

Annual Report 2010

with summary of IFS Strategy 201 1-2020







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Cover photos (left to right): top row: Brian Porter; 2nd row: Vanvimon Saksmerprome, Ingrid Leemans; 3rd row: Amadou Keïta, Per Moksnes; 4th row: N'Golo Kone, Max Troell. Design: Kaigan TBK Printing: Elanders NRS Tryckeri, October 2011

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Message from the Chair & Director

Foreword



2010 has seen the conclusion of the fourth independent review at the International Foundation for Science, and a great deal of reflection and discussion about the next decade. In a science foundation, it is little surprise that two of the most commonly used words during this period have been 'research' and 'scientist'. Historically, it is perhaps much more

surprising to reflect that whilst the term research first emerged in 1577, it was a quarter of a millennium later, in 1833, that the erstwhile Master of Trinity College Cambridge, William Whewell was credited with first coining the term scientist.

Research has been variously described as 'the discovery and interpretation of facts, revision of accepted theories or laws in the light of new facts, or practical application of such new or revised theories or laws'. Put more simply, according to the Hungarian Nobel Prize winning physiologist Albert Szent-Gyorgyi, 'to see what everybody else has seen and to think what nobody else has thought'. A scientist on the other hand can be described as one engaging in 'a systematic activity to acquire knowledge'. Like the science students of American Nobel prize winning physicist, Richard Feynman, IFS encourages scientists, not simply to acquire knowledge, but 'to test all knowledge through experimentation'. Feynman particularly extolled the virtue of 'imagination to create the great generalisations — to guess at the wonderful, simple, but very strange patterns beneath them all, and then to experiment to check again whether we have made the right guess'. So, as we embark on a new era in the evolution of IFS, the contemporary role of IFS remains research support to early career scientists in the developing world, to indeed acquire knowledge through imagination, inspired guesswork and iterative experimentation.

This year, the annual report of IFS is a special one. In common with recent reports, it aims to share the activities, accomplishments and accounts of 2010, but unusually it also summarizes our vision for the next decade. A great many



Graham Haylor

of the IFS constituency, a lot of you now reading this, have contributed to this vision. At each event and every opportunity during this process people gave generously of their time, to share experiences, opinions and ideas. We would like to take this opportunity to express our heartfelt gratitude, and as promised to report back the outcome of those deliberations and to begin to share the new strategic direction that we have created together.

The first section of this annual report features the kind of individual research in the context of biological and water resources, which IFS has supported for nearly 40 years and which will continue within the new 10 year strategy through the provision of renewable research grants and capability enhancing support. The section highlights selected individual IFS research projects, our work with partners, the special efforts to support women scientists, our efforts to help to improve infrastructure, as well as some of the impacts of all these efforts. The map on the next page provides a snapshot of the kind of investigations that IFS grantees have reported during the past year in Africa, Asia Pacific and Latin America.

Whilst a political map depicts boundaries, as Amartya Sen, the Indian Nobel Prize winning economist points out, the borders of science are not drawn along national lines, nor is the concept of 'western science' an especially

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A selection of research from IFS grantees reported in 2010 from across the globe

useful or accurate description. Since the Renaissance, the Industrial revolution and the Enlightenment of the eighteenth century most scientific progress has occurred in 'the west'. However, these scientific discoveries draw substantially on earlier works of Arabs, Chinese, Indians and others, whilst the methods of reasoning show marked similarities across time and regions. To encourage research today in the developing world, in least developed countries, is not to impose a concept of 'western science' but to support indigenous scientists to address problems which they identify, relevant to the needs of their country. In the case of IFS through demand-led long-term, predictable granting and capability enhancing support across a broad spectrum of biological and water resources.

The second section of this special annual report summarises our new strategy. We believe that in an interlinked world of global challenges and interdependent solutions, it is more and more important to be working together. That is: for an international foundation to work with least developed countries, for developing country scientists to team up together in interdisciplinary collaborative research, including between scientists in the developed and developing world, and for researchers to engage with others, so that science findings can be made more accessible to entrepreneurs and policy and decision makers. In the next decade, IFS aims to enable young scientists to contribute to a global research community that is reducing poverty and supporting sustainable development. The primary focus of IFS remains the promotion of excellent science through early career research grants and capability enhancing support to researchers in developing countries. However, the 2011-2020 Strategy will also provide support for collaborative research teams, which combine researchers' strengths, expertise, and experience, to address a larger topic or a 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.

It is both an honour and a pleasure for us, as the new Board Chair and the new Director of IFS, working together with the IFS constituency, to offer the best stewardship we can to the International Foundation for Science.

Jürg Pfister Chair of the IFS Board of Trustees

Graham Haylor IFS Director

IFS research grants programme in biological and water resources

The IFS Research Grants are available to support a wide range of research ideas on biological and water resources, through a competitive process that involves assessment by scientific advisers. The small grants are especially targeted at early career scientists following attainment of their masters' degree or doctorate. IFS does not prescribe what young scientists should research, instead the programme provides a mechanism for applicants to choose research that addresses needs which they have identified. The overall aim of the grants is to increase the opportunities for young researchers to conduct research on issues of relevance to their own situation.

In 2010, IFS undertook a large envisioning exercise parallel with the granting programme and awarded 112 Research Grants to scientists in 39 countries; 50% of which were to women (see Appendix 2, p. 33).

The IFS granting process

The provision of competitive research grants is the major component of IFS support. Promising early career scientists can apply for small research grants in their home country at a critical point in their careers. Evidence suggests that aside from building capability to win funds and manage research, much of the research conducted by IFS grantees leads to useful discoveries, and can also increase opportunities to secure further funding in the future. Altogether, these attributes of the granting process can contribute to enabling developing country scientists to peruse an indig-



hoto, Amodou Voito

To effectively manage increasingly scarce water resources for food production, Mr Amadou Keïta is studying water drainage and flow processes in an inter-hill irrigation scheme in Burkina Faso.

Working toward the UN Millennium Development Goals

While IFS has an open research agenda for its grantee constituency, meeting the challenges of the 21st century and responding to the MDGs means that certain areas of research are so overwhelmingly critical that IFS actively encourages applications in those areas. Through its existing programme areas, IFS supports a broad spectrum of research projects, many of which address issues of eradication of extreme hunger and poverty, promoting gender equality and encouraging women to enter careers in science, ensuring environmental stability, and combating malaria and other diseases.

Some highlights of the grants awarded in 2010 are given in the next chapter.



Fig. 1 Geographic distribution of IFS research grants 2006-2010.



enous research career helping to prevent the so-called brain drain, because the vast majority of IFS grantees remains working in their home countries. Grants of up to USD 12,000 are available for research projects on the sustainable use, management and conservation of biological and water resources. The funds can be used for the purchase of equipment, supplies, literature and field work. During the research period – a maximum of three grants, each of 1-3 years duration – IFS often supports grantees with capability enhancing support, as described later in this report. There are currently two application deadlines per year, with every application going through a thorough assessment. Each application is reviewed by a number of international scientists from a network of IFS Scientific Advisers. Currently there are eight Scientific Advisory Committees constituted within the review process dealing with different research fields. Assessment criteria are used to ensure that proposals are sound, feasible and relevant to the scientific field and country in question. Constructive feedback is given to every applicant, and many unsuccessful applicants with good potential can further develop their proposals for re-submission.

During 2010 and into 2011 a participatory process has taken place to envisage a new strategy for IFS. The new strategy, summarised later in this annual report, will be launched in early 2012 and will represent a major change to the current scope and approach of IFS. Popular and successful products and approaches will remain. The individual renewable research grant of USD12,000 will continue to be available to early career scientists in least developed countries. The capability enhancing support will also continue to be made available. New products and ways of operating will also be introduced from 2012, when IFS will pilot a new programme of support for collaborative research.

