicated. As described by Claire McNulty, Director of Science, Education, and Society, The British Council's, FameLab is an exciting television competition in which contestants have three minutes to convince the jury and charm the audience with clear and rigorous, but also charismatic scientific monologues. FameLab identifies, trains, and mentors young scientists to communicate clearly and effectively with the general public and the media. FameLab awardee and [The Big Van Theory](#) co-founder, Javier Santaolalla Camino, provided a dynamic performance on the principles of particle physics at the conclusion of the WAYS/ICoRSA session. Javier is a "Ciencia sem Fronteras" Postdoctoral Fellow at the State University of Rio de Janeiro and CERN member, and is working to strengthen the links between CERN and Latin America. Initiatives such as FameLab enable Javier to translate his scientific expertise in a palatable manner to increase understanding of otherwise dense scientific material. The Big Van Project has become an unprecedented phenomenon in schools, science centers, and museums all over Spain, increasing interest in Science, Technology, Engineering, and Mathematics field. More than 5,000 FameLabbers of more than 20 countries are now involved in science communication initiatives or acting as mentors in school projects and workshops for science teachers and students. Exciting young people about science and encouraging them to think about themselves as researchers and problem solvers is an effective approach to making the scientific enterprise sustainable.

DIY (Do It Yourself) Science invites citizens of all ages and levels of educational training to engage in the scientific enterprise. Programs such as WAYS member Michael Fischer's [World Lecture Project](#) (wlp)^o is a platform for delivering academic videos from institutions all around the world. (wlp)^o's library includes videos of multiple academic fields, from several countries, translated into several languages. Educational programs such as (wlp)^o decrease the barriers to learning by providing access to academic content free of charge online. Access to the Internet is all that is required to view the (wlp)^o catalog. Initiatives such

as (wlp)^o and FameLab can facilitate S&T development and dissemination in Low Income Countries (LICs).

Taking advantage of emerging technologies is a route to narrowing the knowledge divide in LICs. In order for this approach to be successful it is important to be trained in core math and science skills necessary to engage with emerging technologies. Ted Fellow and WAYS collaborator Linda Kamau of Kenya is a part of a team of women technologists hoping to lead a revolution for African women and technology with their [AkiraChix](#) project. Technology is one of the drivers of Africa's economic growth, but many in the African community cannot use this tool, as they are not trained in the math and science skills necessary to exploit emerging technologies. AkiraChix tries to address this issue by training young girls who display an interest in "gadgets and gizmos" in core science skills necessary to succeed as a computer scientists or engineers. Programs such as AkiraChix, if implemented nation-wide could significantly increase the number and quality of women engaged in STEM, further enhancing the technology-driven economic rise of the region. Making science as open, inexpensive, and local as possible enhances the chances of building sustainability S&T capacity in Africa. Linda Kamau and the team of women technologists that lead AkiraChix are social innovators. As pointed out by Civic Researcher, Kate Krontiris, social innovators are making science sustainable by identifying market needs and filling them with science inspired solutions. Inspiring self-efficacy and problem solving among young women is a short-term policy initiative that will reap long-term benefits.

V. *Suggestions for Policy Initiatives*

Summarized below are the key recommendations that emerged from the WAYS/ICoRSA session:

1. *Programs that boost mobility and transferable skills serve the purpose of providing PhDs with a variety of career options. However, funding agencies and academic institutions should devise policies in the interest of the researcher and the research institution to avoid the "immigration scientist" effect where researchers are forced to choose mobility and careers in order to find employment, and not as a true desire for change.*
2. *Universities and research institutions should experiment with novel models for inclusion of PhDs and doctoral candidates as staff members.*

3. *Academic and government Education, and Science and Technology institutions should encourage Do-It-Yourself (DIY) science projects as they are a means of facilitating Science, Technology, and Innovation (ST&I) development in a sustainable manner.*
4. *It is important to provide support and promote excellence early in the careers of young scientists. International science organizations and national science academies should survey and implement several models and mechanisms for identifying and supporting young scientists at various career stages. Waiting until someone has a Master's degree or equivalent is time wasted in fostering the mind of a future scientist.*

