The IFS Annual Report has a style which is designed to match our ten-year strategy and includes sections relating to the specific objectives to improve planning of research by early-career scientists, to increase production of relevant, quality research in low and lower middle-income countries, and to increase the use of quality research results produced by IFS.
TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foreword</td>
<td>4</td>
</tr>
<tr>
<td>Mission statement</td>
<td>6</td>
</tr>
<tr>
<td>Résumé en français</td>
<td>7</td>
</tr>
<tr>
<td>IMPROVING PLANNING OF RESEARCH BY EARLY-CAREER SCIENTISTS</td>
<td>8</td>
</tr>
<tr>
<td>Strengthening links with IFS alumni and partner organisations</td>
<td>10</td>
</tr>
<tr>
<td>INCREASING PRODUCTION OF RESEARCH</td>
<td>14</td>
</tr>
<tr>
<td>Individual grants approved in 2015</td>
<td>16</td>
</tr>
<tr>
<td>The second IFS Collaborative research pilot</td>
<td>17</td>
</tr>
<tr>
<td>The Carolina MacGillavry Award</td>
<td>19</td>
</tr>
<tr>
<td>A selection of new individual research grants given in 2015</td>
<td>20</td>
</tr>
<tr>
<td>INCREASING USE OF RESEARCH RESULTS PRODUCED BY IFS</td>
<td>28</td>
</tr>
<tr>
<td>Putting research into use</td>
<td>30</td>
</tr>
<tr>
<td>Reclaiming land for agriculture</td>
<td>33</td>
</tr>
<tr>
<td>Detecting harmful metal contamination in Vietnam’s water</td>
<td>34</td>
</tr>
<tr>
<td>Nigerian hot springs contain useful industrial enzymes</td>
<td>35</td>
</tr>
<tr>
<td>Working harmoniously with bananas</td>
<td>36</td>
</tr>
<tr>
<td>A multiple-points bond with our alumni</td>
<td>37</td>
</tr>
<tr>
<td>THE SUPPORT OF IFS</td>
<td>38</td>
</tr>
<tr>
<td>COMSTECH and IFS – a long-lasting collaboration</td>
<td>39</td>
</tr>
<tr>
<td>Impact of IFS on my life – Nteranya Sanginga</td>
<td>41</td>
</tr>
<tr>
<td>PEOPLE, AFFILIATES, GRANTS AND FINANCES</td>
<td>43</td>
</tr>
<tr>
<td>IFS Board of Trustees</td>
<td>43</td>
</tr>
<tr>
<td>IFS Staff</td>
<td>43</td>
</tr>
<tr>
<td>Audited financial statement 2015</td>
<td>44</td>
</tr>
<tr>
<td>Affiliated organisations 2015</td>
<td>48</td>
</tr>
<tr>
<td>Individual research grants awarded 2015</td>
<td>50</td>
</tr>
</tbody>
</table>
Foreword
IFS 2015: Contributing to global efforts to address the global challenges of poverty, hunger, environmental degradation, and low levels of human wellbeing.

The year 2015 is a pivotal year for global development aspirations. With the Millennium Development Goals (MDGs) expiring at year's end, a new post-2015 development agenda (the Sustainable Development Goals, SDGs) was designed. This agenda encourages every country to take necessary steps to reduce poverty and enhance social and economic development in a sustainable manner. As one of few players devoted to enabling early-career scientists in developing countries to contribute to this global agenda, IFS will continue through our proxies (developing country young scientists) to contribute to this global initiative, and our current strategy (2011–2020) provides the opportunity to respond to a number of the goals.

During the year, we continued to do what we know best, building the capacity and capabilities of young developing country scientists working on sustainable management of biological, water and energy resources in their countries. Our unique research granting approaches enable researchers not only to produce quality research outputs, but also to put them into use, thus contributing to national economic growth and the general wellbeing of their local and national communities.

Thus during the year and within the context of the individual research grants approach, 1,353 grant applications were received, and after the usual rigorous selection process (thanks to our army of scientific advisers), 153 individual applications from 38 different countries were approved for funding. The gender distribution of the awarded research grants was 66% male and 34% female. The regional distribution of the grants was 63% in Sub-Saharan Africa, 27% in South and Southeast Asia, 4% in Latin America, and 6% in the Middle East and North Africa.

For the collaborative research grants approach we launched a second pilot focused on biodiversity. Against a call for applications advertised on an electronic platform (Podio), 26 teams submitted proposals, and 9 teams consisting of 35 researchers (17 women and 18 men) from 8 countries were awarded research grants. There were 6 female and 3 male coordinators; 7 teams were a mix of Anglophone and Francoophone researchers and 2 teams were researchers from Anglophone countries only. The pilot countries were Benin, Burkina Faso, Côte d'Ivoire, Ghana, Nigeria, South Africa, Tanzania and Uganda.

In addition to awarding these grants, IFS provided supporting and mentoring services, i.e., feedback on all research proposals (particularly to unsuccessful applicants) and counselling to successful grantees upon request. With regards to unsuccessful but promising applicants, 59 applicants took the challenge to review their research proposals and 44 of them (about 75%) were successful with a revised application, thus showing the invaluable contribution of IFS scientific advisers to research capacity building in developing countries.

Eleven training workshops, seminars, write-shops and policy consultative meetings, involving approximately 300 participants, were conducted through different partnership agreements, and increasingly together with the IFS alumni associations in developing countries.

Another main activity in 2015 was the scientific equipment procurement service offered to grantees. This service ensures the rapid purchase of required scientific equipment and supplies with considerable cost reductions. During the year 148 researchers benefited from this service, and we recorded a total of 439 transactions.

Another tool in our arsenal of support services provided to our grantees and which was used in 2015 is the supplementary grant. This tool often provides effective solutions to obstacles and problems that could prevent a full and successful project implementation. This year 25 grantees benefited from the use of this tool which enabled them to successfully address the objectives of the research projects.

In 2015, we therefore once again demonstrated the value of IFS’ unique approach of strengthening the weak link in research and innovation capacity and capability develop-
ment in developing countries, i.e. retaining and gainfully engaging young graduates in their countries, so that they can contribute to global development aspirations as detailed in the SDGs.

Details of the above and other activities carried out during the year are provided in this report.

Various groups contributed to the successful implementation of these activities and we acknowledge their contributions including those of: the exceptionally talented and dedicated IFS staff, the army of competent and altruistic Scientific Advisers, our Board of Trustees which provides guidance and oversight, various partner organisations including the budding IFS alumni associations, and our development partners who provide the resources required to carry out these activities.

Finally, the range of challenges facing the global community is as daunting as ever, and IFS is well positioned to contribute to alleviating those of significant importance to developing countries including: poverty, food insecurity, climate change, environmental degradation, and an unacceptably low level of human wellbeing. We are confident that with your continued support our contributions will become increasingly significant and sustainable.

You are invited to enjoy the highlights of the past year in the following pages.

Olanrewaju Smith  
Chair

Nighisty Ghezae  
Director
Mission statement

The need
Science can be a significant driver of economic and human development. Used properly it can help to strengthen the human condition globally through improved livelihoods, food security, health and wellbeing. The scientists of tomorrow must contribute to securing accessible and affordable food, water and energy for a rising population within a scenario of environmental sustainability, as directed by the 2030 Sustainable Development Goals.

While low-income countries produce a sizeable number of scientists, they experience significantly high rates of brain drain as scientists migrate in search of facilitated conditions in the most developed countries. The International Foundation for Science holds that a sound basis for contributing to the establishment and expansion of developing country science and to help these countries retain scientific talent is to identify, select and support promising early-career men and women scientists, and offer them opportunities in their home countries to plan, produce and put knowledge and technology into use.

In the next decade, individual and collaborative research conducted by developing country scientists needs to contribute to global efforts to reduce poverty and support sustainable development to deliver on the global Sustainable Development Goals. Support by the International Foundation for Science will strengthen the possibilities for early-career men and women scientists to productively engage in innovation and policy domains of relevance and use in their own countries.

Over a period of 40 years, IFS has supported 8000 scientists from 105 countries, many of whom are now leading scientists or science leaders. Guided by its 2011-2020 Strategy, IFS will continue to facilitate research on biological and water resources, with a focus on physical, chemical, and biological processes, as well as relevant social and economic aspects important in the conservation, production, and renewable use of natural resources.

The mission
IFS shall contribute towards strengthening the capability of young men and women scientists in developing countries not only to conduct relevant and high quality research, but to enhance opportunities to put it into use in their home environments.

The strategy
In its 10-year strategy, IFS aims to support excellent individual and collaborative research, to build capability of early-career scientists in the developing world, and to facilitate the process of innovation for the sustainable use and management of biological and water resources. An important goal is to enable young scientists to contribute to a global research community that is aiming to reduce poverty and support sustainable development. The primary focus will be the promotion of excellent science through early-career research grants and capability-enhancing support to researchers in developing countries. However, the interlinked development challenges that face humanity increasingly require scientists to work with each other, as well as with other professions and specialists. Therefore, the phased introduction of a collaborative research approach will provide support for research teams, which will combine researchers' strengths, expertise, and experience, to address a broader topic or research issue where more than one discipline is required. A major change in our agenda is not only to aspire to strengthen the capability of those embarking on a research career in the developing world, but also to support young scientists in the actions they undertake to bring about change, in terms of their values and objectives. In other words, to promote the individual agency of men and women scientists, early in their career in developing countries, to put their science into use.
Résumé en français

En 2015, l’IFS a développé sa stratégie, a continué de renforcer les capacités de recherche des jeunes scientifiques des pays en développement pour produire de nouveaux résultats de recherche, de qualité reconnue par les pairs académiques, a favorisé l’accès aux réseaux de recherche collaboratifs et a promu l’utilisation des résultats de la recherche.

BOURSES INDIVIDUELLES DE L’IFS
Deux sessions ont été ouvertes pour les candidatures aux bourses de recherche et les postulants ont soumis leurs projets au sein d’un des trois thèmes suivants:
- Ressources biologiques des systèmes terrestres
- Ressources hydrologiques et aquatiques
- Sécurité alimentaire, diététique et moyen de subsistance sain.

1353 projets ont été reçus, l’enregistrement de projets de bourses de recherche et le pré-screening en interne se sont déroulés conformément aux règles. A la suite de quoi, les projets ont été soumis à un groupe d’experts internationaux établis, pour évaluation et commentaires (l’IFS a environ 1400 conseillers actifs dans sa base de données). Un Comité Scientifique d’Évaluation (SAC) s’est réuni à Prague en mai et plusieurs meetings virtuels d’évaluation ont été organisés en Novembre pour analyser et classer les projets. Ainsi, en juin, 98 projets individuels ont été retenus tandis qu’en Décembre, ce sont 55 projets révisés ou renouvelés qui ont été approuvés portant à 153 le nombre total de bourses financées pour une valeur totale de 1 741 462 $US (soit 14 587 004 SEK).


En complément des bourses de recherche, l’IFS a apporté des soutiens variés, comme les commentaires donnés aux postulants malheureux, des conseils positifs sur les projets et de l’assistance pour l’achat des équipements et des fournitures.

LES BOURSES COLLABORATIVES DE L’IFS

Les chercheurs éligibles intéressés ont été invités à rejoindre un réseau social sur une plateforme spécifique, s’appuyant sur le logiciel commercial PODIO (offert gratuitement à l’IFS). Sur un espace virtuel global, les personnes étaient invitées à faire connaissance “scientifiquement” et à se réunir autour d’un appel à projet collaboratif présent sur la plateforme. 45 équipes ont pu rejoindre ensuite un espace privé, lui aussi sous PODIO, sur une plateforme permettant de planifier et de décrire leur projet propre d’équipe. A la date limite de cette initiative, 26 équipes ont pu ainsi finaliser leur projet, et le soumettre pour un pré screening qui en a retenu 13 sur la base de leur éligibilité et de leur qualité scientifique. Chaque projet a ensuite été envoyé pour évaluation à notre panel d’experts scientifiques.

Le Comité d’Evaluation des projets de Recherche Scientifique Collaborative s’est tenu en décembre, et a soumis à la décision de la direction, neuf équipes composées au total de 35 chercheurs (17 femmes et 18 hommes) de huit pays différents pour un montant global de 514 738 $US (4 494 796 SEK). Six projets seront coordonnés par des femmes, trois par des hommes; sept équipes sont francophone et seuls deux équipes ne comprennent que des chercheurs de pays Anglophones.

WORKSHOPS
Au total dix rencontres, séminaires, ateliers de rédaction, conférences consultatives, réunissant 300 participants ont été organisés impliquant différents partenaires et de plus en plus les Associations d’anciens boursiers IFS. Trois ateliers, composantes d’un projet EU-ACP, se sont tenus en coopération avec des partenaires africains et européen sur l’écriture scientifique et la communication.

Une autre rencontre a été réalisée en collaboration avec les universités nigérianes d’Abuja, de Kano, d’Ibadan et de Port pour identifier les problèmes matériels et comment y répondre.

Cinq ateliers de formation se sont tenus avec l’Université d’Abomey Calavi (Bénin et l’association des anciens boursiers IRS du Bénin sur la rédaction de projet, sur l’échantillonnage et l’analyse multivariée, sur l’utilisation de power-point, sur la présentation orale et sur les recherches collaboratives.


IFS ANNUAL REPORT 2015 *** 7
Improving planning of research by early-career scientists

It is a declared objective of IFS to improve planning of research by early-career scientists in low- and lower-middle-income countries that is relevant to those countries.

We aim to do this by:
• Providing unbureaucratic granting opportunities and capability building support to young scientists to do research in the developing world;
• Recruiting and using numerous independent reviewers;
• Attracting large numbers of applicants;
• Providing all applicants with detailed feedback;
• Holding dedicated training and supporting alumni to associate and support others planning science, and through empowering other research councils to do the same.

Observation of attack of leaf blast on a rural plot in Manananetivohitra, Madagascar.

PHOTO: HARINIAKA RAVELOSON
Strengthening links with IFS alumni and partner organisations
– through research planning workshops

Eleven workshops, seminars, writing workshops and policy consultative meetings, involving approximately 300 participants, were conducted through different partnership agreements and increasingly together with the IFS alumni associations.

Three workshops were held in cooperation with African and European partners on scientific writing and science communication as a component of the Africa, Caribbean, Pacific (ACP-EU) project. Another workshop was undertaken in conjunction with Nigerian universities in Abuja, Kano, Zaria, Ibadan and Port Harcourt, to identify needs for scientific equipment and supplies and to discuss how to address these. A further workshop was held with the International Centre for Insect Physiology and Ecology (icipe) in Nairobi.