On the following pages we present some selected research grants awarded in 2010 to high level promising young researchers in developing countries.

Current country eligibility for IFS research grants

Countries which are eligible for IFS support are defined using indicators for assessment of their economic development and their scientific infrastructure.

Researchers based at institutions in the following categories of countries are, in principle, eligible to apply for IFS grants:

Low Income Countries (LIC), Lower Middle Income Countries (LMIC) and some Upper Middle Income Countries (UMIC) namely those with a below-average GNI/Capita of that category of countries.

IFS gives priority to research applications of satisfactory scientific quality from researchers based in countries classified as LICs and LMICs. This joint category includes most countries in Sub-Saharan Africa and some in Latin America and Asia. The rationale for this policy is that researchers based in UMICs in general have much better access to national research funding and infrastructure than their colleagues in LICs and LMICs.

IFS also gives priority to countries where young scientists have difficulty accessing research funding and research tools. It aims to allocate at least 70% of its research grants to scientists from its priority countries.



Fig. 3 Percentage of IFS research grants awarded to scientists in the IFS priority countries compared to other eligible countries, 2000–2010.

Selected research highlights

Current projections hold that the population of the world will grow to over 9 billion by 2050. Much of this increase is projected to occur in developing countries which currently face the greatest level of food insecurity. To feed the increased world population it is estimated that the global food production will have to increase by 70 percent over the same period, and more specifically by almost 100 percent in developing countries. In addition, due to the increasing challenge from land degradation, climate change, scarce water supplies and competition for energy resources from industry and urbanisation, growth in agricultural productivity is affected. Solutions to these immense challenges will depend on a varied basket of science-generated knowledge and technologies. Crop and animal pests and diseases must be confronted. Resistance to harsh weather conditions must be enhanced and biodiversity must be managed.

IFS recognises the importance of a significant increase in agricultural production and productivity on a sustainable basis in order to respond to the challenges of a growing demand. In 2010 several young researchers were awarded results-oriented agricultural research grants that address several critical agricultural issues. Each project is contributing to knowledge systems that will be required to strengthen global food security and enhance knowledge in agricultural productivity growth. Both food security and knowledge are strongly linked to economic growth in developing countries and have substantial impact on reducing poverty.

Sustainable agriculture

Increased sustainable agricultural production, in quantity as well as in quality, is needed to reduce hunger for millions of people in developing countries, as well as to improve food security, human health and nutrition and to reduce poverty. Through their research projects, IFS grantees contribute to addressing these challenges. Evaluation of rain water harvesting and conservation techniques among smallholder farmers in semi-arid eastern Kenya Semi-arid eastern Kenya is inherently characterised by high rainfall variability which often causes wide fluctuations in agricultural production, leaving the population food insecure and dependant on relief. Rainwater harvesting has the potential to improve rain-fed agriculture and address the problem of food insecurity in the region. Mr Charles Recha will identify effective rainwater harvesting and conservation techniques in Tharaka district and examine determinants of adoption of such techniques among smallholder farmers. Study findings are expected to contribute to the development of rainwater harvesting techniques applicable within the socio-economic conditions of farmers. Ultimately, farmers may not only improve their crop water management but also cope with within-season rainfall variability and thus enhance their food production.



In many semi-arid areas food production is often limited by water shortage. Mr Charles Recha, Kenya, will assess the potential of different rainwater harvesting techniques, such as the use of depressed planting areas to collect and concentrate rain water directly around the plants, to increase crop production and contribute to food safety.

Maize is the most important cereal crop in Sub-Saharan Africa and the staple food of the majority of the population in Southern Africa. Declining soil fertility, pests and environmental stresses such as drought affect crop production and health. The use of early maturing maize varieties generate early food supplies and reduce the risk of crop failure due to exposure to drought later in the growing season. However, yields of early maize varieties are usually substantially less than of late maturity ones, thus limiting their potential benefits. Under laboratory and experimental field conditions, Mr Edmore Gasura will study genetic variability and inheritance of grain fill and duration in different maize varieties. Ultimately, these studies are expected to contribute to developing high yielding early maize.

In vitro virus elimination from taro (Colocasia esculenta) for conservation and safe international exchange

Taro, tapioca and yam are important staple root crops on many of the Pacific islands. The Centre for Pacific Crops and Trees (CePaCT) based in Fiji conserves a globally unique collection of taro germplasm from the Pacific and South-East Asia and acts as a centre for exchange of plant genetic resources. Exchange and sharing of these resources is particularly important considering that the genetic resource base in many individual Pacific island countries is low. Enhancing access to genetically diverse material for propagation purposes will benefit farmers and contribute to food and nutritional security, especially considering the challenge of climate change. However, much of the germplasm available in the region is shown to be infected by viruses that may cause severe yield and quality losses. In order to make better use of the existing genetic diversity, effective virus elimination and mass propagation methods are required. Using Dasheen mosaic virus (DsMV) infecting taro as a model, Mr Amit Sukal will identify and evaluate different technologies for their DsMV elimination efficiency and effectiveness in a collaborative project between CePaCT and University of the South Pacific. Successful virus elimination will allow safe and long-term storage of taro germplasm in genebanks and production of virus-free plants for distribution to farmers.



Agricultural productivity can be raised through the selection of improved seeds and planting materials. Mr Edmore Gasura, IFS grantee in Zimbabwe, is showing the difference between parental inbred maize lines (left) and hybrids (right), planted on the same day and receiving the same management conditions.

Production and delivery of double-stranded RNA to control yellow-head virus disease in shrimp Shrimp farming is an important aquaculture sector, creating substantial income to small scale farmers in many countries. In South-East Asia, the black tiger shrimp (Penaeus monodon) is one of the economically important cultured species. Under intensive farming conditions, shrimp susceptibility to viral pathogens is a constant threat to aquaculture production. Viral diseases such as yellow head disease occur commonly



Dr Vanvimon Saksmerprome, IFS Grantee in Thailand.

and are the cause of mass mortalities associated with important economic losses. During her earlier research, Dr Vanvimon Saksmerprome successfully protected shrimp against yellow head disease in lab-scale experiments using modern molecular technology (RNA interference). However, injection of individual shrimp is not practical in farm operations. The long term aim of the present study is to improve the method for delivering double stranded RNA (dsRNA) into shrimp by oral administration, using chitosan based nanoparticles in shrimp feed.

Climate change

Climate change, resulting in raising temperatures as well as changing weather patterns in ways that accentuate extremes like flooding and drought, poses one of the greatest threats to humankind in the 21st century.

Africa is thought to be one of the regions in the world most vulnerable to the impacts of climate variability and change.

Vulnerability and adaptation of Ghana's food production systems to climate variability and change Climate change scenarios predict that Ghana in the coming decades will experience a substantial rise in temperature while rainfall will decrease. Consequently, Ghana's agriculture is expected to be highly vulnerable to climate change. Several simulation studies predicting the likely impacts of climate change on the world's agricultural resources have suggested that potential climate change damage may be limited through adaptation of agricultural techniques. In this project, Mr Philip Antwi-Agyei will explore the socioeconomic, institutional and biophysical factors that contribute to vulnerability and resilience of food production systems to climate change in Ghana. It will focus on food production systems in the Ejura Sekyedumase and the Bongo districts in Ghana and a theoretical framework of food production systems vulnerability will be developed to guide more general discussions regarding the sorts of food systems that are more adaptable to potential effects of climate change.