In his closing statement, Martin Hynes evoked renaissance inventor Gutenberg as a lesson to current day policy makers with shortsighted views about the length of time required for investments in S&T to bare tangible fruits that impact society. Many politicians and policy makers think that investment in young scientists starts once the person has earned a Masters level degree or the equivalent. This is a shortsighted view to supporting young scientists. As illustrated by projects such as The Big Van Project and AkiraChix, if more policies to create sustainable S&T capacity were geared towards initiatives that engage scientists at all ages and levels of their careers, it may be possible to reverse the trend of disinterest in S&T among young people and the lay public in general. Programs such as Brazil's current initiative to significantly increase Brazilian PhDs may face several hurdles when the PhD's come home to roost unless carefully executed. Policies that promote mobility and skills transfer increase employability of researchers in academia and prepare them for the wider labor market. Research funding agencies and institutions should devise policies that invest in researchers by providing transferable skills training while enabling mobility when it is in the interest of both the researcher and research institution. We have to avoid the "immigration scientist" effect, where researchers are choosing mobility and varying career paths to fulfill the need of gainful employment and not as an earnest choice. To avoid the creation of "immigration scientist," researchers and policy makers have to communicate their needs more effectively. As politicians usually have the gift of gab, it is up to scientists to pursue programs that train them to be better communicators. Early career scientists should receive training similar to the British Council's FameLab, where they are taught how to take the cobwebs out of formal academic instruction and bring learning alive with dynamic performance pieces. Presenting science in a manner that speaks to the youth ensures there will be a next generation of scientists. Finally, as illustrated by (wlp)^o, policies promoting DIY projects should be encouraged, as they are a means of facilitating S&T development in a sustainable manner.

Mobility, skills transfer, improving communication, and DIY initiatives also have the added strategic benefits of improving teaching quality, knowledge transfer, commercialization, communication and international co-operation. The complementary efforts of WAYS and ICoRSA are united to ensure that the next generation of scientists across all disciplines have a collective voice, are integrated into the decision-making process, contribute to the sustainable development of society, while being treated with equity to ensure their successful career developments.

VI. *WAYS/ICoRSA WSF2013 Media*

- [Dr. Javier Santaolalla \(The Big Van Theory - FameLab\)](#)
- [ScidevNet America Latina \(Spanish\)](#)
- [Unidos pela ciência \(Portuguese\)](#)
- [British Council Blog](#)
- [Sociedade Brasileira para o Progresso da Ciência](#)
- Twitter [@ways_remixed](#)

VII. *WAYS/ICoRSA Session-related Links*

- [Careers \(not just jobs\) for Ph.D.s outside the academy](#)
- [The Logistics of Scientific Growth in the 21st Century](#)
- [Growth in Untenured Academic Science Jobs Seen Hurting Careers](#)
- [The disposable academic: Why doing a PhD is often a waste of time](#)
- [Postdocs: A voice for the voiceless](#)
- [The Phd Factory, Nature](#)
- [Ticket to Everywhere, Naturejobs](#)

VIII. *References*

1. Cyranoski, D., et al., *Education: The PhD factory*. Nature, 2011. **472**(7343): p. 276-9.
2. Uskokovic, V., *The role of postdoctoral scholars associations in the times of unionization*. Journal of Postdoctoral Affairs, 2011. **1**(1): p. 31-45.
3. Van Noorden, R., *Global mobility: Science on the move*. Nature, 2012. **490**(7420): p. 326-9.

IX. Acknowledgements

WAYS/ICoRSA thank UNESCO, specifically, Lidia Brito, Diane Malpede and Nicole Webley for their sustained support of WAYS/ICoRSA initiatives and funding of WAYS/ICoRSA participants to attend WSF2013. We also thank ICSU's Regional Office for Africa, specifically, Edith Madela-Mntla, for continued support and funding of WAYS/ICoRSA participants to attend WSF2013. The organizers also thank The Richard Lounsbery Foundation, specifically, Maxmillian Angerholzer III, for providing seed funds for the WSF2013 panel session. The authors thank Marga Soler Gual, Javier Santaolalla Camino, and David Proctor for comments to the report. Finally, we thank the WSF2013 Secretariat, specifically the Brazilian Academy of Science President Jacob Palais, Gabriella Fiahlo de Mello and Fernanda Wolter, and the Hungarian Academy of Sciences President József Pálincás and Balazs Gulyas for the invitation to participate and have the voice of young and early career scientists present at prior, current and hopefully, future World Science Forums.