Five training workshops were held with the University of Abomey-Calavi (Benin) and the Beninese Alumni Association on proposal writing, sampling design and multivariate analysis, PowerPoint design, oral presentation and training on collaborative research, and one consultative meeting was held with the MacArthur Foundation and hosted by the African Academy of Sciences (AAS).

COLLABORATION WITH ICIPE
IFS and icipe held a project proposal writing workshop in September 2015 for the benefit of their intern researchers. The participants, selected by icipe, mirrored, in their commitment to the workshop, the very high standard of research conducted at this centre of excellence.

The structure of IFS workshops continually evolves according to the needs of different categories of participants. This five-day course comprised lectures with a heavy focus on interactive practical group sessions and emphasised those elements of writing a project proposal with which the participants were not so familiar. This combination proved, as on previous occasions, to be highly successful; talks were kept as short as possible and delivered in such a way as to guarantee ease of assimilation. The group sessions then translated the content of the lectures into action – this ‘learning by doing’ aspect was very much appreciated by the participants, many of whom reported that they had never participated in such a course previously. The course component that was most appreciated and in which very few participants had any previous experience was logical framework (logframe) analysis. Two examples were used to illustrate the principle of logframe analysis – a theoretical scientific research project and perhaps more compellingly, a logframe analysis of the workshop itself.

The course also provided a springboard for participants to network more closely. Unlike in most workshops, because the participants were interns at icipe and so had some prior knowledge of everyone’s research area, they were able to interact constructively at a greater level of detail regarding each other’s projects.
Communicating science is not just about writing papers

Excellent research skills are of course necessary for generating new knowledge. But the endeavour is compromised if the results of quality research are not published. So, scientists must be able to communicate well. Scientific papers boost a career – very important for young scientists. But sharing research data with other scientists is not enough; what is vital to making applied research truly applied is sharing results with non-scientists, in order to bring new knowledge into use.

But communication, be it academic or ‘popular’, is not usually taught in post-graduate programmes, and in some parts of the world good mentors for helping to develop such skills are scarce. To avoid good applied science getting stuck on the shelf and its results not being implemented, training contributes to the solution.

IFS, with its partners in Europe and Africa, has been part of this solution for many years and in October-November 2015, 75 young agricultural scientists from 15 countries in Sub-Saharan Africa participated in three regional training courses on science communication held in Benin, Kenya and Zimbabwe. The courses formed a component of a larger project which aims to strengthen capacity, education and policy for upgrading value chains of neglected and underutilised African crops, such as Bambara groundnut and amaranth – these are examples of crops which are highly nutritious and can grow in marginal environments. Others also have ‘economic niche value’. The project is supported by the Africa, Caribbean and the Pacific (ACP) Science & Technology Programme and funded by the European Union. The week-long courses were co-organised by IFS, Bioversity International (Italy), the University of Nairobi (Kenya), Africa University (Zimbabwe) and the Laboratory of Biotechnology, Genetic Resources and Animal and Plant Breeding (BIORAVE) of the University of Abomey-Calavi in Benin. The courses were highly participatory, mixing short lectures with group exercises in which
the participants’ own draft manuscripts were in focus. Giving and receiving constructive critique was a key learning method, which kept the motivation high. How to write a good title, abstract and discussion were much appreciated topics. A question such as ‘Why is this poster terrible?’ was the subject of a lively debate. Most trainees were not familiar with the issue of predatory journals which often have poor or nonexistent editing and peer-review standards; weblinks were provided to help them identify such journals.

Communicating with non-scientists was something quite new for most participants. A role-playing exercise to explain a science project to e.g. an imaginary taxi driver, donor, relative, school class or journalist in just two minutes generated a great deal of interest (and entertainment). Linking research to solving problems on the ground via a ‘theory of change’ was new thinking to many trainees. When it came to extracting key messages from a research project, it was clear that this was a completely new skill for the participants, many of whom had difficulty doing this.

Since the participants came from different countries in a region, the courses also served as a vehicle for networking, setting the stage for sharing of experience and possible future research collaboration. Two new Facebook groups are now keeping the communication flowing among the trainees.

The courses received extremely positive evaluations from the participants and many said that they would share this knowledge with their colleagues back home. Typical comments included: “The training was an eye-opener”, “This will help us in our day-to-day life as scientists and also help us uplift the standards of quality communication of research results in our institution.”
Maria Goss, Zimbabwe and Nellie Amosi, Malawi, attending the IFS/ACP-EU workshop in Zimbabwe.

The IFS/ACP-EU workshop in Benin.
Increasing production of research in low- and lower-middle-income countries

It is a declared objective of IFS to improve production of research by early-career scientists in low- and lower-middle-income countries that is relevant to those countries.

We aim to do this by:
• IFS providing competitive research grants and capability enhancing support;
• IFS-funded researchers being supported with equipment procurement services;
• Well qualified IFS-advisers and reviewers evaluating and feeding back to researchers;
• IFS grantees receiving travel grants to increase international exposure, networking and collaboration;
• IFS alumni associations nurturing and supporting research with early-career scientists.

IFS contributes to increased production of research through supporting of the research by early-career scientists in low- and lower-middle-income countries, and by building capability to conduct research and engage with others their research.
Individual grants approved in 2015

A total of 1353 individual research grant applications were received in two evaluation sessions. Following a rigorous selection procedure, a total of 153 individual applications from 38 different countries were approved for funding.

The gender distribution of the awarded research grants was 66% male and 34% female. This also reflected the proportion of men and women among the applicants.
The second IFS Collaborative research pilot

The second IFS call for collaborative research grant applications started in 2014 and people were requested to express interest to collaborate on research into biodiversity. The pilot countries in this second call were: Benin, Burkina Faso, Côte d’Ivoire, Ghana, Nigeria, South Africa, Tanzania and Uganda. This pilot was financed by the Carnegie Corporation of New York, the Carolina MacGillavry endowment and the Belgian Science Policy Office (BELSPO). Grants were awarded in 2015.

Eligible interested researchers were invited into a specially designed social networking platform built on Podio software, donated to IFS by Podio. In a ‘plenary workspace’ people discovered each other’s profiles and against a call for collaborative research applications advertised on the platform, coalesced into 45 teams, each receiving access to a private team workspace built on the social networking platform where they could plan and write their team applications. At the submission deadline (we allowed 14 weeks for the submission) 26 teams submitted proposals, 13 passed a pre-screening for eligibility and scientific quality, and were sent out for review to multiple scientific experts.

We convened a Collaborative Research Scientific Advisory Committee to recommend teams for funding, and following the director’s decision, nine teams were funded. The graphic shows the numbers of young scientists at each stage in the process.

The teams consisted of 35 researchers from the 8 pilot countries and comprised 17 women and 18 men. There were six women coordinators and three men; seven teams were a mix of Anglophone and Francophone researchers and two were from Anglophone countries only. The overall success rate was <5%. After two pilots we can say that the process of commissioning collaborative research takes 18 months.

The following teams were funded:

**TEAM ‘LIVINGSTONES’**
The team aims to predict risks of local extinction by monitoring over-harvesting of multi-purpose tree species in community forests; impacts of selective pruning in woodland (Both in the Biosphere Reserve of Pendjari, BRP, in Benin), and impacts of uranium mining in Selous Game Reserve, Tanzania.

**Coordinator:** Emeline Assede

**Collaborators:** Akomian Fortuné Azihou, Sayuni Mariki

**TEAM ‘PANORAMA’**
The team aims to determine the backgrounds in which efficient conservation, use and development of White’s ginger, *Mondia whitei*, might be rooted by looking at the geographic distribution and genetic variability, local management strategies, uses, and market demand in the different countries.

**Coordinator:** Romaric Vihotogbé

**Collaborators:** Paula Spies, Cissy Nambejja

**TEAM ‘AVI-WEST’**
The team will assess the effect of pathogen interaction within avian host species on host fitness with respect to habitat loss. Data collection will be carried out in selected study sites in Ghana, Nigeria and Uganda.

**Coordinator:** Constance Agbemelo-Tsomafo

**Collaborators:** Leonce Kouakanou, Jesca Nakayima, Taiwo Crossby Omotoriogun
The following teams were funded:

**TEAM ‘AMKID’**
The team aims to assess the concentrations of seven heavy metals and some commonly used pesticides in river-shore soils, surface water, underlying sediments and most consumed species of fish and shellfish species from selected African wetlands (Wami river sub-basin in Tanzania, River Niger at Lokoja, Nigeria and Lake Volta at the Volta river basin, Ghana).

**Coordinator:** Adedotun Onoyinka Afolayan
**Collaborators:** Isabela Thomas Mkude, Kingsley Kodom

**TEAM ‘ARTHROPOD DIVERSITY’**
Several insects have been suspected as possible reservoirs of Mycobacterium ulcerans, the pathogenic agent of Buruli Ulcer disease. The team aims to investigate the role of mosquitoes, in the ecology of M. ulcerans in this disease in Uganda, Benin, Nigeria and Tanzania.

**Coordinator:** Claire Mack Mugasa
**Collaborators:** Moses Olotu, Joy Anogwih, Barnabas Zogo

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**TEAM ‘SOIL BIODIVERSITY’**
The team aims to characterise soil biodiversity (specifically microorganisms and insects) and soil properties associated with maize fields under different agricultural practices (tillage systems, crop rotation and farmers’ traditional practices such as slash and burn) and to compare soil biodiversity conservation techniques as potentially less harmful management practices.

**Coordinator:** Adedayo Oyedele
**Collaborators:** M. Edith Ilbudo, Emanueli Mathayo Ndassi

**TEAM ‘PHYTODIVERSITY 2014’**
The team aims to prospect for new anti-plasmodial compounds capable of being developed into malaria drugs from Africa’s rich flora. Plant species used to treat malaria and malaria-like symptoms will be collected from Ghana, Nigeria, Tanzania and Uganda and tested to evaluate their anti-plasmodial activity. Highly potent extracts will undergo further purification to isolate the bioactive compounds responsible for the observed anti-plasmodial efficacy.

**Coordinator:** Lawrence Sheringham Borquaye
**Collaborators:** Francis Atanu, Paulo Ochanga, Olorunfemi Eseyin, Dickson Robert Opio

**TEAM ‘AFRICAN RESEARCHERS’**
The team aims to unveil the enigma of African taro biodiversity through multidisciplinary collaborative research. The research will be conducted in study areas within Burkina Faso, Côte d’Ivoire, Ghana, Nigeria and Tanzania. The main objectives of the research will be to delineate biodiversity of taro in Africa and its potential as human and livestock food.

**Coordinator:** Renan Ernest Traoré
**Collaborators:** Nkeiruka Ann Kanu, Kouadio Florent N’Guessan, Naomi Asomani Antwi, Pius Kavana

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The Carolina MacGillavry Award

The prize honours the memory of the Dutch crystallography scientist Carolina MacGillavry and its purpose is to encourage research collaboration by talented young researchers from the developing world.

Carolina MacGillavry was born in the Netherlands in 1904. She began her career in natural science studying celestial objects such as moons, planets, stars, nebulae, and galaxies, later turning her attention to crystallography and examining the arrangement of atoms in a solid. In 1950 she was appointed Professor of Chemical Crystallography in Amsterdam and in the same year became the first woman to be admitted to the Royal Netherlands Academy of Arts and Sciences.

She was a champion of young scientists and research collaboration, and played an important role in various scientific organisations, including in 1972, when she helped establish the International Foundation for Science.

In honour of the memory of the Dutch crystallography expert and erstwhile IFS Trustee, Prof Carolina MacGillavry (picture), following a bequest to IFS, we established the Carolina MacGillavry Award for the highest ranked team application(s). As Prof MacGillavry was a sponsor of the Dutch artist M C Escher, we were given permission from the Escher Foundation to use the image of the artist reflected in a metal sphere.

TEAM ‘INV-AFRICA’

The team will investigate the ecosystem impacts of the Triffid weed, Chromolaena odorata (Asteraceae), in three regions in Africa: Banco National Park, Côte d’Ivoire; Ezemvelo Wildlife Reserve, South Africa and South West Nigeria.

The Collaborative SAC awarded this year’s Carolina MacGillavry prize to Team INV-AFRICA.

Coordinator: Palesa Mothapo

Collaborators: Oludare Oladipo Agboola, Betty Nalikka, Marie-Solange Tiébré, Biplang Godwill Yadok
A selection of new individual research grants given in 2015

Biological Resources in Terrestrial Systems

Researching Biological Resources in Terrestrial Systems helps us to explore sustainable management of such systems. That is not just focused on exploiting nature for the benefit of mankind, but doing so in a way which will not jeopardise the wellbeing of future generations. Natural resource and ecological management is a complex and difficult issue to balance with social and economic demands, and it is about managing people as much as nature.

MR OSE PAULEUS
Country: Haiti
Project Title: Land change in Haiti and charcoal production: a case study of the charcoal value chain in Haiti using participatory mapping methods
Project Summary: In Haiti, poverty and rapid population growth have stressed limited natural reserves causing rapid land change. This study will undertake an interdisciplinary and multi-scale approach to investigate land change as a result of charcoal production. It will focus on the local charcoal trade, its stakeholders, the supply chain and historical impact on the environment, its monetary and socio-economic value. The study will combine socio-economic and demographic data with remote sensing imagery to understand how the informal charcoal business shapes the natural environment and at the same time evaluate environmental values/perceptions in Haiti. The project aims: 1) to determine the role of charcoal in deforestation and identify drivers of forest recovery, 2) to generate a charcoal value chain identifying key stakeholders and their profit margins, 3) to generate a hotspot map of charcoal production and areas of deforestation, 4) to compare Landsat/MODIS maps to the participatory map from GIS to identify areas of deforestation and reforestation and 5) to calculate increase in forest cover in Haiti since 2001 (it has been shown that the total forest cover in Haiti has increased in the last two decades). Thus, it is predicted that the negative impact of charcoal production has been exaggerated as producers often use fast-growing species that contribute to recovery.