Soil carbon stocks and fluxes in four tropical forests in the Republic of the Congo

Forests influence climate in different ways and their net effects on climate depend on many interrelated factors such as climate, soil, tree species as well as changes in land use - including deforestation - and may vary over time. It is generally considered that forests may contribute to climate change protection through sequestration of atmospheric CO₂. Forests in the Republic of the Congo are among the largest tropical forests in the world, but relatively little detailed knowledge is available about the roles these forests play in the global carbon cycle. Through ground based measurements in selected forest sites, Dr Suspense Ifo will study soil carbon stocks and the spatiotemporal dynamics between soil carbon stocks and above ground carbon pools in trees, litter and woody debris. The study is expected to contribute to collecting baseline date facilitating more reliable estimates on carbon emission and sequestration by tropical forests.



Tropical forest ecosystems may contribute to climate change protection but, at the same time, are vulnerable to climate change variability. The research project of Dr Suspense Ifo, from the Republic of the Congo, will contribute to expanding our still limited understanding of climate change impacts on tropical forests and vice versa.

Biodiversity, conservation and environmental management

Biodiversity loss has severe consequences for humankind. It erodes the capability of the Earth's ecosystems to provide the goods and services like nutrient recycling, water and air filtration services, pollution assimilation, gene banks that satisfy economic, agricultural, public health, scientific, cultural, and spiritual needs.

Mitigation efforts include nature conservation, where rare and endangered species are located and conserved, and larger environmental management efforts in ecosystems dominated by monoculture or infrastructure development, or where increasing land degradation, destroyed forests or degraded water resources imperil biodiversity.

Distribution and diversity of Termitomyces fungi in Côte d'Ivoire

Sub-Saharan Africa is home to a wide variety of mushroom species, many of which are well-known and highly appreciated by local communities for their nutritional and medicinal properties. In a few countries, biology and ecology of some fungi have been studied in some detail, but wild edible mushrooms have, until recently, been relatively ignored by science. In Côte d'Ivoire, the fruiting bodies of Termitomyces fungi - a genus associated with certain termite assemblages - are considered as delicacies for human consumption. They are harvested and marketed and thus constitute a source of income for local communities. Using participatory research methods, Mr N'Golo Abdoulaye Kone will integrate ethno-ecological knowledge with scientific knowledge generated through



studies at field sites to generate information on the biodiversity of these mushroom species. The results of his study are expected to contribute to the formulation of a strategy for sustainable conservation and utilisation of these fungi.

Photos:

[Above] Opened and closed caps of Termitomyces letestui [Right] *IFS grantee, Mr N'Golo Kone of Côte d'Ivoire, during field work collecting the* Termitomyces *mushrooms, on which he does his research.*

[Below] Generation of rural income and non-farm employment: Young women selling the mushrooms along the international highway in N'Zianouan, Côte d'Ivoire.







Contribution to the management of *Isoberlinia spp.* woodlands of the Guinean ecological zone of Togo: diversity, ecology and structure *Isoberlinia doka* and *L tementosa* are widespread woodlar

Isoberlinia doka and I. tomentosa are widespread woodland trees in West and Central Africa. I.doka constitutes the major component of the woodland belt that stretches from Guinea in the west to Sudan and Uganda in the east. They are widely exploited as commercial timber for carpentry, fuel wood and charcoal, medicinal plants and building materials. In spite of their economic importance for local people, information on these forests is lacking. In the West-Sudanian ecoregion of Togo, human pressure threatens the sustainability of these forests, but in the Guinean ecoregion, the tree population is still relatively stable as they are not yet affected by overharvesting. Dr Marra Dourma will study the structure and distribution of Isoberlinia forests in both zones, the ways they are exploited as well as the level and impact and consequences of human activities. Additionally, he will compare the mode of regeneration in the presence or absence of human activities. The project is expected to provide base-line data on these forests in Togo and to generate knowledge that will contribute to the sustainable utilisation and management of these woodlands.

Relationship between the biodiversity in the Guasaganda region of Ecuador and the dietary diversity of local diets

Biodiversity, agriculture, food and nutrition, and ultimately human health, are intimately linked. In recent years, there is greater awareness of the important role wild foods play in contributing to food security and food diversity of many local communities. It is thought that biodiversity facilitates dietary diversity with positive health outcomes. Ms Dolores Peñafiel Anchundia will use a combination of qualitative, quantitative and participatory research methods to document and assess the local uses and values of food biodiversity in relation to the diversification of local diets in a tropical forest in the Guasaganda region in Ecuador. Her study will contribute to increased knowledge of roles and values of wild foods by the local communities.

Isolation and characterisation of extremophilic sulfate reducing bacteria for treatment of acid mine drainage

The Andean region in Bolivia is seriously affected by contamination of ground- and surface-water through mining operations. Metal mines commonly generate



Mr Langa Tembo from Zambia is researching molecular markers related to resistance to ear rot in tropical maize at Makarere University in Uganda and recieved his first IFS Grant in 2010.

highly acidic discharges often containing high levels of potentially toxic metals. However, natural microorganisms may occur in acid mine drainage environments that are able to reduce and detoxify these metals. Ms Maria Alvarez will try to isolate and characterise such micro-organisms for potential future applicaton in bioremediation of environmental pollutants.

Isolation and characterisation of cellulose nanocrystals from agricultural residues for the production of bioplastics

Environmental pollution by non-biodegradable plastic is a global concern. In a response to this threat we have in recent years seen the introduction and increased use of bioplastics. Even more recent is the application of nanotechnology to improve bioplastics from cellulose rich agricultural residues. Ms Melissa Agustin will isolate and characterise nanomaterials from agricultural residues such as rice straw, corn husk and coconut husk that are locally available in the Philippines for possible application as reinforcing filler material in bioplastics. These bioplastics may not only find suitable application in medical and packaging industries but may also contribute to reduced environmental pollution.

Capability enhancing support Research skills workshops and thematic events

In order to become established scientists, capable of undertaking qualified research and meaningfully contributing to poverty reduction and sustainable development in their countries, young scientists need not only to gain knowledge in their specific field of scientific expertise, but also to gain adequate skills and understanding of research methodologies - problem formulation, research design, data handling and analysis - , as well as to gain experience in other critical elements such as science communication and networking, project management, leadership skills.

Therefore, as a second core component of its programme alongside the research grant scheme, IFS provides different forms of capability enhancing support, including research theme specific workshops as well as research skills trainings. The overall aim of these training courses is to better equip young researchers for a science career. For a list of workshops organised by IFS and its partners see Appendix 1.

Research skills workshops

With the aim to help scientists increase their skills in successfully submitting research proposals to funding agencies and getting their research results published in reputable scientific journals, almost 250 workshop participants were trained in important aspects of the scientific writing process.

Eight scientific writing workshops were organised in seven different countries in Africa, Asia and Latin America.

While most workshops attracted participants from a wide variety of scientific disciplines, two workshops were specifically organised for African scientists working on Neglected and Underutilised plant Species (NUS) and



At workshops arranged by IFS, young scientists from developing countries have the opportunity to meet and discuss with established scientists in an international setting. Here, at a Scientific Writing workshop held in Ecuador in 2010.

two other workshops were organised for women scientists only and are described in more detail under the chapter "supporting women in science". For scientists working on NUS, an additional workshop dealt with experimental design and data analysis.

Whereas the focus of the scientific writing workshops differed depending on the previous experiences of the participants, their needs and interests, as well as their expectations, they all provided an introduction to the basic principles of conceptualisation of research projects and the writing of research proposals and scientific publications. All workshops were highly interactive and included, alongside plenary lectures, training modules in the form of individual and group participatory activities.

High response rates to calls for participation in research skills workshops in combination with positive feedback and high satisfaction rates of participants after the workshops, not only confirm that there is high demand for these activities but also demonstrate that they fill an important capability gap.

Thematic workshops

In addition to research skills workshops, IFS also organises thematic workshops. Usually these workshops are arranged in collaboration with partners and, often, they are linked to other activities such as bigger conferences. During 2010, IFS arranged one thematic conference and two workshops in collaboration with partners.

The international conference "Pesticides and other water pollutants" held in Burkina Faso in December 2010 attracted 35 participants, including IFS grantees and advisers as well as potential applicants from different countries in Western and Eastern Africa. The status of present knowledge on pesticides in the different countries and regions, access to scientific equipment, as well as the potential benefits of increased networking, were among the issues addressed at the conference. The conference was co-funded by the International Science Programme (ISP), the Society of Environmental Toxicology and Chemistry (SETAC), the International Organisation for Chemical Sciences in Development (IOCD), and IFS.

One of the workshops, held at Maseno University in Kisumu, Kenya, focused entirely on issues related to global change. The workshop specifically targeted women scientists and is described in more detail under the section "Supporting women in science".

The third workshop "Science outreach: communication and local communities" was held in Zanzibar, Tanzania, in December 2010. The workshop aimed at broadening the understanding of the complex links between coastal social processes and ecosystems in relation to sustainability and development. Special attention was given to the role of interactive communication in order to establish better understanding between villagers and researchers, and to emphasise the need for more reflexivity on the ethics of scholarly engagement in the field and in publications. To this aim, twenty representatives of local coastal communities, all with experience of receiving scientists in their villages, participated in the workshop in addition to more than 60 scientists from countries in the Western Indian Ocean region as well as from countries in the North. The workshop was organised by IFS in collaboration with its partner the Western Indian Ocean Marine Science Association (WIOMSA).

Scientific counseling is a key element of research skills workshops arranged by IFS. Here, scientific writing workshop participant Dr Esmeralda Mariano from Mozambique, discussing her research project with workshop facilitator Prof Henri Verhaaren from Ghent University, Belgium.





Successful networking through IFS/WIOMSA collaboration

In the past four years, IFS had the opportunity to work closely with its partner the Western Indian Ocean Marine Science Association (WIOMSA).

Through funding from Sida, a series of seven workshops and other activities were organised specifically aiming at strengthening partnerships within the global research community. The workshop "Science outreach: communication and local communities" was the last in the series. Young scientists from Sweden working on issues relevant to the sustainable management and utilisation of marine and coastal resources and environments were linked with researchers in Eastern and Southern Africa working on similar topics.

Over the years, a multidisciplinary network has been created in which 50 Swedish scientists and more than 100 in the Western Indian Ocean (WIO) region have been active. Through a combination of workshops on a variety of themes, participation in scientific conferences, and visits to field sites and meetings with local communities as well as with representatives of local government and administration, opportunities were generated for a deeper understanding of the many and often complex issues ruling the lives of people in coastal areas. Participants were introduced to and trained in the utilisation of a variety of research and communication tools and together they identified relevant thematic issues in which scientists could and should play a role, and several research projects were started with funding from other donors. The project had spin-off effects in that more scientists not originally part of the network became involved, thus further strengthening collaboration between scientific institutions in the region and in Sweden.





Supporting women in science

Women all over the world contribute significantly to food production, community development and natural resources and biodiversity management. In doing so, they play a key role in development and are at the centre of meeting the MDGs. It is also widely recognised that science, technology and innovation are a prerequisite to generate knowledge, tools and strategies to meet development challenges. Consequently, it is important not only to promote the opportunities of women scientists in contributing to these endeavors but also to promote the greater participation of women in science. While the 20th century saw more women becoming successful scientists, globally there remains a huge imbalance in the proportion of women in science. It has been shown that their professional progress is slower compared to their male colleagues and they continue to be poorly represented at decision making and management levels in the science, information, technology and engineering sector.

The year 2010 was yet another year in which IFS was proactively reaching out to early- and mid-career women scientists and worked to expand their involvement and participation in science. IFS contributed to increase scientific productivity by women scientists and enhance their research skills and capabilities through awarding research grants and capability enhancing support in the form of participation in training courses and workshops. Regarding the latter, this year's efforts were concentrated in Africa, where support from the IFS regional office – hosted by the Regional Universities Forum for Capacity Building in Agriculture (RUFORUM) – with a remit to specifically support women scientists, proved particularly useful in the planning, administration and organisation of several of the workshops described below.

Fifty-six talented women scientists received grants in a wide variety of research fields related to the sustainable utilisation and management of biological and water resources. Some of the research grants awarded to women scientists in Africa are highlighted below.



IFS grantee Ximena Aguilera (left) from the Universidad Mayor de San Simon in Cochabamba, Bolivia, discussing her research project with Patricia Gill-Kodaka (right) from Lima, Peru, during a study visit to the lab while attending a regional workshop on scientific writing.

In 2010, three training courses and workshops specifically tailored to the needs of women in science were organised by IFS in collaboration with partner organisations. More than hundred women scientists attended these workshops. The workshops attracted researchers working in many different scientific disciplines and generated ample opportunities for the sharing of experiences regarding the challenges and opportunities for career development of women scientists, their roles in science, as well as promotion of interdisciplinary networks.

A workshop in Uganda aimed to provide skills and tools for conceptualizing and writing successful research proposals related to agricultural science and development with a gender perspective. In a workshop in Mozambique, participants were trained to acquire skills and tools for writing and editing scientific papers intended for peer review, for presenting and communicating research evidence to the media as well as to inform agricultural policy development.

The third workshop was a thematic one, held in conjunction with the 26th Greater Horn of Africa Climate



IFS grantee Ms Rahel Muche Kassa (right) interviewing a farmer during a reconnaissance survey prior to selection of case study villages for her project on the effects of land degradation on people's livelihoods in South Wollo, Ethiopia.

Outlook Forum organised by the IGAD Climate Prediction and Applications Centre (ICPAC), held in Kisumu, Kenya. The IFS workshop gathered young women scientists from Eritrea, Ethiopia, Sudan, Kenya, Uganda, Tanzania, Rwanda and Burundi, all working on issues related to climate change. The workshop was organised following the unanimous recommendation by participants attending the IFS hub inauguration meeting in Entebbe, in October 2009, that IFS push an initiative to enhance participation of African women scientists in climate change research.

Research highlights of projects by women scientists

Gender, environment and sustainable development – Understanding the Linkages: the case of the Upper Blue Nile River Basin

The serious degradation of soil and water resources in the Upper Blue Nile Basin in Ethiopia has influenced the livelihoods of millions of people in the upstream as well as the downstream of the basin. Dramatic policy shifts and large scale aid interventions that occurred during the last three decades in response to recurring famines have not improved livelihood security or rural household and have created gendered impacts. Ms Kassa will examine the dynamics of soil erosion as a result of the interaction of social and biophysical processes. Her study aims to better understand how the daily reality of gendered struggles articulates with national and international policy development and implementation. The results of the study are expected to contribute to the development of policy-making, providing new insights and approaches to effective interventions leading to sustainable land and water management and greater livelihood security.



Three young women scientists from Saint Louis University and Benguet State University in the Philippines, attending a scientific writing workshop at the University of Can Tho, Viet Nam.

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Sustainable production of medicinal plants in Madagascar: Dynamics of the growth and bark regeneration in *Prunus africana*

Prunus africana, commonly known as African cherry is a widespread tree in African montane habitats including Madagascar. It provides multiple uses to local people, including the use of its bark in traditional medicines against a variety of ailments. Madagascar is the second largest exporter of bark of *P. africana* which generates more than half of the foreign currency income from medicinal plants in Madagascar. However, due to overexploitation, *P. africana* is now endangered. Ms Harisoa Ravaomanalina will compare different methods for harvesting the bark, and study wound healing and bark regeneration dynamics to design sustainable harvesting strategies for wild and cultivated trees.