DR BASANT GIRI
Country: Nepal
Project Title: Development of paper-based analytical methods for measuring total flavonoids, total phenolics and antioxidant activity of medicinal plants
Project Summary: Phenolic compounds including flavonoids are widely known antioxidants from plants. Antioxidants help to protect healthy cells from damage caused by free radicals and this is associated with the prevention of many non-communicable diseases. Normally to investigate the medicinal value of plant products, it is necessary to screen many samples for their total phenolic and flavonoid content along with antioxidant scavenging activity. However, these methods require large sample/reagent volumes, a well equipped laboratory facility with advanced instrumentation, and a trained operator – all of which are scarce in developing countries. This study proposes to develop an inexpensive analytical method for determination of metabolites and their antioxidant scavenging activity on a piece of filter paper. Paper with hydrophilic test zones will be created by selectively coating it with hydrophobic material. The zones for specific tests are modified with appropriate reagents before sample loading. Characteristic colour changes will be observed in the presence of target compound(s). The analysis of colour and colour intensity in test zones using the naked eye, a camera or scanner and image processing software will provide both qualitative and quantitative information. The novel and new paper-based method will be optimised and validated using mushroom extracts. Results from such paper test devices will be compared with results obtained using conventional spectrophotometric methods.

DR MINH HONG NGUYEN
Country: Vietnam
Project Title: Application of a stable microorganism consortium for biodegradation of polycyclic aromatic hydrocarbons in polluted soil
Project Summary: The pollution of soil and groundwater with polycyclic aromatic hydrocarbons is a widespread environmental problem. Since 1996, the economy of Vietnam has developed rapidly and the resulting industrialisation has been accompanied by a dramatic increase in the number of motorcycles and vehicles in urban areas, and consequent pollution. Bioremediation by microorganisms is an approach that has been used to clean up areas contaminated by hydrocarbons. However, bacterial bioremediation is limited for two main reasons. Firstly, bacterial growth is constrained by low nutrient availability and stress conditions in polluted soil. Secondly, the introduced microbes cannot penetrate
deeper soil layers. This study proposes to develop a novel method to establish a stable bacterial consortium on the roots of ferns, which live in a wide variety of habitats (mountain regions, dry desert and open fields), to increase the efficiency of hydrocarbon biodegradation. The use of a stable microbial consortium has a number of advantages such as a self-secreted matrix which protects bacterial cells from stress conditions and supplies necessary nutrition. The fern roots would effectively be a kind of bio-injector to enable bacteria to penetrate soil layers normally impermeable to bacteria.

**MS JUDITH LAURE DEMGNE FOPROSSI**

**Country:** Cameroon  
**Project Title:** Characterisation, antimicrobial and antitumoral potential of endophytic actinomycetes isolated from some Cameroonian medicinal plants  
**Project Summary:** Endophytic actinobacteria are yet relatively little researched as potential sources of novel natural products for medical and commercial exploitation. Cameroon is recognised throughout Africa for its diverse flora, especially in rain forests, many of which have pharmaceutical uses. However, little is known about the endophytic actinobacteria of this tropical area. This study aims to characterise three endophytic actinomycetes isolated from Ancistrocladus korupensis and Prunus africana, two endemic medicinal plants of Mount Cameroon and to evaluate their antimicrobial and antitumoral properties in vitro. Morphological, physiological and biochemical characteristics will be examined by established methods. Following fermentation, secondary metabolites will be extracted with ethyl acetate solvent. The antimicrobial activity of crude extracts will be tested by diffusion and dilution methods against pathogenic bacterial and fungal strains. Additionally, purification of compounds will be done using methods including thin layer chromatography, column chromatography and high performance liquid chromatography. Antitumoral activity of purified compounds on different cancer cell lines will be determined by cytotoxicology using 3-[4,5-dimethylthiazol-2-yl]-2,5 diphenyltetrazolium bromide (MTT) as indicator. In this way, the discovery of new antimicrobials and/or antitumoral agents is anticipated.

**MR DAMIGOU BAMMITE**  
**Country:** Togo  
**Project Title:** Assessment of the agromorphological and genetic diversity of taro (Colocasia esculenta (L.) Schott) in Togo  
**Project Summary:** The nutritional value of taro, as reported by FAO, shows that it could help to combat malnutrition in people living in the tropics and contribute to increasing the economic status of households, particularly women’s social status. In Togo, taro is one of the most important food crops in some rural areas but appears at the country level as a neglected and underutilised species (NUS) and should be promoted. However, adequate information on the existing genetic diversity and its structure is a prerequisite to the development of efficient breeding schemes and its sustainable preservation and use. This study aims to: 1) document indigenous knowledge related to production, utilisation and conservation of taro in the production zones of Togo, 2) establish a national taro germplasm in Togo, 3) assess the agromorphological and genetic diversity within the established germplasm for breeding and conservation purposes, 4) evaluate the agronomic performance of the cultivars across major production zones, and 5) determine dry matter and starch content of the cultivars for value addition purpose. Ethnobotanical data will be collected using participatory research appraisal with both group and individual interviews based on questionnaires. The agromorphological diversity will be assessed using Biodiversity International descriptors of taro, while the genetic diversity will be evaluated with known polymorphic taro SSR markers. Field trials will be implemented in three production sites of different agroecological zones for yield assessment. Laboratory analysis will be conducted to assess water and starch content. Collected data will be analysed with both descriptive and multivariate statistics. The results will be published in international peer reviewed journals, and key findings will be disseminated to farmers through rural radios and selected NGOs operating in the agricultural sector in Togo.
**MS Buyandelger Suuri**  
Country: Mongolia  
Project Title: Do Siberian marmot colonies represent biodiversity hotspots? Evaluating the conservation importance of one of Mongolia’s most endangered mammals  
Project Summary: The Siberian marmot (*Marmota sibirica*) is a relatively large (6-8 kg), social rodent that lives in colonies, some covering > 1 km² and including > 100 burrows, across the Mongolian steppes. Marmots are highly endangered in Mongolia (IUCN Red List ‘EN’; criteria A2ad) and have declined 85% since the mid-1970s from over-hunting. The decline of marmots may have serious consequences for conservation because they are thought to be a ‘keystone’ species that supports a large amount of biodiversity. For example, a previous study showed marmot burrows represent important resources for carnivores like the corsac fox (*Vulpes corsac*). Other studies have also suggested that marmot burrows provide an important habitat for insects, reptiles, birds and small mammals, and that marmot digging influences plant communities. To date, little information exists on Siberian marmot ecology and no study has fully examined the links between marmots and biodiversity. Understanding these links is important for prioritising conservation efforts in protected areas, especially in nature reserves, where funds for conservation activities are limited and marmots are declining rapidly.

**Mr Daniel Jaleta Negasa**  
Country: Tanzania  
Project Title: Effect of eucalyptus forest dynamics on catchment hydrology in Ethiopia  
Project Summary: Land cover change is a significant driver of environmental changes at different scales. It is considered the most important indicator of global change affecting ecological systems. Significant land use/land cover change has also been observed in Ethiopia, with the shift from natural ecosystems to managed (agro-) ecosystems. A recent significant land cover change is the expansion of eucalyptus woodlots (*E. globulus* and *E. camaldulensis*) across central Ethiopian highlands. Eucalyptus is assumed to negatively affect basin scale water resources particularly through high evapotranspiration. The effect of eucalyptus on water resources, particularly on water yield and runoff in catchments, has been investigated after reducing the number of trees in plots. However, little work has been done on the expansion effects of eucalyptus on catchment surface runoff and sediment yield. This study aims to evaluate changes in catchment surface runoff and yield sediment due to eucalyptus expansion on study sites. Understanding the effect of eucalyptus expansion will enable policy makers to plan wisely on potential catchment land and water resources.

**Dr Saadia Naseem**  
Country: Pakistan  
Project Title: Use of bacteriophage as a biological control agent against citrus canker disease in Pakistan  
Project Summary: Canker is one of the most destructive and widely distributed diseases of citrus worldwide. In Pakistan, citrus canker disease is the most significant challenge to citrus production. Citrus canker disease is caused by the bacterium *Xanthomonas campestris* pv. *citr.*. The disease is managed through good agricultural practice or by chemicals. Research has also been conducted in the country to find natural resistance varieties against this disease in Pakistan, but unfortunately without success. Besides the ongoing research for effective treatment and control by chemicals or antibiotics, we propose to use bacteriophages to kill the causative bacteria. This project will focus on the characterisation and further isolation of bacteriophages associated with *Xanthomonas campestris* strains. Phage formulations against *Xanthomonas* will be developed, the survivability of biocontrol agent after application and its deleterious effects on beneficial soil microorganisms in the citrus rhizosphere will be studied.
According to the World Bank, 2.8 billion people live in areas of high water stress. Water stress takes many forms. At least 1.2 billion people do not have access to safe water, and pollution of water affects not just people but whole biological communities. Some of IFS’ projects that relate to good water management are highlighted here as well as projects which relate to sustainable exploitation of natural aquatic resources.

**Mr Chan Sopheaktra Sovann**  
*Country:* Cambodia  
*Project Title:* Quantifying the economic value of a wetland’s ecosystem services for sustainable stormwater management  
*Project Summary:* Phnom Penh is serviced by an old combined sewer system and many city streets are flooded when there is heavy rain. Recently, the city has upgraded the sewer system to prevent flooding, but it is uncertain how Phnom Penh’s system will cope with rapid urban development (infilling of natural wetlands, constructing new buildings) and changing climate conditions. This study will build on the work previously done at Royal University of Phnom Penh to model the city’s sewer system, but it will include a much more accurate measurement of wetland bathymetry and flow in the sewer system in order to calibrate the model and improve the earlier work.

**Mr Toundji Olivier Amoussou**  
*Country:* Benin  
*Project Title:* Genetic characterisation of wild populations of tilapia Sarotherodon melanotheron in Southern Benin using microsatellite DNA markers  
*Project Summary:* The project aims to contribute to the promotion and conservation of local genetic resources of tilapia Sarotherodon melanotheron populations in Benin. Specifically, the project objectives are to: i) establish a microsatellite DNA marker bank for S. melanotheron populations from three hydrographic basins (Ouémé, Couffo and Mono), ii) amplify, by PCR, the DNA sequences of the fresh and brackish water populations of the species, iii) determine the inter- and intra-population genetic variation of the tilapia strains, iv) propose strategies for the choice of a productive population to promote fish farming. Data collection will be based on fish fin clip samples (about 1 cm²). Expected outputs at the end of the study will include genetic characterisation of S. melanotheron strains which will constitute a basis for the development of an integrated genetic improvement programme for sustainable development of aquaculture in Benin, or even further afield in West Africa. In the long term, the most zootechnically efficient and economically profitable strains will be obtained through selective breeding, and then distributed to small-scale fish farmers to improve their income and to contribute to food security.

**Mr Frank Onderi Masese**  
*Country:* Kenya  
*Project Title:* Influence of livestock and wildlife populations on the functioning of an African savanna river system in Kenya  
*Project Summary:* Large (livestock and wildlife) herbivores transfer nutrients and organic matter from the terrestrial landscape to aquatic ecosystems. In the Mara River basin, Kenya, large herds of livestock and wildlife graze on the savanna and upland grasslands and enter water in the Mara River and its tributaries. While doing so they deposit substantial amounts of urine and faeces into the water. Extensive livestock trampling also results in increased fluxes of sediment and organic material entering streams during the rainy season. These inputs are variable and the influence on the river biogeochemistry and ecology is likely dependent on discharge levels and stream size. Available preliminary data show that sites below livestock watering points have enriched delta13C and delta15N values regarding basal resources (algae,
periphyton) and this implies the influence of cattle faeces and urine (mostly C4). However, how much this change is related to the longitudinal changes in delta13C of dissolved inorganic carbon is not known. This study will investigate the influence of large herbivores on the functioning of the Mara River and contributions of autochthonous and allochthonous resources to riverine food webs. Nutrient diffusing substrates below and upstream of herbivore watering points will be used to determine the contribution of livestock inputs to primary production. Nutrients (from livestock excreta – urine and faeces) addition experiments will also be conducted to determine their influence on primary production and on the isotopic signatures of the algae/periphyton and consumers (invertebrates and fishes). This study will contribute data for comparison with a similar study that is focusing on the interaction between hippos and wildebeests and discharge on the functioning of the Mara River.

**DR NADIRA SULTANA**  
Country: Bangladesh  
**Project Title:** Carbon and water footprint of milk production systems in Bangladesh: implications for environmental impacts  
**Project Summary:** Milk production is inevitably linked with enteric methane (a powerful greenhouse gas) emission and water consumption (e.g. feed production). This has a significant contribution to the carbon footprint and water footprint of the dairy industry. This study aims to analyse dairying in Bangladesh to find options and strategies to minimise water consumption and to possibly reduce methane emission. A “life cycle assessment” approach will be used. The major milk production systems of Bangladesh will be selected on the basis of different uses of water, feeding systems, and socio-economic conditions. A two-stage purposive sampling technique will be applied to select 100 dairy farm households. A pre-tested and pre-designed questionnaire will be used to collect data to test the hypothesis and objectives. Adequate milk, feed and water samples will be collected for analysis during each farm household visit. The detailed feed analysis will be done for estimating water use for feed and methane emission from the feed. The data will be analysed using STATA and Excel 2010. The outcomes of this study are expected to provide significant insight to dairy farming in Bangladesh in relation to options for reducing its environmental burden.

**DR ASSOGE DABAR OMAR**  
Country: Djibouti  
**Project Title:** Geochemical modelling of groundwater evolution in the Bara plain, Djibouti  
**Project Summary:** Good quality water provision is essential for the economic development of a country. Water demand in Djibouti has increased rapidly with the construction of power plants, urbanisation and improving living standard expectations. In the south of Djibouti, particularly in the Bara area, the main
water supply for drinking and irrigation activities will be sourced.

This project aims to study the hydrogeological conditions in Djibouti, and the chemical characteristics and changes of groundwater in the Bara plain area will be analysed for the first time. This will be done through field surveys, sampling, field testing, laboratory experiments, interpretation of hydrochemical and isotopic data in conjunction with basic hydrogeologic background information to generate knowledge regarding recharge patterns and geochemical changes, statistical classification of hydrochemical data using the method of Q-mode hierarchical cluster analysis and correlation of the classified groups. In the field of geochemical modelling, ‘PHREEQC’ software will be used to perform hydrochemical modelling of the water-rock interaction and to quantitatively analyse any change processes and the accumulation mechanisms of the local groundwater.