Participatory selection and characterisation of *Macrotyloma geocarpum* (Harms) varieties in the context of climate change in Benin

Macrotyloma geocarpum is also known as the geocarpa groundnut, Hausa groundnut, or Kersting's groundnut. It is highly nutritious and its commercialisation generates income for rural households. However, while this crop was once more widely grown, its cultivation has decreased due to a variety of agronomic, genetic, economic and cultural factors. This drought tolerant crop is potentially interesting in the fight against malnutrition, particularly under changing envi-



Biodiversity loss diminishes the supply of raw materials that can be used in natural medicines. Ms Harisoa Ravaomanalina is studying ways to conserve and sustainably manage the African cherry tree (Prunus africana), a tree of Madagascar with medicinal properties.

ronmental conditions. Through farmers' participation, Ms Assogba will identify and document the different varieties that are grown, their distribution, agronomic characteristics, and culture practices. She will also try to identify constraints for the cultivation of the plant and study the agronomic culture requirements. These studies should lead to the identification of the most promising varieties.

Verocytotoxinogenic Escherichia coli and

Salmonella contamination of meat in Burkina Faso Food-borne diseases are a concern for public health worldwide and they are more pronounced in developing

Plants associated with certain arbuscular mycorrhizal fungi can be used to detoxify soils polluted by arsenic. IFS grantee Dr Xin Zhang, China, is watering the mutant wheat she is using to study arsenic uptake, metabolism and detoxification.



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Bringing research results into use involves participation by members of local communities. Here, IFS grantee *Ms Espérance Zossou (centre), discussing her project on the role of radio and video on learning new technologies with local farmers in Benin.*

countries due to poor hygienic conditions. Most of the food-borne enteric infections in Burkina Faso are caused by diarrhoeagenic *Escherichia coli* and *Salmonella* strains. Earlier studies demonstrated high levels of contamination of these zoonotic bacteria in meat. In order to better understand the epidemiology of these infections in and around the city of Ouagadougou, in the present study Ms Kagambèga will compare samples from meat from abattoirs and market, with those from animal faeces samples and from cases of human diarrhoea. Thus she will be able to demonstrate shortcomings in the implementation of hygiene rules and regulations along the meat production and marketing chain and to suggest improvements.

Role of rural video and radio in learning postharvest technologies and their influence on the quality and marketing of local rice in Benin Rice is becoming an important staple food in many West African countries including Benin. Great progress is being made in research on the pre-harvest characteristics of rice. But much remains to be done on post-harvest operations which are income-generating activities for women in rice growing areas. Local rice is not yet competitive on the market because farmers have limited access to information on post-harvest technologies that are being developed. The rapid and continuous development of information technology and communication (ICT) can help meet the challenge of farmers' limited access to information. Ms Zossou will study the importance of rural video and radio in the dissemination of post-harvest agricultural technologies and the relationship between these approaches to extension and marketing of local rice. This will allow policy makers and extension workers to see how the quality and competitiveness of local rice can be improved by learning systems using rural video and radio.

Biological decolorisation of textile wastewater in bioaugmented membrane bioreactors

The need for wastewater reuse in various parts of the world has promoted the development of wastewater treatment technologies and in recent years the application of membrane bioreactors (MBRs) has become an established process option to treat wastewaters. Dr Khelifi from Tunisia is interested to explore the potential of this technology for the treatment of wastewater from the textile industry. In these waters a wide range of dyes and dye metabolites can be found which are expected to be sensitive to bioremediation by microbial consortia. 18

Collaborative activities with IFS partner organisations

At IFS, we believe in working together with others. In 2010 we continued to strengthen collaboration with partner organisations to award research grants and organise thematic and research skills development workshops and other capability enhancing support.

Collaborations aim to boost the capability of young researchers and ensure that the research conducted meets both prescribed ethical and quality standards. Recent efforts undertaken with partners are increasing capability to formulate, implement and evaluate science research, and improving ability to manage research grants, and organise workshops and scientific meetings.

During 2010, IFS contributed to the Consultative Group on International Agricultural Research (CGIAR) and the Earth System Science Partnership (ESSP) Climate Change, Agriculture and Food Security Program. Our role was to contribute to work on 'Building human and institutional capacity for enhancing the conservation and use of Neglected and Underutilised Species of crops in West Africa, and Eastern and Southern Africa'. The work was in partnership with the Regional Universities Forum for Capacity Building in Agriculture (RUFORUM), Uganda, Bioversity International, Italy; the African Network for Agriculture, Agroforestry and Natural Resources Education (ANAFE), Kenya, the Institut de Recherche et de Développement sur la Biodiversité des Plantes Cultivées, Aromatiques et Médicinales (IRDCAM), Benin, the Plant Genetic Resources Research Institute (PGRRI), Ghana, the University of Nairobi, Kenya and University of Malawi, Malawi. The project is funded by the European Union in cooperation with the ACP Science and Technology Programme during 2009-2012.

Joint IFS/COMSTECH Collaboration

Collaboration with COMSTECH (Standing Committee on Scientific & Technological Cooperation of the Organisation of Islamic Cooperation) continued in 2010, focussing on co-funding research grants to young



Figure 1. Ten countries in Sub-Saharan Africa targeted for capability development for research on Neglected and Underutilised Species of crops

scientists in Organisation of Islamic Cooperation (OIC) member countries. After verifying the scientific quality and relevance, eight projects were selected for funding.

Other activities included scientific workshops, support to purchasing of scientific equipment and travel grants for grantees to attend international meetings or training courses to underpin or share their research learning.

Joint IFS/OPCW Collaboration

The Organization for the Prohibition of Chemical Weapons (OPCW) and IFS continued their collaboration by jointly funding research grants for the peaceful use of chemistry and organising a number of scientific events focussing on the achievements of the IFS/OPCW grantees. In 2010 thirteen research projects were funded.

IFS and Syngenta Foundation project on food security and agriculture productivity in Sierra Leone

Food security and agricultural productivity remain fundamental issues across the developing world. With the support of the Syngenta Foundation, IFS organised a scientific methodology workshop on research to improve food security, increase agriculture productivity and production at Njala University in Sierra Leone in December, 2010. The workshop, hosted by Sierra Leone Agriculture Research Institution (SLARI) and Njala University, aimed to increase participants' understanding of scientific methodology, especially the observation of problems, literature searching, the statement of research objectives and hypotheses, and testing of hypotheses through experiments, data analysis, evaluation and sharing findings.

IFS was instrumental in getting access for Njala to the WHO HINARI Programme that enables developing countries to gain access to one of the world's largest collections of biomedical and health literature, and to the AGORA program, set up by the Food and Agriculture Organization of the UN (FAO) together with major publishers, that enables developing countries to gain access to an outstanding digital library collection in the fields of food, agriculture, environmental science and related social sciences. This was achieved through IFS contacts with Information Training and Outreach Centre for Africa (ITOCA), a capacity building organisation aimed at enhancing information and communications technology in South Africa, AGORA in Rome, HINARI in Geneva and Online Access to Research in the Environment (OARE), an international public-private consortium coordinated by the United Nations in Nairobi. IFS supported Njala University and SLARI in Njala to experience a paperless training to the satisfaction of the directors, the vice dean and all participants.