MR BELFRID DJIHOUESSI
Country: Benin
Project Title: Water quality modelling to assess the impact of nutrient load on hydrological pathways: a case study from the Ouémé delta in Benin
Project Summary: This research project will investigate water quality in the Ouémé delta (the Lake Nokoué and Porto-Novo Lagoon complex) in the context of Benin’s National Plan of water management. The main objective is to develop a process-based model of nitrogen load in the complex and that can be used to test different scenarios. More specifically, the study will assess and characterise the interactions and relationship between agricultural land use in upper Ouémé catchment and the quality of river and wetlands ecosystems in the Ouémé delta area. The proposed methodology couples integrated Geographic Information Systems (GIS) to experimental data (monitoring and measurement of field data, laboratory experiments). The fate of nitrogen will be assessed along the whole hydrological pathway of the Ouémé catchment at precise points. By using the result of the spatiotemporal changes in water quality, mitigation/adaptation measures will be identified and their benefits will be assessed based on ecosystem services (nitrogen cycle, maintenance of soil fertility, and water purification). Emphasis will be placed both on the reliability of the data used for modelling, and optimisation of numerical methods to understand how contaminants are fed into the system.

MR MOHAMMED M. RAHMAN
Country: Bangladesh
Project Title: Modelling the complex groundwater-surface water interaction in riparian depressional wetlands of Bangladesh
Project Summary: Many riparian depressional wetlands, locally called ‘haor’, exist in the upper Meghna River Basin of Bangladesh. In the dry season (December-March), haor wetlands become suitable arable land for rice cultivation except in the deepest areas of wetland, which serve as breeding and feeding habitats for fish. Haor wetlands produce annually about 18% of the country’s rice and 0.432 million tons of fish. However, establishing such dykes raises two questions: (i) to what extent is dyking effective, taking into account accelerated groundwater discharge into wetlands after increased water levels in rivers and alluvial shallow aquifers? (ii) post-monsoonal (October-November) retarded drainage of dyked wetlands increase flood-damage vulnerability of late planted Boro rice crop in the next pre-monsoon season? In this project, a representative haor wetland will be studied to collect year-long hydro-meteorological data. Other data, for example digital elevation, soil, and aquifer properties will also be collected from relevant sources. With these data a sophisticated surface-groundwater model (GSFLOW) will be developed, calibrated and validated for experimental wetland. Based on the modelled results a sustainable water management plan will be developed for the ‘haor’ wetlands.
Food Security, Dietary Diversity and Healthy Livelihoods

Food security exists when people have access at all times to sufficient, nutritious food in order to be able to lead an active and healthy life. There are many angles to food security – food safety, nutritional aspects, and simply securing entitlement to food. Below are some of IFS’ projects dealing with these aspects.

**MS ANN NGARI**  
Country: Kenya  
Project Title: Chemical composition of attractive blends in selected Ocimum species traditionally used to lure honey bees  
Project Summary: Globally, commercial beekeeping is worth USD 15–20 billion to agriculture every year. However, beekeeping depends on successful establishment of a bee colony and thus bees must be attracted to hives. Lures or baits such as sugar and fruits encourage pest infestation while pheromone-based lures remain unaffordable to many farmers. *Ocimum* plant species such as *O. kenyense*, *O. kilimandscharicum* and *O. lamifolium* are rubbed or smoked into hives to attract bees. Though sweet scents of these plants do attract bees, no work has been done to identify the specific signals responsible for bee luring activity. This study seeks to determine the chemical composition of attractive blend constituents responsible for the bee luring effect. Completely randomized Latin Square field experiments will be conducted to identify the most attractive *Ocimum* species. Essential oils will then be extracted by steam distillation while volatiles will be collected using an air entrainment kit. Chemical constituents of the attractive blends will be identified by gas chromatography linked to mass spectrometry (GC-MS), GC co-injections with authentic standards and gas chromatography linked to an electroantennographic detector (GC-EAD). The behavioural response of the honey bee to blends of the identified plant constituents will be determined through a series of subtractive bio-assays in a dual choice olfactometer. The ultimate aim of the project is to formulate a bee lure based on blends from the plants to improve colony establishment.

**DR YOSRA AHMED**  
Country: Egypt  
Project Title: Prevalence and characterisation of Phytophthora species associated with ornamental plants in Egypt  
Project Summary: The ornamental crop industry is considered one of the fastest growing sectors of agriculture in many countries. One of the unique features of these crops is the relatively high value on the commodities produced. Fungal diseases are a major constraint for sustained production of ornamental crops due to demand for unblemished plants. *Phytophthora* spp. are among the most important pathogens attacking ornamental crops in nurseries and landscapes. A number of *Phytophthora* spp. are known to cause root rot, crown rot and foliage blight on floriculture and woody ornamental crops, including *P. cryptogea*, *P. drechsleri*, *P. nicotianae*, *P. palmivora*, *P. citrophthora* and others. In Egypt, little research has focused specifically on the role of *Phytophthora* diseases on ornamentals. Therefore, the study aims to assess the occurrence of *Phytophthora* diseases and to characterise their associated species. Since no previous *Phytophthora* surveys have been carried out in Egypt, two years of survey will be carried out and the results will be compared to identify the pathogen changes over time. Isolates will be identified based on characteristics of the sexual and asexual reproductive structures and temperature range. Single and multiple gene phylogenetic analysis will be performed using DNA sequences of nuclear and mitochondrial
genes. Pathogenicity, aggressiveness and host specificity of some obtained isolates will be further investigated. The results of this research would be of much interest for implementing potential disease management strategies in ornamental nurseries.

DR MARY NYAWIRA MURIITHI
Country: Kenya
Project Title: Managing arbuscular mycorrhizal fungi (AMF) communities for sustainable agriculture in Kenyan agro-ecosystems
Project Summary: Arbuscular mycorrhizal fungi (AMF) management in low input technologies such as combining use of mineral fertiliser and organic inputs is crucial in improving soil aggregation and nutrient use efficiency in Kenyan agro-ecosystems. Yet, the factors that control their diversity and functioning are still poorly understood. Mostly, studies have given priority to the effect of phosphorus (P) on AMF community and functioning, neglecting the effect of nitrogen (N) and soil carbon (SOC) levels which are vital in AMF growth and in regulation of P uptake. Negative implication of low SOC levels on N availability is thought to have a negative effect on AMF diversity and functioning under integrated soil fertility management (ISFM) practices. This study aims at understanding the implication of various N and P fertilisation regimes under organic and inorganic amended soil in maintaining a stable and functional AMF community through (i) assessing and monitoring seasonal changes in soil conditions (N, P, SOC) on diversity, abundance, and sustainability of individual AMF species under ISFM practices, (ii) monitoring the role of AMF in nutrient use efficiency and soil aggregation through correlating AMF activity and crop performance, (iii) characterising AMF communities using morphological and molecular tools and (iv) identifying the role of individual AMF species on crop nutrition (N, P) and soil aggregation. AMF seasonal changes in relation to soil conditions (N, P, SOC) will be studied using lysimeters, while AMF individual functional traits will be studied using a series of greenhouse/in vitro studies. The study will also explore use of other sources of organic inputs like composted household waste fortified with low release phosphate fertiliser (rock phosphate) and biochar. The project hopes to provide basic information in management of AMF and in promoting use of AMF biotechnology in crop production.

DR JAIROS RURINDA
Country: Zimbabwe
Project Title: Simulating productivity of food crops in response to climate change and adaptive farm management options in Zimbabwe
Project Summary: Climate change and increased climate variability are currently seen as major constraints to crop production in Southern Africa, including Zimbabwe. Maize, the staple food in the region, is projected to decline significantly due to rising temperatures and changing rainfall patterns. The projected decrease in maize yield implies that maize alone will not be able to sustain food production. Diversifying crops on farms to include small grains such as sorghum and millets can be a potential entry point for building a resilient cropping system in smallholder farming systems. Small grains are more drought tolerant than maize. Sorghum and millets not only help to stabilise household food, but are highly nutritious. Field experimentation and simulation modelling will be the main approaches used in the study. Field experiments will be conducted at three sites over two agricultural seasons with contrasting climates in Zimbabwe, to generate data for modelling. The field experiment will involve four crops: maize, sorghum, pearl and finger millets. To reduce uncertainty, two simulation models: (i) APSIM and (ii) DISSAT will be used to simulate yield responses of maize, sorghum and millets to projected climate change and to two key management options – planting date and fertiliser use. Outputs from five global circulation models (CNRM-CM5, EC-EARTH, HADGEM2-ES, IPSL-CM5A-LR and MPI-ESM-LR) and two ‘Representative Concentration Pathways’: rcp4.5 with radiative forcing of 4.5 W m-2 and rcp8.5 with radiative forcing of 8.5 W m-2 will be used to generate climate data. The study will permit an understanding of future climate change impacts on crop productivity in Southern Africa.
Increasing use of research results produced by IFS

It is a declared objective of IFS to improve use of research by early-career scientists in low- and lower-middle-income countries that is relevant to those countries.

We aim to do this by:
• IFS-funded research being accepted for presentation, or researchers funded by IFS grants being invited speakers at international conferences;
• IFS-funded researchers being recognised as experts in their fields and being invited to policy meetings or expert groupings;
• Well qualified IFS-funded grantees becoming IFS experts, advisers and reviewers;
• IFS grantees disseminating their approved IFS-funded research results in popular form (TV, radio, workshops, policy briefs, booklets/cartoons);
• IFS grantees research results in contributing innovation through being used in new products, services or policies.

IFS contributes to innovation through supporting research of early-career scientists in low- and lower-middle-income countries, building capability to share research and engage with policy processes and by building linkages to those who can support the use of their research.

Estimating the height of a plank buttress root of a Khaya ivorensis.
PHOTO: ULRICH BOUKA DIPELET
Putting research into use

Knowledge of the sustainable management of biological, water and energy resources is not enough. To help to reduce poverty and attempt to solve some of the environmental challenges that we face, we also need to take action. That is why IFS undertakes a range of initiatives that can contribute to innovation, and that is why the IFS mandate includes not only strengthening capability but also agency to put it into use.
Increasing use of research results produced by IFS

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imply generating new knowledge on the sustainable management of biological, water and energy resources is not sufficient – we also need to take action to help reduce poverty and attempt to solve some of the environmental challenges that we face. That is why IFS undertakes a range of initiatives that can contribute to innovation. One of these elements is 'Facilitated Advocacy'.

FACILITATED ADVOCACY AND BACKGROUND TO ACTIVITIES IN 2015

The term facilitation literally means "to make the process easier". We are not aiming to speak for people but to make the process easier for them to speak for themselves, to give potential recipients of service provision a voice in shaping development processes from which practical support could flow.

In this context as a follow-up from the “Conference on Getting and Using Equipment for Scientific Research in Africa”, held in Nairobi in May 2012, the International Foundation for Science and the African Academy of Sciences (AAS) continued their collaboration during 2013-2014 through the implementation of the MacArthur Foundation-funded project on "Scientific Equipment Policy Development and Change", along with partner organisations in Ethiopia, Ghana and Kenya.

Informed by the discussions and outcomes of an Inception Workshop held in Nairobi in November 2013, these project activities followed:

• Country studies with national co-facilitators in Ethiopia, Ghana and Kenya to review the effectiveness of science equipment policies of key organisations in relation to structures and systems, and to map the national and regional research and policy landscape (January–March 2014)

• National Scientific Equipment Policy Workshops in Ethiopia, Ghana and Kenya (March–April 2014)


(Reports of the country studies and national workshops are available on the IFS website at www.ifs.se/ifs-publications/).

A one-year extension to the project concluding in 2015 was agreed with the MacArthur Foundation for IFS and AAS to work with partners in Ethiopia, Ghana and Kenya, and across Africa, to promote scientific productivity and innovation through identification and resolution of issues regarding equipment needs assessment, procurement, installation, use, service and maintenance, and disposal.

AAS hosted a Consultative Meeting (20–21 August, 2015) on Scientific Equipment Policy, one of the concluding activities in the current phase of the MacArthur Foundation-funded project. In addition to colleagues from AAS and IFS, the 42 participants included representatives of academies of sciences and research institutes in Ethiopia, Ghana, Kenya and South Africa. Other organisations included: ANAFE; BecA; CEMASTE; C SPEED; KNEC, NACOSTI, the Ministry of Higher Education, Science and Technology, several universities, institutes and education organisations in Kenya; NEPAD agencies; Seeding Labs; UNESCO; and IFS alumni from six African countries. The meeting’s purpose was to raise Pan-African awareness of how the identification and resolution of scientific equipment issues are critical for scientific development in Africa, and to identify national and regional channels to share learned experiences and to influence policy on scientific equipment.

Following welcome remarks from Prof Berhanu Abegaz, the AAS Director, Dr Graham Haylor, the IFS Director, and a message delivered on behalf of Maciej Nalecz, Director of UNESCO’s SC/PCB, the meeting was opened by His Excellency, Dr Moses K Rugutt, Director General of Kenya’s National Commission for
Science Technology and Innovation (NACOSTI), on behalf of HE Professor Jacob Kaimenyi, the Cabinet Secretary for Higher Education, Science and Technology. Participants were then informed about the project's history, outcomes and outputs by Dr Nighisty Ghezae of IFS and Dr Benjamin Gyampoh of AAS. Representatives from Ethiopia, Ghana and Kenya gave presentations about their respective countries' present efforts at policy change with regard to scientific equipment, effective approaches to advocacy, actors and roles in policy change advocacy, and recommendations to identify and engage with scientific equipment policy change channels.

IFS alumni spoke about their experience as early-career scientists on a range of issues dealing with scientific equipment and policy advocacy, followed by a presentation on microscience, scientific equipment and policy approaches by Prof. John Bradley of the RADMASTE Centre in South Africa, and Prof. James Cestino of IOCD. From the day's presentations and deliberations emerged a range of themes for more detailed discussion; participants settled on three: microscience, the impact of research on national development, and existing national and regional frameworks and bodies. From these came suggestions on channels of advocacy for policy change on scientific equipment and who needs to work together.