IFS/VLIR-UOS collaboration

During 2010 the partnership between IFS and VLIR-UOS (Flemish Interuniversity Council – University Development Cooperation) was further strengthened through the organisation of four regional workshops for VLIR-UOS partner universities in Africa, Latin America and Asia. Participating universities could select from a variety of research skills topics offered by IFS. All universities aimed for a combination of scientific proposal writing and scientific manuscript writing. The following workshops, accommodating 25 participants each, were delivered by IFS:

- In Maputo, Mozambique, at Universidade Eduardo Mondlane, with participation also from the University of Limpopo and the University of Western Cape, both in South Africa
- In Cochabamba, Bolivia, at Universidad Mayor de San Simon, with participation from Universidad Central Marta Abreu de las Villas, Cuba, and Universidad Nacional Agrária la Molina, Peru
- In Cuenca, Ecuador, at the University of Cuenca, with participation from the Escuela Superior Politecnica del Litoral, Guayaquil, Ecuador, and Anton de Kom University, Suriname
- In Can Tho, Viet Nam, at Can Tho University with participation for Hanoi University of Technology, and Saint Louis University and Benguet State University in the Philippines

Norad

IFS together with Norad organised a thematic seminar entitled "Science for science and/or for social relevance – is there a contradiction?" at the end of October in Oslo. The theme was discussed in a broad academic and developmental context and was also considered more specifically as a contribution to the process of envisioning the 10-year IFS Strategy 2011-2020. The seminar considered questions such as:

- Does science have an inherent social relevance?
- Do the results of good science trickle down into practice and policy development towards improvement of people's livelihood?
- What strategy can equip young researchers with useful information and exposure to both theoretical issues, practical experiences and to enable understanding of research in a broader context?
- How can we equip young researchers to tackle individual science questions and then graduate to interdisciplinary research efforts that are required by the multiple challenges faced in world today?
- How can we turn "science into solutions" and how can we "match scientific understanding to human needs"?
- How can we make sure that science is not increasingly left sitting in books and research papers?"

The seminar was attended by academics from Nordic and developing countries, as well as IFS Trustees, Donor Group and management staff. 20

Measuring results and impact

IFS uses several tools and indicators to follow up grantee performance and their professional development. Performance indicators are, among others, the scientific quality of the grant report and publications as judged by IFS' scientific advisers, career development, supervisory responsibility to PhD and MSc students and participation in scientific conferences. During 2010, IFS received more than 200 scientific reports from individual grantees and 38 reports summarizing the professional developments achieved during the life-time of the IFS support.

Summarizing, 112 manuscripts were published in international journals, 51 elsewhere. During their IFS research period 12 grantees obtained their PhD, 17 were promoted, 18 received national or international awards and have succeeded in getting funding from other sources. In addition to the grantees themselves, 105 scientists working at the grantees' home institutions, 71 scientists from other institutions, 57 technicians and 185 research students have benefited from the IFS grants. Thus, these reports reconfirm that IFS support through individual research grants and capability enhancing support generates a multiplier effect far beyond the individual scientists.

Some examples from 2010:

- IFS/COMSTECH grantee Ms Yang Mooi Lim was awarded the second prize at the International Conference on Natural Products (ICNP), Penang Malaysia, 10-12 December, for the way she presented her research.
- Dr Isel Pascual Alonso from Cuba, informed IFS that she has just obtained the National Chemistry Award in the category for young promising scientists.
- Dr Déo-Guide Rurema became the new Chief of Cabinet at the Second Vice Presidency, Republic of Burundi. As IFS grantee, Dr Rurema worked in Benin. Back in Burundi, he was first Director Research and lecturer in crop protection and biological control.



hoto: A K Thiruvenkada

Many of the world's poor depend on small livestock for their livelihoods. Dr A K Thiruvenkadan (left) in Tamil Nadu, India, received an IFS research grant to characterise the local goat breeds, which are well-adapted to the local environment.

- IFS Cuban grantee, Mr Luis Mazorra attended the Oslo discussions on scientific excellence versus practical relevance, hosted by IFS and Norad. Once returned, he set up a network focussing on innovation and integration of local and scientific knowledge. 'Now young researchers are visiting local communities and working with farmers, consumers and policy-makers. We are impressed how this is changing attitudes and how science can have real impact'.
- Dr Esron Munyanziza wrote 'IFS has made a very significant contribution to my being today and it will remain so. You intervened when I really needed a hand and you freely offered it and that enabled me to get a PhD (and to a large extent life) at a time when it was a slaughter in my country with a target on people of my kind'. A national of Rwanda, he moved to Tanzania where he received two IFS research grants. Upon his return in 2008, he was appointed full Professor at the National University of Rwanda, where he coordinates the MSc programme in Agroforestry and Soil Management and investigates biodiversity, ecology and socio-economic values of native acacia trees.

Scientific infrastructure

The International Foundation for Science was established 'in order to address the stultifying conditions under which younger faculty members in the universities of developing countries were attempting to do research' (Pugwash Conference, Venice 1965). It has worked ever since to provide funds and capability enhancing support for scientists, and for the scientific infrastructure on which they rely.

Since 1983 IFS has offered procurement services for equipment to grantees upon request. Allowing IFS to do the procurement of laboratory instruments, chemicals and supplies has two main advantages for grantees: firstly, lower prices are obtained due to bulk buying arrangements, and secondly, delivery times are reduced.

Today most requests for procurement services come from grantees in Sub-Saharan Africa (Benin, Burkina Faso, Cameroon, Congo, Ghana, Ivory Coast, Kenya, Niger, Nigeria, Sudan, Togo and Zimbabwe) and Cuba, with only around 7 per cent from Asia. In 2010, IFS assisted 134 individual grantees with procurement matters and placed 158 orders at a value of SEK 3.8 million for 75 of them. The number of grantees using our procurement services is rather stable since 2007.

In addition to its procurement support to individual grantees, IFS continued its pioneering approach to participatory 'procurement, installation, service and maintenance' (PRISM) of scientific equipment to support educational, research and development efforts in selected Nigerian and Madagascan universities. With support from the MacArthur Foundation, IFS has developed and is piloting a new approach to equipment procurement and management at the institutional level.

IFS has facilitated an inventory of the current status of equipment and scientific infrastructure at six selected universities in Nigeria and Madagascar, coordinated the purchase of equipment and maintenance programs and continuously monitored and evaluated the project in order to provide follow up support.



Access to modern laboratory equipment is vital to many research projects like that of Mr Borys Chong Pérez studying disease resistance of the banana in Cuba.

In 2010, the new approach to equipment procurement funded by MacArthur Foundation was tested by the IFS PRISM project in Ahmadu Bello University, Bayero University, Institut Malgache de Recherches Appliquées, University of Antananarivo, University of Ibadan and University of Port Harcourt.

There are a range of operational and financial aspects related to procurement, which PRISM is addressing. For example: the development of a stakeholder committee to encourage participatory assessment of need, discussion of issues around the selection of research topics and equipment needs, the selection of new equipment to procure, shipping procedures, equipment repair and maintenance, insurance, installation, training, decommissioning procedures and monitoring and evaluation of equipment procurement and the efficacy of the PRISM approach. A participatory assessment and bulk purchase approach has placed 46 orders at a value of SEK 12.8 million.

Taking time to reflect and shape the future

During 2010, and in to 2011, the International Foundation for Science undertook a time-bound process to envision how the shape and direction of the organisation could best support early career scientists in the least developed countries.

The envisioning process was highly participatory. IFS conducted three Regional Consultation Meetings in Merida, Bangkok and Kampala, and nine ad hoc consultation meetings in connection with already planned meetings, workshops and conferences in Can Tho, Kampala, Mombasa, Nairobi, Njala, Ouagadougou and Zanzibar. A digital questionnaire survey was also sent to all IFS stakeholders. In all 274 people attended the consultations, contributing ideas from 43 countries. Fifty six per cent were drawn from Africa, 20% from Asia and the Pacific, 10% from Latin America and 14% from Europe. The desire to work together, with early career scientists in developing and developed countries, policy makers, entrepreneurs and other knowledge brokers was made very clear.