The meeting concluded with each participant making commitments to take forward efforts at scientific equipment policy change. These ranged from broad intentions to raise awareness about these issues at institutional, national and regional levels, to specific commitments of collaboration and funding. AAS committed itself to pursue an advocacy role to persuade governments and institutions to develop clearly articulated guidelines for the procurement, manufacture, installation, shared use, operation and maintenance of scientific equipment, including microscience equipment. IFS reaffirmed its long-standing commitment to address scientific equipment issues as a contribution to the development of Africa's scientific endeavours.
Salts, particularly sodium, can accumulate by various means in soils particularly in arid or semi-arid areas. This process is often detrimental to crop production and has become a major issue in Senegal. In this country, of the 3,800,000 ha cultivated lands, more than 1,230,000 ha are affected by salinity and are seriously compromised for agricultural purposes. Due to their tolerance to adverse soil and climate conditions, *Casuarina* trees grow well in a range of climates and disturbed, poor soils, and serve as biological tools for the rehabilitation of degraded lands, including those affected by salinisation. In addition, *Casuarina* spp. are fast-growing and useful for their wood and yield high quality charcoal. The performance of *Casuarina* can be further enhanced through association with soil micro-organisms such as arbuscular mycorrhizal fungi (AMF) and nitrogen-fixing bacteria (*Frankia* spp.). Through an IFS-supported project, Dr. Diagne has been able to select in the laboratory salt-tolerant species of *Frankia* spp. and AMF and these in turn enhance the tolerance of, and soil-remediating effect of *Casuarina* in salt-affected lands. Beginning in 2012, Dr. Diagne and her team conducted trials in one of the worst salt-affected regions in Senegal. Her results showed that co-inoculating with the AMF, *Rhizophagus fasciculatus*, and *Frankia* strains increased the survival and growth of *Casuarina glauca* and *Casuarina equisetifolia* in field conditions. Dr. Diagne’s new IFS project will use *Casuarina/Frankia*/AMF associations in large-scale trials to rehabilitate lands affected by salinity in Senegal. She will test the ability of crops to be highly productive in combination with the soil-remediating and fertility-enhancing benefits of *Casuarina/Frankia*/AMF associations in regions badly affected by salinity.

**Dr Nathalie Diagne**

*Project:* Optimisation des couples *Casuarinaeae/Champignons mycorhiziens arbusculaires pour la valorisation agrosylvopastorale des écosystèmes dégradés par le sel au Sénégal

*Institution:* Laboratoire Commun de Microbiologie (LCM/IRD/UACD), Dakar

*Country:* Senegal

*Grants Awarded:* 2012, 2015

![Re vegatalization of saline soils using *Casuarina* at Palmarin, Senegal.](image)
Detecting harmful metal contamination in Vietnam’s water

Many villages in Vietnam do not have piped access to clean water and so people have to get their water from underground sources. Many of these are contaminated with metals such as iron and manganese. When the problem is severe, the colour and taste are affected. Normally, water containing a great excess of iron has a yellow-brown colour. However, lower ‘invisible’ but still harmful concentrations of metals can cause health problems, including some nervous disorders and malfunctioning of key enzymes in the human body, and so should be removed. Furthermore, these two elements can be ‘sentinels’ in as much as they can denote the presence of other heavy metals in the water.

However, accurate detection of iron and manganese is currently time-consuming and expensive. So, Dr Pham, with the help of his first IFS grant in 2012, set about working on a microbial fuel cell enriched with iron bacteria with the aim of developing a cost-effective, on-site detection system for iron and manganese.

To accomplish this, Dr Pham undertook the enrichment of electrochemically active bacteria in the fuel cell under lithotrophic conditions and carried out microbiological and molecular analyses to identify the bacteria. The enriched bacteria were highly adapted to lithotrophic conditions, meaning they could utilise inorganic nutrient sources, particularly iron in the anode of the fuel cell – and this is important because otherwise they would have little specificity for iron. Additionally, the finding that pseudomonads are the dominant bacterial species that may play key roles in performance of such a lithotrophic fuel cell is completely new.

Next, Dr Pham began the process of putting his results into practice – using the lithotrophic microbial fuel cell as a biosensor for detecting iron and manganese in water samples. Results were good in the laboratory and then, in field tests, the fuel cell has performed well with real ground water. Follow-up of the improvements of the system to ensure consistency of performance is the subject of a second IFS grant application. Dr Pham looks forward to the commercial exploitation of his research results.
Nigerian hot springs contain useful industrial enzymes

Enzymes are biocatalysts that have all kinds of commercial and industrial applications. One group, alkaline proteases, are used in basic and applied areas of research and manufacturing processes, such as those pertaining to the food, beverage, pharmaceutical, detergent, leather processing, and peptide synthesis industries. The detergent industry in particular has a need for such enzymes which are stable at high temperatures.

Thermostable enzymes are advantageous in many industrial applications because higher processing temperatures can be used which make the reactions go at faster rates with reduced incidence of microbial contamination.

Dr Folasade Olajuyigbe’s research career took off through winning her first IFS grant in 2004, and she consequently set about looking for bacteria in Nigerian hot springs which produce potentially useful heat-loving enzymes with unique characteristics. And she found them! She purified and characterised one such thermostable alkaline protease (from *Bacillus licheniformis*) which was very stable under both acidic and alkaline conditions. With her second IFS grant, which she obtained in 2011, she has gone a long way to optimise production of the thermostable alkaline protease from hot springs using cheap and easily available substrates. Now Dr Olajuyigbe is going one step further – she plans to isolate the genes that code for the novel enzymes for over-expression in heterologous hosts which will generate the high yields required by industries.

Dr Olajuyigbe’s career, given the quality of her applied research, has resulted in her receiving several prestigious international awards for her achievements. She is presently a Senior Lecturer at the Federal University of Technology, Akure, Nigeria.

**DR FOLASADE OLAJUYIGBE**

Project: Production and optimization of commercially viable alkaline proteases from *Bacillus* species isolated from selected hot spring and organic waste sites in Nigeria

Institution: Department of Biochemistry, School of Sciences, Federal University of Technology, Akure

Country: Nigeria


Dr Folasade Olajuyigbe checking the shaking incubator in readiness for another run of fermentation experiment.
Jessica Nanyunja, while attached to Makerere University in Uganda, used her IFS grant to study cross-country (Kenya and Uganda) differences in the production and trade trends of fresh produce as well as a comparison of modalities and incentives for implementation of Food Safety Management Systems. She found that while food safety certification schemes provide farmers with useful practical knowledge to improve safety, hygiene and quality of their fresh produce, there were differences between the two countries. Food safety levels were higher in Kenya than in Uganda and this probably reflects the kind of enabling and supportive environment that exists in the two countries. The well-organised fresh produce value chains in Kenya are a key factor in responding to the institutional and market forces imposed by buyers of green beans in the strict premium European markets. Apart from the smallholder farmers and exporters in both Kenya and Uganda that were affected directly with the strict pesticide regulation imposed by the EU, other chain stakeholders have also responded to promote and support improvements in the production controls for fresh produce to ensure that they continue to compete at the international level.

Jessica Nanyunja is now exploiting the knowledge gained in her project to improve quality assurance systems in Uganda for agro-value chains such as bananas and hot peppers. But she has gone a very important step further: she has established her own agribusiness company in Uganda, ‘Harmony Nutrifoods Ltd’, which manufactures banana juice-based beverages according to strict standards of safety and management. She envisages that many young people, particularly women, will eventually be employed in her company in the banana value-addition supply chain.
In 2015 we continued the bond with our alumni on multiple points and worked closely with them in Benin, Burkina Faso, Ethiopia, Ghana, Kenya, Madagascar and Togo. IFS also continued to support alumni associations to get the legal recognition that will enable them to partner with like-minded organisations that advance science for development.

Together with our alumni we organised a meeting on the role of young researchers in shaping the Sustainable Development Goals (SDGs). The meeting focused on opportunities and challenges related to including inputs from young scientists in the SDGs, and how they can play a role in fostering interaction between policy processes and science. The meeting featured a presentation on the targets of SDGs, assessment of the ongoing process on the SDGs and the post-2015 development agenda, the role of young researchers in shaping the SDGs at national and local levels, and their engagement between local and international science communities and with policymakers.

In order to increase the number of applicants from developing countries and to enable potential young researchers to compete at an international level, we organised together with our alumni several training courses on proposal writing, sampling design and multivariate analyses, PowerPoint design, oral presentation and scientific article writing. In addition to these, several monthly seminars were held where new advances in a given scientific topic were debated, for example: Why Africa lags behind other regions of the world in scientific productivity and knowledge systems; problems, challenges and opportunities of higher education systems in Africa; Africa’s economic growth and the need to strengthen Africa’s human capabilities to sustain such growth; and how to ensure that the growth is accompanied by significantly less poverty and greater shared prosperity for the continent.
The support of IFS

A range of donors and funders support the work of IFS, or parts of it:

As an individual or a representative of an organisation, if you share the mission of IFS, and wish to help, please contact us about: core funding of IFS, financing general or themed research calls, supporting capability building, collaborating on approaches or projects, co-funding our work, commissioning us to deliver research calls or capability building events, providing or sponsoring travel or placements for grantees, tools, equipment or software licences.

To make a bequest or legacy in your will is a valuable and enduring way of assisting and a personal investment to benefit early-career scientists in the developing world. If you or someone you know would like to make a bequest of financial support to IFS, please contact, in the first instance, the IFS director.

IFS donors/sponsors in 2015:

- Belgian Science Policy Office (BELSPO)
- Carnegie Corporation of New York
- Carolina MacGillavry endowment, The Netherlands
- Deutsche Forschungsgemeinschaft (DFG), Germany
- Institut de recherche pour le développement (IRD), France
- Ministère des Affaires Étrangères (MAE), France
- Organisation for the Prohibition of Chemical Weapons (OPCW), The Netherlands
- Organisation of Islamic Cooperation Standing Committee on Scientific and Technological Cooperation (COMSTEC), Pakistan
- Podio Project Management Software Citrix Systems Inc.
- Swedish International Development Cooperation Agency, Department for Research Cooperation, Sweden
- Swiss National Science Foundation (SNSF), Switzerland
- The European Commission, Research Directorate-General
- The John D. and Catherine T. MacArthur Foundation, USA
Special feature: COMSTECH and IFS – a long-lasting collaboration

COMSTECH – the Ministerial Standing Committee on Scientific and Technological Cooperation of the OIC (Organization of Islamic Cooperation) – is one of IFS’ most established collaborators. COMSTECH, through a variety of human resource development initiatives, supports science and technology in the OIC member states. Like IFS, COMSTECH places great importance on science and technology and innovation as a major contributor to socio-economic development. There are 57 OIC member states, of which 38 are eligible ‘IFS countries’, so it was only natural that IFS and COMSTECH should collaborate to share resources and thus mutually expand their reach.

COMSTECH signed a Memorandum of Understanding with IFS in 1998 for strengthening of science and technology in the member states. The goal of the COMSTECH/IFS grant programme is “to strengthen the capacity in developing countries which are members of the OIC to conduct relevant and high quality research in sciences related to the management, use and conservation of biological resources”.

Most activities of the two organisations to realise the shared vision of helping young developing country scientists to establish their careers, focus on supporting research grants. Over the years, this programme has financed 275 projects in various disciplines in 32 member states of the OIC to the tune of USD 2.9 million. The country-wise distribution of COMSTECH-IFS grantees is shown below.
In this grant-sharing programme, individual research grant applications (sent to IFS during an open call) are subjected to a detailed in-house and external evaluation. This call is the same for all individual research grant applications and these fall into the three IFS research clusters, ‘Biological Resources in Terrestrial Systems’, ‘Water and Aquatic Resources’ and ‘Food Security, Dietary Diversity and Healthy Livelihoods’. As a result, those scientifically strong applications emanating from OIC countries, which are approved for IFS support, are submitted to COMSTECH. COMSTECH selects those applications which coincide with their research priorities and verifies their scientific quality and relevance. The cost of these grants (up to USD 12,000 each) is shared by both organisations.

As with an ordinary IFS grant, the grants can be used for field and laboratory equipment, supplies, temporary labour, literature and a realistic and accountable amount of local travel for field trials, surveys etc. If the grantee makes good progress (as evidenced by a satisfactory report and publications) in his/her research, the grant is renewable at the end of the project.

The collaboration with COMSTECH was taken a stage further in 2004 through the establishment of a tripartite funding arrangement between IFS, COMSTECH and a third partner, INWRDAM. INWRDAM is an intergovernmental, autonomous organisation operating under the umbrella of COMSTECH. The project aimed to support research into water as a scarce resource and included research on water for livelihoods, sustainable sanitation, water for agriculture and the social and economic dimensions of water resource management. This programme supported 39 young scientists from OIC countries at a cost of USD 500,000. Besides the research projects, the COMSTECH-INWRDAM-IFS programme also organised 13 workshops and trained 404 scientists from OIC states.

Apart from research grants and training courses, COMSTECH has many other activities including establishing new centres, Inter-Islamic networks, organising seminars, thematic workshops, scholarship programmes, travel grants, and online database services. Regarding the latter, COMSTECH purchased scientific databases for free scientific literature search services and has created a large network of libraries that can share their journal holdings with the scientific community of the OIC member states and provide free photocopies of research articles to active research scientists. Under this programme, COMSTECH has networked the journal holdings (comprising more than 28,000) of 48 major libraries spread across 15 OIC member states.

Today, our collaboration with COMSTECH continues. IFS looks forward to many more years of fruitful collaboration.
Impact of IFS on my life

Nteranya Sanginga: Shaping young minds and empowering youth

"Every single IITA staff member has demonstrated the effectiveness of funding in IITA through dedication to their work and motivation to team up together to match a common goal. The team spirit in IITA is visibly very developed and makes me feel like being home."

(Rob Bertram, Chief Scientist, USAID’s Bureau for Food Security)

As Director General of IITA, I have endeavoured to develop a powerful institutional culture to make employees “own” IITA – to believe in what we do and what we represent. I considered my mission was to transform IITA into a strategic centre and important partner for research-for-development in Sub-Saharan Africa. IITA has over 200 scientists addressing the challenges of natural resource management, climate change, and youth unemployment. It now has the biggest operating budget in the CGIAR system and also leads a multi-million dollar initiative to transform African agriculture to feed its teeming millions.

During my tenure at IITA, research infrastructure has expanded; laboratories and field facilities are now being used by more than 200 research-for-development programmes and for capacity development of partners in the DR Congo, Mozambique, Nigeria, Tanzania, and Zambia.

Mentoring to youth and young scientists

“Dr Sanginga introduced the IITA Youth Agripreneur scheme – providing an opportunity for young people to be gainfully involved in agriculture. He constantly encourages us and has never let us down or looked down on us.”

(Gbemisola Adewuyi, Agripreneur, IITA-Ibadan)

I have a passion for mentoring young minds. The IITA Youth Agripreneurs (IYA) scheme builds character, fosters determination, and promotes self-worth, hard work, self-discipline and teamwork. When I established the IYA (2012), the programme emphasised hands-on training in agribusiness, working with a small group of young graduates including non-scientists, who wanted to try their hand at market-oriented agriculture. Four years later, the success of the model has attracted strong interest from various African governments and development partners, including the African Development Bank (AfDB).

Dr Nteranya Sanginga received two IFS grants in the area of soil fertility as a scientist in the DR Congo. The high quality of his research was recognised in 1990 when he received the Sven Brohult Award – the most prestigious scientific award of IFS. In giving the award, the IFS Board of Trustees said: “Dr Sanginga is a world leader in the field of nitrogen fixation in agroforestry systems and will continue to influence the area through his research and his assistance to other developing country scientists.” This statement was prescient.

In this article Dr Sanginga describes the achievements of IITA under his leadership as Director General.
IYA is an independent enterprise for production, processing and marketing, cutting across value chains of cassava, banana/plantain, soybean, and maize, vegetables and fish. Now, youth groups in DR Congo, Kenya, Tanzania, Uganda and Zambia provide training in agribusiness. It is a science-led, market-driven approach to rural enterprise, employment and marketing, and a model for youth engagement in agricultural development. A multimillion dollar Youth-in-Agribusiness programme is now planned to cover 25 countries in Africa.

**Working with National Partners**

At IITA, I have revived the Institute’s partnership and capacity development programme, to work towards the common vision of agricultural development in Africa. One aspect of the IITA programme is to provide the new generation of African scientists with opportunities to work with advanced research institutions in developed countries, by fostering more north-south and south-south collaborations.

**As a visionary, motivator, and influencer**

“Dr Sanginga is a good pilot for the IITA plane – he leads by example. He is a visionary and has put smiles on the faces of staff. His personal engagement, touch, and powerful negotiation skills have helped to motivate staff to focus on the 'bigger picture', thereby enabling IITA to reach new frontiers.”

(Manuele Tamo, Insect Ecologist and Country Representative, IITA-Benin)

As the first African DG of IITA, I have encouraged developments linked to the major African organisations – AfDB, African Union, Forum for Agricultural Research in Africa (FARA), and others, while maintaining IITA’s brand as a world-class research institute working in Africa for the millions of smallholder farmers and their families.

IITA’s successes speak for themselves: through an integrated research programme (Africa RISING), hundreds of thousands of hectares of farmlands in target regions have been expanded, increasing both maize and rice yields by 50%. The project provides a pathway out of hunger and poverty for smallholders through sustainably intensified farming systems that sufficiently improve food, nutrition, and income security, especially for women and children.

Another IITA success is the Business Incubation Platform (BIP) for a food-sufficient Africa. Through BIP, IITA partners with the private sector, by providing agribusiness opportunities in seed systems and products that increase yields and food quality, and by value-added processing. It is a platform linking research, development, commercialisation, and capacity development leading to establishment of full-scale production facilities for adoption by the private sector.

An example is aflasafe™, which reduces aflatoxin contamination in maize and groundnuts by 80–99%. The technology (about USD20 per hectare) improves both food safety and the health and livelihoods of rural households. The investment return on aflasafe™ for farmers is between 200 and 480%. Now, about 98% of maize harvested by thousands of farmers in Kenya meets aflatoxin standards in the US.

Another example, is NoduMax™ for improved biological nitrogen fixation. This rhizobia-based inoculant enhances soybean production by 20-40% and eliminates the need for costly nitrogen fertilizers. NoduMax™ has undergone product registration in Ghana, Kenya, Nigeria, and Tanzania and is approved for commercialisation and mass production.

Through a project ‘Making Agricultural Innovations Work for Smallholder Farmers Affected by HIV and AIDS in Southern Africa (MIRACLE),’ IITA has improved the health and nutritional status, food security, and income of women and children affected by HIV/AIDS through supportive agricultural advocacy.

I am committed to ensure that IITA remains a relevant research and go-to institution in Sub-Saharan Africa for solutions to development and tropical agriculture problems.
People, affiliates, grants and finances

IFS BOARD OF TRUSTEES 2015

Prof Olanrewaju Babatunde Smith, Canada, Director, Lanrify Agriculture, Food and Nutrition Consulting Inc, Ottawa (Chair)
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Dr Wenche Barth Eide, Norway, Associate Professor, University of Oslo
Dr Nighisty Ghezae, Sweden, incoming Director, Stockholm (Ex-officio)
Dr Graham Haylor, Sweden, outgoing Director, Stockholm (Ex-officio)
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IFS STAFF 2015

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Mr Ulf Edin, Head of Administration
Ms Annika Eriksson, Programme Administrator, Animal Production and Aquatic Resources
Dr Nighisty Ghezae, Head of Programme, incoming Director
Dr Richard Hall, Scientific Programme Coordinator, Forestry/Agroforestry and Crop Science
Dr Graham Haylor, outgoing Director
Dr Ingrid Leemans, Scientific Programme Coordinator, Animal Production and Aquatic Resources
Ms Ingrid Lindhe, Programme Administrator, Crop Science
Ms Nathalie Persson Andrianasitera, Scientific Programme Coordinator, Food Science and Social Sciences
Ms Liliane Plaie, Administrative Assistant
Ms Sirilak Pongpatipat, Accounting Administrator
Ms Eva Rostig, Programme Administrator, Natural Products
Ms Pirkko Tolamo, Office Manager
Dr Cecilia Öman, Scientific Programme Coordinator, Water Resources
In 2015 IFS progressed in implementing its strategy and continued building the capacity of young developing country scientists, to produce new research findings of assured quality according to current academic principals, availed access to collaborative research networks and promoted the use of research.

**IFS GRANTS TO INDIVIDUALS**

Applicants submitted their proposals through three thematic research clusters namely:

- Biological Resources in Terrestrial Systems
- Water and Aquatic Resources
- Food Security, Dietary Diversity and Healthy Livelihoods

1353 applications were received, registration of the research grant applications and the internal pre-screening of all proposals were performed according to plan. Thereafter, applications were sent to internationally established scientific advisers and experts for comment (IFS has approximately 1400 advisers in its database). A Scientific Advisory Committee (SAC) meeting was held in Prague in May and several virtual SAC meetings were held in November where proposals were reviewed and prioritised. In June, 98 individual applications were approved for funding, and in December, 55 Revised/Rewritten and Renewal Proposals were approved for funding totalling 153 proposals to the combined value of USD 1 741 462 (SEK 14 587 004). The gender and regional distribution of the awarded research grants was as follows: 66% male, 34% female, 63% Sub-Saharan Africa, 27% South and SE Asia 4% Latin America, and 6% Middle East and North Africa.

In addition to research grants, IFS provided supporting services, i.e. feedback on research proposals for the failed applicants, valued counselling, and assistance in the purchasing of equipment and supplies.

**THE IFS COLLABORATIVE GRANTS**

The collaborative research call focused on biodiversity. The pilot countries were: Benin, Burkina Faso, Côte d’Ivoire, Ghana, Nigeria, South Africa, Tanzania and Uganda, the programme being financed by the Carnegie Corporation of New York, the Carolina MacGillavry endowment and The Belgian Science Policy Office (BELSPO).

Eligible interested researchers were invited into a specially designed social networking platform built on 'Podio', a commercial software product (provided free of charge to IFS). In a 'plenary workspace' people discovered each other's profiles and, against a call for collaborative research applications advertised on the platform, coalesced into 45 teams, each receiving access to a private team workspace built on the 'Podio' platform where they could plan and formulate their team applications. At the submission deadline, 26 teams submitted proposals, of which 13 passed a pre-screening for eligibility and scientific quality and were each sent out for review to several scientific experts. The Collaborative Research Scientific Advisory Committee meeting was held in December and, following the director's decision, nine teams consisting of 35 researchers (17 women and 18 men) from the eight countries were funded to a total value of USD 514 738 (SEK 4 494 796). There were six women coordinators and three men; seven teams were a mix of Anglophone and Francophone researchers and two teams were of researchers from Anglophone countries only.

In total, ten workshops, seminars, write-shops, policy consultative meetings, involving approximately 300 participants were conducted through different partnership agreements and increasingly together with the IFS Alumni Associations. Three workshops, a component of an EU-ACP project, were held in cooperation with African and one European partner on scientific writing and science communication.

Another workshop was undertaken in conjunction with Nigerian Universities in Abuja, Kano, Zaria, Ibadan and Port Harcourt, to identify material needs and to discuss how to address these.

Five training workshops were held with the University of Abomey Calavi (Benin) and the Beninese Alumni Association on proposal writing, sampling design and multivariate analysis, PowerPoint design, oral presentation and training on collaborative research. One consultative meeting was held with the MacArthur Foundation hosted by AAS, with participants from the Academy of Sciences of South Africa; ANAFE; BecA; CEMASTE; Ethiopian Academy of Sciences; Government of Kenya, Higher Education, Science and Technology; IFS alumni associations from Benin, Burkina Faso, Kenya, Ethiopia, Ghana, Madagascar and Togo; IOCD; Kenya National Academy of Sciences; NACOSTI, Kenya; NEPAD (Planning and Coordinating Agency); NMIE; RADMASE Centre, University of the Witwatersrand, STEPRI of CSIR, Ghana; Seeding Labs; SANBio; UNESCO Micro-sciences Programme.

93.7% of total expenditure for the year 2015 was on programme services, fund raising and partnership building.
The advisers and experts who make evaluations of proposals do not receive remuneration for reviewing nor for their attendance at SAC meetings. These contributed services which can be valued at approximately 4 million USD in *pro bono* support are not reflected in this report.

**PLANS FOR 2016**

- **Stewardship of IFS** (resource mobilisation, communications, managing change, improving efficiency and implementation of the new strategy).

- **IFS Individual Research Approach** (Specific objectives: capability of young developing country scientists built, to produce new research findings relevant for developing countries and of assured quality according to current academic principals).

- **IFS Collaborative Research Approach** (Specific objectives: capability of researchers from developing countries to access collaborative research networks promoted, including links to the international research community).

- **IFS Contributing Innovation Approach** (Specific objectives: the use of research in developing countries promoted and the demand for research increased).

**FINANCIAL RESULT**

The financial result for the year 2015 is a deficit of SEK 705 028 (EUR 76 846). The deficit is due to a conscious overrun of the budget as we received and approved a large number of exceptionally high-quality research applications 2015.

The result of the organisation’s activities, and the financial position at the end of the year, are reflected in the following Statement of Income and Expense and Balance Sheet.

All amounts in the Audited Financial Statement are shown in Swedish Crowns (SEK) unless otherwise noted.
STATEMENT OF INCOME AND EXPENSE (in thousands SEK)

<table>
<thead>
<tr>
<th></th>
<th>1 January– 31 December 2015</th>
<th>1 January– 31 December 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Programme Revenue</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Core and Restricted Contributions</td>
<td>34,949</td>
<td>36,543</td>
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<tr>
<td>Grants Withdrawn</td>
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<td>1,012</td>
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<tr>
<td>Other Programme Revenue</td>
<td>45</td>
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<td><strong>Total Programme Revenue</strong></td>
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<tr>
<td><strong>Programme Expense</strong></td>
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<tr>
<td>Programme Services</td>
<td>33,789</td>
<td>34,330</td>
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<td>Fundraising and Partnership Building</td>
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<td>2,133</td>
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<tr>
<td>Management and General</td>
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<td><strong>Total Programme Expense</strong></td>
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<td><strong>Programme Income less Expense</strong></td>
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<td>-1,387</td>
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<tr>
<td><strong>Result from financial assets</strong></td>
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<tr>
<td>Income from other investments held as fixed assets</td>
<td>570</td>
<td>496</td>
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<tr>
<td>Interest Income</td>
<td>72</td>
<td>69</td>
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<tr>
<td>Exchange gain / loss</td>
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<td>3,313</td>
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<tr>
<td><strong>Asset Income less Expense</strong></td>
<td>1,997</td>
<td>3,879</td>
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<td><strong>Net Income less Expense</strong></td>
<td>-705</td>
<td>2,492</td>
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<tr>
<td><strong>Change of designated funds</strong></td>
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<tr>
<td>Net Income less Expense for the Year (see above)</td>
<td>-705</td>
<td>2,492</td>
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<tr>
<td>Use of designated funds from previous years</td>
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<td>0</td>
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<tr>
<td>Designated funds</td>
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<tr>
<td>Remaining amount/change of equity balance</td>
<td>-1,212</td>
<td>457</td>
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</table>
### BALANCE SHEET (in thousands SEK)

<table>
<thead>
<tr>
<th></th>
<th>31 December 2015</th>
<th>31 December 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assets</strong></td>
<td></td>
<td></td>
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<tr>
<td>Fixed Assets</td>
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<td></td>
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<tr>
<td>Tangible Assets</td>
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<td></td>
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<tr>
<td>Equipment, Furniture and Fixtures</td>
<td>49</td>
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<tr>
<td>Financial Assets</td>
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<tr>
<td>Other long-term investments</td>
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<td>12,442</td>
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<tr>
<td>Long-term Donor Receivables</td>
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<tr>
<td>Total Fixed Assets</td>
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<td><strong>Current Assets</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Current Receivables</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Donor Receivables</td>
<td>1,544</td>
<td>1,633</td>
</tr>
<tr>
<td>Other Current Receivables</td>
<td>692</td>
<td>746</td>
</tr>
<tr>
<td>Prepaid Expense and Accrued Income</td>
<td>996</td>
<td>573</td>
</tr>
<tr>
<td>Total Current Receivables</td>
<td>3,231</td>
<td>2,952</td>
</tr>
<tr>
<td>Cash and Bank Balances</td>
<td>22,103</td>
<td>28,919</td>
</tr>
<tr>
<td>Total Current Assets</td>
<td>25,334</td>
<td>31,870</td>
</tr>
<tr>
<td><strong>Total Assets</strong></td>
<td>38,879</td>
<td>45,007</td>
</tr>
<tr>
<td><strong>Equity and Liabilities</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Equity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Board Designated Fund for Contingencies</td>
<td>9,843</td>
<td>9,173</td>
</tr>
<tr>
<td>Carolina MacGillavry Fund</td>
<td>14,611</td>
<td>14,775</td>
</tr>
<tr>
<td>Total Designated Funds</td>
<td>24,454</td>
<td>23,947</td>
</tr>
<tr>
<td>Unrestricted Equity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Balance, 1 January</td>
<td>344</td>
<td>-1,641</td>
</tr>
<tr>
<td>Net Income less Expense for the Year</td>
<td>-705</td>
<td>2,492</td>
</tr>
<tr>
<td>Total Unrestricted Equity</td>
<td>-361</td>
<td>851</td>
</tr>
<tr>
<td>Total Equity</td>
<td>24,094</td>
<td>24,799</td>
</tr>
<tr>
<td><strong>Current Liabilities</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research Grants Payable</td>
<td>9,987</td>
<td>12,124</td>
</tr>
<tr>
<td>Deferred Restricted Contributions</td>
<td>2,099</td>
<td>5,971</td>
</tr>
<tr>
<td>Accounts Payable</td>
<td>413</td>
<td>0</td>
</tr>
<tr>
<td>Other Current Liabilities</td>
<td>741</td>
<td>811</td>
</tr>
<tr>
<td>Accrued Expense and Prepaid Income</td>
<td>1,545</td>
<td>1,302</td>
</tr>
<tr>
<td>Total Current Liabilities</td>
<td>14,785</td>
<td>20,208</td>
</tr>
<tr>
<td><strong>Total Net Assets and Liabilities</strong></td>
<td>38,879</td>
<td>45,007</td>
</tr>
<tr>
<td>Pledged Assets: provision for credit cards</td>
<td>400</td>
<td>400</td>
</tr>
<tr>
<td>Contingent Liabilities</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>
### NATIONAL ORGANISATIONS