A further 4,100 people from 142 countries responded to the digital survey. Of these 50% were drawn from Africa, 30% from Asia and the Pacific and 20% from Latin America. Of the respondents, 70% were male and 30% female, 30% were active or former IFS grantees and 20% were IFS advisers. The remainder comprised representatives of donors, partner organisations and others. Clear quantifiable responses were elicited. The strongest agreements were: to continue to provide individual renewable research grants, to support collaborative research and support to put research into use.

In envisioning our strategy we also reflected on the recommendations of all independent reviews commissioned to date by IFS (Sagasti, Oldham, Thiongane and Vorauri, 1983; Castillo, Head and Matos, 1993; Cetto, Freyvogel, Touré and Thulstrup, 2001 and Muraguri-Mwololo, Schertenleib and Svensson, 2010). These reviewers have acknowledged the cost and complexity, but highlighted the vital importance of small grants provision to individu-



This Regional Consultation Meeting was held in Merida, Mexico, as part of the IFS envisioning process in 2010. Three such meetings as well as nine smaller ones and a broad digital survey, provided input to the development of a new strategy for IFS.

als, to bridge the gap between attaining a graduate science degree and becoming a research scientist. There has been a consistent recommendation to integrate interdisciplinary approaches into IFS and to encourage grantees to use their knowledge in support of development.

Key issues addressed included:

- Eligibility criteria for IFS support, around recipients' age, academic degree when entering the IFS programme, institutional affiliation and country of origin.
- Ways to contribute to gender balance within IFS and ways to empower women scientists.
- The interest in/need for continued support to individual scientist versus the need for collaborative research in order to address the complex challenges in developing countries.
- The type of capability enhancing support needed to empower individual scientists as well as those carrying out collaborative research and to engage in the global research agenda.

The 10-year strategy is summarised in this special annual report. For full details please consult www.ifs.se.

Rapport annuel 2010 résumé

En 2010, nous avons connu plusieurs changements dans nos personnes ressources. Tout d'abord, le Directeur de la fondation, M Michael Stahl, a pris sa retraite en août et a été remplacé par Mme Nighisty Ghezae, Directeur des Programmes, jusqu'à la nomination en octobre 2010 du nouveau Directeur, M Graham Haylor. Au même moment, M Jurg Pfister a remplacé la Présidente sortante du conseil d'administration, Mme Ana Mariá Cetto partant à la retraite et M Olanrewaju Babatunde Smith, a été nommé vice Président. La fondation a aussi fait ses adieux à Mme Sara Feresu et a accueilli deux nouveaux membres au conseil, Mme Edith Taleisnik et M Yunus Mgaya.

Suite à une évaluation externe conclue en 2010, l'IFS a entrepris un processus participatif, ayant pour but de définir la prospective de la fondation pour un meilleur soutien aux jeunes chercheurs en début de carrière des pays les moins développés. Nous avons mené des réunions de consultations régionales au Mexique, en Thaïlande et en Ouganda et des réunions de concertation ad hoc dans le cadre de toutes nos réunions, ateliers et conférences de l'année; au total 274 personnes provenant de 43 pays y ont participé. La volonté de travailler ensemble avec d'autres chercheurs en début de carrière, avec des scientifiques de pays en développement et de pays développés, avec des responsables politiques et des entrepreneurs a été posée d'une façon très claire. Plus de 4100 personnes issues de 142 pays ont répondu à un sondage fait par courriel. La réponse la plus fréquente concerne la poursuite des bourses de recherche individuelles renouvelables, le soutien au modèle de recherche collaboratif et l'aide à la mise en application des résultats de la recherche.

De ce fait, cette année, le rapport annuel de l'IFS est particulier. Dans la continuité des précédents, il vise à faire connaître les activités, les réalisations et l'aspect financier de 2010, mais de façon singulière il résume aussi notre vision pour la prochaine décennie. La première section présente les types de recherches individuelles dans le contexte des ressources biologiques et l'eau, que la fondation a soutenus depuis près de 40 ans et qui se poursuivront dans la stratégie des 10 prochaines années grâce à l'octroi de bourses de recherche et au renforcement des capacités scientifiques. Cette partie met l'accent sur les projets individuels de recherche IFS sélectionnés, sur notre travail avec des partenaires, sur nos efforts particuliers pour soutenir les femmes scientifiques, sur nos efforts pour améliorer les infrastructures, ainsi que sur les résultats issus de tous ces efforts.

La deuxième section résume notre nouvelle stratégie. L'objectif principal de l'IFS demeure la promotion de l'excellence scientifique grâce à l'attribution de bourses de recherche en début de carrière et le développement des capacités scientifiques en investissant sur les chercheurs de nos pays prioritaires. Toutefois, dans un monde interdépendant des défis mondiaux et des solutions solidaires, nous croyons qu'il est de plus en plus important de travailler ensemble. C'est pourquoi, dans notre stratégie 2011-2020, nous apporterons également notre soutien aux équipes de recherche interdisciplinaire, en combinant les forces des chercheurs, leur expertise et leur expérience, pour répondre à un sujet plus vaste ou un thème de recherche nécessitant plusieurs disciplines. Un changement majeur dans notre approche est, non seulement de renforcer la capacité de ceux qui débutent une carrière de chercheur dans les pays en voie de développement mais aussi d'apporter un soutien aux jeunes scientifiques dans leur action en fonction de leurs propres valeurs et objectifs; en d'autres mots, promouvoir l'évolution des scientifiques hommes et femmes très tôt dans leur carrière dans les pays en voie de développement afin qu'ils mettent en application leur connaissance scientifique.

IFS Board of Trustees 2010

IFS would like to thank the outgoing Board of Trustees Chair, until October 2010, Prof Ana María Cetto. The relationship between Professor Cetto and IFS has been long and varied and included her conducting an excellent review of the foundation on which we have drawn in the development of the new 10-year strategy. Of course it is with great pleasure that we welcome the former Donor Group Chair,

Prof Ana María Cetto, Mexico Deputy Director General, Head of Technical Cooperation Department, IAEA (International Atomic Energy Agency) Vienna, Austria (Chair) [until October 2010]

Dr Jürg Pfister, Switzerland Secretary General, Swiss Academy of Sciences Bern, Switzerland (Vice Chair) [until October 2010] (Chair) [from October 2010]

Prof Olanrewaju Babatunde Smith, Nigeria Consultant Ottawa, Canada (Vice Chair) [from October 2010]

Prof Dr Ahnond Bunyaratvej, Thailand Secretary General, NRCT (National Research Council of Thailand) Bangkok, Thailand

Prof Eckart Ehlers, Germany Professor Emeritus, University of Bonn Bonn, Germany

Dr Wenche Barth Eide, Norway Associate Professor, University of Oslo Oslo, Norway

Prof Torbjörn Fagerström, Sweden Senior Adviser, SLU (Swedish University of Agricultural Sciences) Uppsala, Sweden

Prof Sara Feresu, Zimbabwe [until October 2010] Director, Institute of Environmental Studies University of Zimbabwe Harare, Zimbabwe Board of Trustees Vice Chair and long standing Trustee, Dr Jürg Pfister, as the incoming Chair. We are delighted that Prof Olanrewaju Babatunde Smith becomes the new Vice Chair.

IFS bids farewell also to Prof Sara Feresu after many years of excellent service and welcomes new Trustees Prof Yunus Mgaya and Dr Edith Taleisnik.