**ARGENTINA**
- Academia Nacional de Ciencias Exactas, Físicas y Naturales (ANCEFN)
- Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET)

**AUSTRALIA**
- Australian Academy of Science (AAS)

**AUSTRIA**
- Fonds zur Förderung der Wissenschaftlichen Forschung (FWF)
- Österreichische Akademie der Wissenschaften (OAW)

**BANGLADESH**
- Bangladesh Council of Scientific and Industrial Research (BCSIR)

**BELGIUM**
- Académie Royale des Sciences d'Outre Mer (ARSOM)
- Académie Royale des Sciences des Lettres et des Beaux Arts de Belgique
- Koninklijke Academie voor Wetenschappen, Letteren en Schone Kunsten van België (KVAB)

**BOLIVIA**
- Academia Nacional de Ciencias de Bolivia (ANCb)

**BRAZIL**
- Academia Brasileira de Ciencias (ABC)
- Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPQ)
- Fundação Oswaldo Cruz (FiOCRUZ)

**BURKINA FASO**
- Ministère des Enseignements Secondaire, Supérieur et de la Recherche Scientifique (MESSER)

**CAMEROON**
- Ministry of Scientific and Technical Research

**CENTRAL AFRICAN REPUBLIC**
- l'Enseignement Supérieur et de la Recherche Scientifique

**CHAD**
- Direction de la Recherche Scientifique et Technique, MESRS

**CHILE**
- Academia Chilena de Ciencias
- Comisión Nacional de Investigación Científica y Tecnológica (CONICYT)

**CHINA**
- Chinese Academy of Sciences (CAS)

**COLOMBIA**
- Academia Colombiana de Ciencias Exactas, Físicas y Naturales (ACCEFYN)
- Centro para la Investigación en Sistemas Sostenibles de Producción Agropecuaria (CIPAV)
- Instituto Colombiano para el Desarrollo de la Ciencia y Tecnología (COLCIENCIAS)

**CONGO (BRAZZAVILLE)**
- Direction Générale de la Recherche Scientifique et Technique, MENRST

**COSTA RICA**
- Consejo Nacional de Investigaciones Científicas y Tecnológicas (CONICIT)

**CÔTE D’IVOIRE**
- Académie des Sciences, des Arts, des Cultures d’Afrique et des Diaporas africaines

**CUBA**
- Academia de Ciencias de Cuba (ACC)
- Ministry for Foreign Investment and Economic Cooperation

**DENMARK**
- Akademiet for de Tekniske Videnskaber (ATV)
- Det Kongelige Danske Videnberske Selskab (RDVS)

**ECUADOR**
- Fundación para la Ciencia y la Tecnología (FUNDACYT)

**EGYPT**
- Academy of Scientific Research and Technology (ASRT)

**EL SALVADOR**
- Consejo Nacional de Ciencia y Tecnología (CONACYT)

**ETHIOPIA**
- Ethiopian Science and Technology Commission (ESTC)

**FINLAND**
- Delegation of the Finnish Academies of Science and Letters

**FRANCE**
- Académie des Sciences
- Centre de Coopération Inter-nationale en Recherche Agronomique pour le Développement (CIRAD)
- Institut National de la Recherche Agronomique (INRA)
- Institut de Recherche pour le Développement (IRD)

**GERMANY**
- Deutsche Forschungsgemeinschaft (DFG)

**GHANA**
- Council for Scientific and Industrial Research (CSIR)

**GUINEA**
- Direction Nationale de la Recherche Scientifique et Technique

**GUINEA BISSAU**
- Instituto Nacional de Estudos e Pesquisa (INEP)

**GUYANA**
- Institute of Applied Science and Technology

**HONDURAS**
- Consejo Hondureño de Ciencia y Tecnología (COHCIT)

**INDIA**
- Indian National Science Academy (INSA)

**INDONESIA**
- Lembaga Ilmu Pengetahuan Indonesia (LIPI)

**ISRAEL**
- The Israel Academy of Sciences and Humanities

**JAMAICA**
- Scientific Research Council (SRC)

**JORDAN**
- Royal Scientific Society (RSS)

**KENYA**
- Kenya Agricultural Research Institute (KARI)
- Kenya National Academy of Sciences (KNAS)

**KOREA DPR (NORTH)**
- Academy of Sciences of DPR Korea

**KOREA R (SOUTH)**
- National Academy of Sciences (NAS)

**KUWAIT**
- Kuwait Institute for Scientific Research (KISR)

**LATVIA**
- Latvian Academy of Sciences (LAS)

**LESOTHO**
- The National University of Lesotho (NUL)

**LIBERIA**
- University of Liberia (UL)

**MALAWI**
- National Research Council of Malawi (NRCM)

**MALAYSIA**
- Malaysian Scientific Association (MSA)
- Ministry of Science, Technology and Innovation
Mali
Centre National de la Recherche Scientifique et Technologique (CNRST)
Comité National de la Recherche Agricole (CNRA)

Mexico
Consejo Nacional de Ciencia y Tecnología (CONACYT)

Mongolia
Mongolian Academy of Sciences

Morocco
Centre National de Coopération et de Planification de la Recherche Scientifique et Technique (CNR)
Institut Agronomique et Vétérinaire Hassan II

Mozambique
Universidade Eduardo Mondlane (UEM)
The Scientific Research Association of Mozambique (AICIMO)

Nepal
Royal Nepal Academy of Science and Technology (RONAST)

Netherlands
Koninklijke Nederlandse Akademie van Wetenschappen (KNAW)

Niger
Université Abdou Moumouni

Nigeria
Federal Ministry of Science and Technology (FMST)
The Nigerian Academy of Science (NAS)

Norway
Det Norske Videnskaps-­akademii (DNVA)

Pakistan
Pakistan Council for Science and Technology (PCST)

Panama
Secretaria Nacional de Ciencia y Tecnología e Innovación (SENCYT)
Universidad de Panamá

Papua New Guinea
The University of Papua New Guinea

Peru
Consejo Nacional de Ciencia y Tecnología (CONCYTEC)

Philippines
National Research Council of the Philippines (NRCP)

Poland
Polish Academy of Sciences (PAS)

Saudi Arabia
King Abdulaziz City for Science and Technology (KACST)

Senegal
Délégation aux Affaires Scientifiques et Techniques, MRST

Seychelles
Seychelles Bureau of Standards (SBS)

Sierra Leone
Institute of Agricultural Research (IAR)

South Africa
National Research Foundation (NRF)

Sri Lanka
National Science Foundation (NSF)

Sudan
National Centre for Research (NCR)

Sweden
Ingenjörsvetenskapsakademien (IVA)
Kungliga Skogs och Lantbruksakademien (KSLA)
Kungliga Vetenskapsakademien (KVA)

Switzerland
Council of the Swiss Scientific Academies (CASS)
Swiss National Science Foundation (SNSF)

Tanzania
Tanzania Commission for Science and Technology (COSTECH)

Thailand
National Research Council of Thailand (NRC)
Thailand Research Fund (TRF)

Tunisia
Direction Générale de la Recherche Scientifique et Technique, MES

Uganda
National Agricultural Research Organisation (NARO)
Uganda National Council for Science and Technology (UNCST)

United Kingdom
The Royal Society
Natural Resources Institute (NRI)

Uruguay
Programa de Desarrollo de las Ciencias Basicas (PEDECIBA)

USA
American Academy of Arts and Sciences (AAAS)
National Academy of Sciences (NAS)
New York Academy of Sciences (NYAS)

Venezuela
The Ministry of Popular Power for Science and Technology

Viet Nam
Ministry for Science and Technology (MOST)

Zambia
National Institute for Scientific and Industrial Research (NISIR)

Zimbabwe
Science and Industrial Research and Development Centre (SIRDC)
University of Zimbabwe

Regional Organisations
Africa
Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA)
Association of African Universities (AAU)
Centre Regional pour l’Eau Potable et l’Assainissement à faible coût (CREPA)
Instituut du Sahel (INSAH)
The African Academy of Sciences (AAS)
West and Central African Council for Agricultural Research and Development (WECARD/CORAF)
Western Indian Ocean Marine Science Association (WIOMSA)

Latin America and the Caribbean
Centro Agronómico Tropical de Investigación y Enseñanza (CATIE)
The Caribbean Academy of Sciences (CAS)
Caribbean Agricultural Research and Development Institute (CARDI)

International Organisations
BioNET-INTERNATIONAL (The Global Network for Taxonomy)
International Organisation for Chemical Sciences in Development (IOCD)
International Union of Forest Research Organisations (IUFRO)
The Academy of Sciences for the Developing World (TWAS)
Consultative Group on International Agricultural Research (CGIAR):
CGIAR Secretariat
Bioversity International
Centro Internacional de Agricultura Tropical (CIAT)
Centre for International Forestry Research (CIFOR)
International Centre for Agricultural Research in the Dry Areas (ICARDA)
International Centre for Research in Agroforestry (ICRAF)
International Water Management Institute (IWMI)
World Fish Center
INDIVIDUAL RESEARCH GRANTS AWARDED 2015

BANGLADESH

ISLAM, Md. Rashidul
Molecular and phenotypic characterization of Xanthomonas oryzae pv. oryzae races from Bangladesh

ISLAM, Md. Shariful
Potential use of naturally grown halophytes for phytodesalination of salt-affected soils in the coastal region of Bangladesh

RAHMAN, Mohammed Mizanur
Modelling the complex groundwater-surface water interaction in riparian depressional wetlands (Haor) of Bangladesh

SAROWAR, Mohammad Nasif
Towards understanding mycotic diseases in aquaculture in Bangladesh: molecular approach to characterization of the causal agents

SULTANA, Nadira
Carbon and water footprint of milk production systems in Bangladesh: implications for environmental impacts

UDDIN, Mohammad Belal
Comparison of different forest management institutions in Bangladesh – a socio-ecological approach

BENIN

ADECHINA, Adéniran Rodrigue
Fonctionnement hydro-sédimentaire actuel à subactuel des rias du domaine margino-littoral béninois; con de l’interface deltaïque lac Nokoué-fleuve Ouémé

AGBOBATINKPO, Bidossessi Pélagie
Amélioration de la fermentation des grains de néré, Parkia biglobosa, par utilisation de bac de fermentation et d’additif fonctionnel traditionnel Yankanyku

ALOWANOU, Goué Géorcelin
Évaluation des propriétés anthelmintiques et toxico-écologiques de Bridelia ferruginea, Combretum glutinosum et Mitragyna inermis dans la production ovine au Bénin

AMAKPE, Felicien
Study of the impact of the seasons on artificial queen rearing of the benvo-soudanian Apis mellifera adansonii ecotype in the republic of Benin (West Africa)

AMOUSSOU, Toundji Olivier
Genetic characterisation of the wild populations of the tilapia Sarotherodon melanotheron Rüppell, 1852 in Southern Benin (West Africa) using microsatellite DNA markers

ASSANI SEIDOU, Alassan
Modélisation de la transhumance à l’intérieur de la Forêt Classée de l’Alibori Supérieur au Nord du Bénin

DAYOU, Éphremé Dossavi
Conception, réalisation et évaluation d’un semoir en semis direct

DJHIHOUESSI, Bellfrid
Process-based, GIS-based water quality modelling to assess impacts of hydrological pathways’ nutrient load on Delta ecosystem services: a case study from the Ouémé River Catchment in Benin.

DONOU HOUNOSODE, Tadogbe Marcel
Land-use type, harvest intensity and socio-economic impacts of use patterns of raffia (Raphia spp.) on their population dynamics in Benin (West Africa)

GBEDOMON, R Castro
Assessing seasonal variation and effectiveness of home gardens in conservation of phyto genetic resources in Benin

GOUSSANOU, A Cedric
Estimation and monitoring of litterfall carbon fluxes in the Lama forest reserve

HODOMIHOU, N Richard
Heavy metal contamination in vegetables and soils from suburban agricultural areas of Dakar, Senegal

HOUETCHEGNON, Towanou O
Étude écologique du Prosopis africana (Guill., Perrott. et Rich.) Taub, Mimosaceae) au Bénin, Afrique de l’Ouest

KELOMEY, Eminsédé Aude
Caractérisation moléculaire et ethologique de l’abeille Apis mellifera adansonii et de son parasite, Varroa destructor, au Benin

KIKI, Akwegnon Dotoun Martial
Modelling the influence of people, livestock and climate factors on their population dynamics in Benin (West Africa)

KOURA, Bossima Ivan
Grazing lands in the peri-urban area of Southern Benin: characteristics and farmers’ management practices

KOURA, Kourouma
Gestion durable des ressources agroforestières de la population du Néré (Parkia biglobosa (Jacq.) R. Br.) du Bénin: caractérisation agro morphologique et diversité génétique des sous-populations

LAWIN, Iboukoun Fidèle
Ecologie, morphologie des fruits et phénologie de Cola millenii K. Schum au Bénin

ZOUNDIJ, Charlotte C
Improvement of Bambara groundnut (Vigna subterranea) productivity in Benin by the use of efficient nitrogen-fixing bacteria

BURKINA FASO

GUIRA, Flibert
Caractérisation de microorganismes d’intérêt nutritionnel du ferment de manioc et leurs métabolites pour la valorisation des produits dérivés du manioc au Burkina

KIEBRE, Mariam
Etude ethno botanique et évaluation de la diversité génétique de Corchorus olitorius, un légume indigène en domestication au Burkina Faso

SIRIMA, Dijama
Utilisation de l’Abeille (Apis mellifera adansonii Latrell.1804) dans la gestion de l’éléphant de savane (Loxodonta africana africana, Blumenbach 1797) au Burkina Faso

TANKOANO, Boalidioa
Contribution de la télédétexion et des SIG à l’aménagement et la gestion durable des aires protégées du Burkina Faso: cas du Parc national des deux-Balé

YAMEOGO, T Jérôme
Contribution des CES à l’amélioration de la résilience des forêts à l’ouest du Burkina Faso

ZONGO, Aboubié Elisabeth
Étude de la diversité pathogènique et moléculaire du virus de la mosaïque BCMV-BIC du voandzou au Burkina Faso

ZOUGRANA, Sylvain
Evaluation de la stabilité de nouvelles sources de résistance aux Xanthomonas oryzae, agents pathogènes de la bactériose vasculaire et à stries foliaire translucides du riz au Burkina Faso

CAMBODIA

SOVANN, Chansopheaktra
Quantifying the economic value of a wetland’s ecosystem services for sustainable stormwater management

CAMEROON

DEMNGE FOPOSSI, Judith Laure
Characterization, antimicrobial and antitumoral potential of endophytic actinomycetes isolated from some Cameroonian medicinal plants.
HAKO TOUKO, Blaise Arnaud
Upgrading natural disease resistance against avian paramyxovirus 1 (Newcastle disease) and in situ in vivo conservation of selected local chickens

KEMGANG DONGMO TCHOUTA, Etudes hydrogéologiques et géophysiques des nappes en creux dans le bassin du lac Tchad, région Waza-Maroua-Yagoua (Extrême-nord Cameroun)

MBOUWE, Irene Franceline
Evaluation des potentialités de domestication et gestion participative des populations de Monodora myristica Dunal (Gaertn), Annonaceae, une épicé à usage multiple qu’il convient de valoriser

MUNE MUNE, Martin Alain
Production potential of functional ingredients for the prevention or treatment of type II diabetes by enzymatic hydrolysis of food proteins

NGO LEMBA TOM, Esther
Propriétés cardiovasculaires de Harungana madagascariensis: étude in vivo et in vitro

NJIANA, Evangeline
Evaluation d’un résidu agro-industriel (poussière de plomb) pour l’extraction et la détection électrochimique de plomb (II) en solution aqueuse

NKENMOGNE KAMDEM, Inès Estelle
Encapsulation d’une lipase et de l’acétate d’isomyle par des gommes hydrocolloïdes extraites d’espèces végétales cultivées au Cameroun

NOUBISSI, Paul Aime
Study of anti-diarrheal and anti-microbial effects of Crinum jagus (Amaryllidaceae) extracts

NYEMB, Jean Noël
Phytochemistry and pharmacological studies of two medicinal plants of Cameroonian pharmacopeae

PAGUEMII, Archille Eric
Genetic study of taurine cattle breeds in North Cameroon with respect to differential susceptibility or resistance to five pathogenic agents of veterinary importance

TCHIECHOUA, Yves Hernandez
Régénération et domestication de Prunus africana (Hook f.) Kalkman au Cameroun par l’emploi des champignons mycorhiziens à arbuscules (CMA)

ZEMAGHO MBOUZANG, Lise Arlette
Biosystematic and phylogeny of Sabicea species of continental Africa

ZHAHNG, Jin-zhi
Morphological characterization and molecular mechanisms of self-pruning in citrus spring shoots

CONGO
LOUBOTA PANZOU, Grace Jopaul
Variations de l’allométrie des arbres d’Afrique centrale et ses conséquences sur l’estimation de la biomasse et les stocks de carbone

CONGO, D R
JUSTE, Yamoneka Wasso
Etude des propriétés physicochimiques, technofonctionnelles des matières grasses d’Irvingia gabonensis et de Dacyodes edulis en vue de leurs intégrations dans la formulation d’émulsions alimentaires

KISEKELWA, Tchalondowa
Diversité et structure des communautés ichtyologique dans le Parc National de Kahuzi-Biega au sens large (Est de la RDC)

COSTA RICA
ALVARADO MESÉN, Javier
Cloning, purification and the molecular and functional characterization of a novel hemolysin from the sea anemone Anthopleura nigrescens

CÔTE D’IVOIRE
AGBO, Adouko Edith Chiaoun
Amélioration de l’état nutritionnel des populations par l’action anti-oxydante des épices sur les micronutriments au cours de la cuisson des légumes feuilles.

KOUAKOU, Lombart Maurice
Assessing the role of urban parks and green spaces in the conservation of biodiversity in the Abidjan district

CUBA
MONTERO ALEJO, Vivian
Obtaining and evaluation of chimeric variants of antimicrobial peptides derived from a defensin-like peptide family found in the spiny lobster Panulirus argus

DJIBOUTI
OMAR, Assowe Dabar
Geochemical modeling of the groundwater evolution in Bara plain (Djibouti)

ECUADOR
TOBAR, José
Characterization of the Prunus serotina Self-Incompatibility (S-) Locus and development of a PCR-based system for the identification of S-haplotypes

EGYPT
ABDEL-WAHED, Mahmoud Saad
Overcoming water and energy shortages using magnetic photocatalytic materials

AHMED, Yosra
Prevalence and characterisation of Phytophthora species associated with ornamental plants in Egypt

AYAT, Hashim
Ecofriendly copper-silica nanomaterials: synthesis, characterisation, DNA binding profile and evaluation of their antifungal activity against Phytophthora infestans

KHAMIS, Youssif
A new approach for controlling grey mould of table grapes using electrolysis water integrated with natural salts

MOHAMED HISHAM ABDELRAFI, Fadi
Consumers’ attitudes towards food waste in Egypt

REHAN, Medhat
Downstream genes in the s-triazine biodegradation pathway in Frankia sp EUH1c and other local strains

ZAHRAN EL-NAGGAR, Eman
The antimicrobial polypeptides repertoire in Nile tilapia exposed to Streptococcus iniae: molecular cloning and characterisation of enhanced innate immune responses
ETHIOPIA

ABDISSA, Negera
Natural products from Ethiopian Kniphofia plants towards the management of malaria

ADDISIE, Meseret
Assessment of hydrological and geotechnical factors on the evolution and control of gully erosion in the humid northern Ethiopian highlands

ANAGAW Atickem (Meshesha)
Wildlife conservation and sustainable agricultural practice: does shade coffee sustain large mammalian biodiversity in Ethiopia?

ASSEFA AGIDEW, Alemmeta
Land management practices for sustainable food security in the southern Wollo Zone of Ethiopia: the Keskes-Teleayen watershed case study

ENKU, Temesgen
Understanding the dynamic interactions of groundwater and evapotranspiration in the Fogera plain, Tana sub basin, Ethiopia

GEBRE, Kasha Tadel
Breeding objectives and alternative breeding schemes for local goat populations adapted to arid and hot conditions in Ethiopia

GIRMA, Wendamagegn
Modeling hydrological responses to changes in land use and land cover and climate of the Genale River catchment, Ethiopia

GIRMA, Yemane
Haplotype analysis of the stem rust resistance (Sr) genes in Ethiopian elite bread wheat (Triticum aestivum) varieties for their sustainable use

HAILU, Keneni Alemu
Suitability and adaptability of high rate algal ponding technology for municipal wastewater treatment in Ethiopian climates; environmental and economic implications

HAILU, Keneni Alemu
Assessment of hydrological and geotechnical factors on the evolution and control of gully erosion in the humid northern Ethiopian highlands

OGATO, Geamechu Shale
Land use/land cover change and urban flooding nexus in towns of Ethiopia and towards developing integrated urban flooding hazard management strategies: the case of Ambo town

SUBHATU ALEMTESEHAY Teklay
Long term effects of soil and water conservation and potential impacts of integrated watershed management on ecosystem services in the Abbay (Blue Nile) Basin of Ethiopia

WAKUMA, Kenatu Angassa
Municipal wastewater treatment using a constructed wetland system: case study of Addis Ababa, Ethiopia

YAZEZW MAMMO, Dereje
Impacts of habitat fragmentation on the behavioural ecology of the Omo River Guereza (Colobus guereza guereza) in Wol-Washa Natural State Forest, Central Ethiopia

GHANA

AMPOFO-ASIAMA, Jerry
Influence of thermal processing on the nutrient content and shelf-life of soursop juice

HAITI

PAULEUS, Ose
Analysis of land change trends from 2001 to 2014 in the context of charcoal production: a case study of the charcoal value chain in Haiti using participatory mapping methods

INDIA

NANIWADAKAR, Rohit
Understanding impacts of hornbill loss on plant-disperser networks in North East India

KENYA

ALAKONYA, Amos
Development of Striga hermonthica-resistant transgenic maize via a host-induced gene silencing technique

ALATI, Victor Mkakha
Assessing the impact of mollusc harvesting on their species composition and socio-economic aspects along the Kenyan coast

KIANI, Nelson
Exploration of organochlorine pesticide degrading bacteria in polyeextreme ecosystems for potential applications in bioremediation

MASESE, Frank Onderi
Influence of livestock and wildlife populations on the functioning of an African savanna river system

RANOELISON, Hasina (Volahasina) Tsilavina
Modélisation des dynamiques d’évolution de la mangrove de Toliara (Madagascar)

RAKOTOMALALA, Christian Ulrich
Etude hydrologique des nappes d'eau souterraine ainsi que leur vulnérabilité à la pollution dans les zones environnantes du site d’exploitation minière d’Ambatovy, côte Est de Madagascar

RANOVONA, Zoelinoronirina
Potentialités nutritionnelles et antioxydantes des feuilles de Centella asiatica de Madagascar, effets des procédés de séchage et/ou de cuisson sur les phytonutriments

RAZAFIMANDIMBY, Harizoly
Caractérisation morphologique, génétique, biologique et écologique de tsiperifery (Piper nigrum) et de maintirano (Piper melastomum) pour la gestion durable des ressources génétiques à Madagascar

RAZAFITSALAMA, Falintsoa Fanantenana
Reconstruction climatique et projection des caractéristiques des eaux souterraines de la région lhorombe

RAZANAMALALA, Kanto
Priming effect: vers un outil de gestion de la fertilité des sols cultivés à Madagascar

RAZANAMARO, Onja Harivelonaina Morilline
Système de reproduction, flux génique et étude d’impact de la fragmentation de l’habitat chez les deux espèces de Brevibalanus: Adansonia suarezensis et Adansonia granddieri

NGARI, Ann Gathigia
Chemical composition of attractive blends in selected Ocimum species traditionally used to lure honey bees

OGALI, Irene Nafula
Molecular diversity of Paramyxovirus in domestic poultry and wild birds in Eastern and Coastal Kenya

OJWANG, Redemtor Awoor
The compositional, phytochemical and genetic characterisation of Jackfruits (Artocarpus heterophyllus Lam) found in selected areas in Kenya and Uganda
SOLOVIONY NAVALONAMANITRA, Andrianjafinandrasana
Evaluation des potentialités fongitoxiques des huiles essentielles de Ravensara aromatica et de girofle en traitements après récolte des fruits tropicaux (mangue, papaye, banane)

MALAYSIA
LIM, Jitkang
Development of iron oxide nanoparticle-augmented polymeric microcapsules for heavy metal removal from industrial waste water

TANG, John Yew Huat
Biosafety of Vibrio cholerae in popular local seafood products

VADIVELU, Vel Murugan
Accumulation and extraction of biopolymers from aerobic granules treating palm oil mill effluent

PHILIPPINES
CAMARIN, Ma-ann
Bacterial load and species composition associated with freshwater prawn (Macrobrachium rosenbergii) and its rearing environment

REPUBLIC OF SOUTH SUDAN
MOGGA, Maurice L
Genetic improvement of yield and grain quality in upland rice (Oryza sativa L.) in South Sudan

SENEGAL
DIAGNE, Nathalie
Optimisation des couples Casuarinaceae/Champignons mycorhiziens arbusculaires pour la valorisation agro-sylvopastorale des écosystèmes dégradés par le sel au Sénégal

NIGERIA
ABOSEDE, Olufunso Olumide
Synthesis, characterization and biological applications of some metal complexes of macrocyclic compounds with polypyridyl ligands

SUDAN
MOHAMMEDSALIH, Khalid
Evaluation of albendazole resistance status of gastrointestinal nematodes in cattle and goats in South Darfur State, Sudan

TANZANIA
JAILETA NEGASA, Daniel
Effect of Eucalyptus forest dynamics on catchment hydrology in Ethiopia

TOGO
BAMMITE, Damigou
Assessment of the agromorphologic and genetic diversity of taro (Colocasia esculenta (L.) Schott) in Togo
TUNISIA
BEN JEMAA, Slim
Identification of genetic structure in Tunisian sheep breeds and genome-wide association mapping of genes responsible for infertility phenotype in Barbarine sheep

MASMOUDI, Khaoula
Modelling and life-cycle assessment of biological MF/UF membrane reactors for the treatment and reuse of grey water

VIETNAM
HOANG ANH, Hoang

KHA, Tuyen Chan
A pilot-scale production of Gac aril powder by heat pump drying and its use as a natural colour additive and a nutrient supplement in pork sausage products

LAI, Thi Ngoc Ha
Utilisation des enzymes dans l’extraction de piceatannol à partir des pépins du fruit de sim (Rhodomyrtus tomentosa) et production de poudre rich en piceatannol applicable dans l’industrie alimentaire

LE Hai Trung
Grass root reinforcement of soil on sea dikes in Vietnam

LY, Thi Bich Thuy
Development of a P450-based recombinant Escherichia coli whole-cell biocatalyst for the transformation of sesquiterpene-compounds

NGUYEN, Minh Hong
Application of a stable microorganism consortium for biodegradation of polycyclic aromatic hydrocarbons in polluted soil

NGUYEN, Thanh
White Spot Syndrome virus envelope protein VP28: food-grade overexpression in Lactobacillus and application for oral vaccination

NGUYEN, Thanh Nam
Investigation of genetic diversity and distribution of the endemic cave fish Pterocryptis cucphuongensis (Mai, 1978) in Vietnam

NGUYEN, Thi Thu Trang
Characterisation of the soybean Na+ extrusion GmSOS1 gene for salt tolerance in transgenic soybean

NGUYEN ANH, Tuan
Analysing the impact of climate change on water resource availability and use in the Gam River Basin, Northeast Vietnam

ZIMBABWE
RURINDA, Jairos
Stimulating productivity of food crops in response to climate change, and adaptive farm management options in Zimbabwe
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