Dr Jean-Francois Giovannetti, France Senior Scientific Adviser Ministry of Foreign and European Affairs (MAE) Paris, France

Dr Ernesto Medina, Nicaragua Rector, Universidad Americana Managua, Nicaragua

Dr Yunus Daud Mgaya, Tanzania [from October 2010] Professor, Aquatic Sciences and Fisheries University of Dar es Salaam Tanzania

Prof Dr Atta-ur-Rahman, Pakistan Coordinator General, COMSTECH (Standing Committee on Scientific and Technological Cooperation of the Organisation of Islamic Cooperation) Islamabad, Pakistan

Dr Edith Taleisnik, Argentina [from October 2010] Research Fellow, CONICET (National Research Council of Argentina) Córdoba, Argentina

Prof Dr Yola Verhasselt, Belgium Secrétaire perpétuelle Académie Royale des Sciences d'Outre-mer Brussels, Belgium

Dr Michael Ståhl, Sweden [until August 2010] Director, International Foundation for Science Stockholm, Sweden (Ex-officio)

Dr Graham Haylor, Sweden [from October 2010] Director, International Foundation for Science Stockholm, Sweden (Ex-officio)

IFS staff 2010

Ms Heli Andersson [from Sept. 2010] Manager, Database and Statistics

Dr Jane Bemigisha Programme Manager IFS Eastern Africa Hub (Uganda)

Mr Ulf Edin [from February 2010] Head of Administration

Ms Rumila Edward Programme Administrator, Water Resources

Ms Annika Eriksson Programme Administrator, Animal Production and Aquatic Resources

Ms Eva Gerson [until April 2010] Head of Finance and Administration

Dr Nighisty Ghezae Head of Programme **Dr Richard Hall** Scientific Programme Coordinator, Forestry/Agroforestry and Crop Science

Dr Graham Haylor [from Oct. 2010] Director

Dr Ulrika Huss Melin Scientific Programme Coordinator, Natural Products

Dr Ingrid Leemans Scientific Programme Coordinator, Animal Production and Aquatic Resources

Ms Ingrid Lindhe Programme Administrator, Crop Science

Ms Petronella Nyakundi [until June 2010] Programme Administrator, Forestry/Agroforestry

Ms Nathalie Persson Andrianasitera Scientific Programme Coordinator, Food Science Ms Liliane Plaie Administrative Assistant

Ms Sirilak Pongpatipat Accounting Administrator

Mr Brian Porter Manager, Network and Information

Ms Dina Rakotonirina Andersson Scientific Programme Coordinator, Social Sciences

Ms Eva Rostig Programme Administrator, Natural Products

Dr Michael Stahl [until August 2010] Director

Ms Pirkko Tolamo Office Manager

Dr Cecilia Öman Scientific Programme Coordinator, Water Resources

Change of IFS Director

We are sure that all of the IFS constituency would like to join us in thanking the former IFS Director, for his contribution to the foundation. Dr Michael Ståhl who retired in August was replaced by the Head of Programme at IFS, Dr Nighisty Ghezae who acted until the IFS Board of Trustees appointed in October Dr Graham Haylor as Director of IFS.

Graham Haylor, a British citizen, studied in the UK, receiving an honours degree from University of Liverpool in Marine Biology, an MSc in Aquaculture and Fisheries Management and a PhD in tropical aquaculture science both from University of Stirling. He has a long background in international development work, most recently as Senior International Development Specialist and Director of Business Development at Natural Resources International (NRIL) in the UK.

He has led and worked on many research and development programmes and projects in Europe, Africa and Asia. Whilst Dr Haylor's technical background is in the fields of fisheries and aquaculture, his career has taken him into researching and working in support of poverty alleviation, livelihoods-based development approaches and communications. He has worked in collaboration with governments, development agencies, donor organisations, researchers, farmers and fishers. As an academic, independent consultant and programme director he has worked with universities, national, international and regional organisations and donors.

Excerpt from the Audited Financial Statement 2010

The Board of Trustees and Director submit the annual financial statement for the year ended 31 December 2010.

Administration Report

Information about the activities

2010 has been an interesting year at IFS. The IFS Director, Michael Stahl retired in August and the Head of Programme at IFS, Nighisty Ghezae acted until the current Director, Graham Haylor assumed the post in October. This coincided with the response of IFS to last years' review and the launch of the recommended 'envisioning process' regarding our future strategy. In addition, in September the Agriculture Team of the Research and Evidence Division of the UK Department for International Development advised that, due to the ratio of their staff to their administrative burden, DFID would cease the current core funding to IFS and other organisations to which they give relatively small amounts of funds. They stressed that they value the work of IFS and that the decision was based solely on their current administrative difficulties. In October, Norad informed IFS that their financial commitments for 2011 do not allow for any core funding for IFS in 2011. Following negotiations, Norad has been able to increase its support to activities strengthening female researchers and gender related issues in connection with the IFS core foci including the HUB at the Makerere University in Uganda. In response IFS proposed and received a budget increase of 2 million NOK for 2010 and anticipates that a further allocation of NOK 3 million will be made available from April 2011. Norad expressed support for the IFS work and the important commitment in academic fields of importance and relevance in fighting poverty through enhancing sustainable knowledge and management of biological and water resources.

It is important to flag up that Sida, which provides significant core funding to IFS, is undergoing reorganisation and has extended the period of the most recent tranche of funding to IFS to March 2011, pending negotiations around future support. In March 2011 a new head of the Unit for Global Research which provides support to IFS will take up his position. A concept note outlining the future direction of IFS will be discussed with Sida ahead of the finalisation of the envisioning.

In the midst of these changes, for the year 2010, IFS provided support to 1700 young scientists in developing countries in the form of research grants, feedback on research proposals including the failed applications, assistance in the purchasing of equipment and supplies, arrangement of workshops and training courses, and network support. One hundred and seventeen (117) new research grants were awarded while 13 skill-building workshops were arranged for altogether 435 young scientists.

In addition, programme services included two annual meetings each of the eight Scientific Advisory Committees which assess the new research grant applications and recommend the high quality applications for funding. Programme services also include staff costs and allocated general and administrative costs to provide this support. Programme services expense totalled SEK 34 720 287, (EUR 3 857 810) or 87% of total expense for the year 2010.

The IFS granting process includes the receipt and registration of the research grant applications and the internal pre-screening of all proposals. Thereafter, applications are sent to internationally established scientific advisers and experts for comment (IFS has approximately 1400 advisers in its database). The proposals are then reviewed and prioritised at the meetings of the Scientific Advisory Committees (SAC); these meetings are held twice each year with the participation of advisers. Upon the recommendations of the SACs, the IFS Director approves the research grants for funding. Thereafter, the Secretariat draws up the contracts for signature by the grantee, head of institution and the IFS Director. During the research period (one to three years, renewable twice), IFS provides supporting services to the grantees.

The advisers and experts evaluations of proposals do not receive remuneration for reviewing nor for the SAC meetings. These contributed services are not reflected in this report.

In 2010 IFS continued to pilot a regional office (hub) for Eastern Africa located on the campus of Makerere University, Kampala, Uganda and hosted by the Regional Universities Forum for Capacity Building in Agriculture (RUFORUM). The hub is staffed with one locally employed programme manager. It provides services to IFS grantees and applicants in the region.

Financial Result

The financial result for the year is a surplus of SEK 3 487 359 (EUR 387 484).

Recommendation for the disposition of the net result

Balance, 1 January	2 918 868	(EUR 324 319)
Board Designated Fund for Contingencies	800 000	(EUR 88 889)
Net Income less Expense for the Year	3 487 359	(EUR 387 484)
	7 206 227	(EUR 800 692)

The Board of Trustees and Director recommend that the accumulated surplus is carried forward to the following year.

7 206 227 (EUR 800 692)

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.

Notes

Accounting Principles

The evaluations and assessments are in accordance with generally accepted accounting principles in Sweden. The Financial Statement is in conformance with the laws on annual financial reports and is consistent with the prior years.

Accounting for Contributions

The IFS programme is funded annually by various donor organisations. Some of the contributions are unrestricted (Core Funds) and some contain restrictions on their use (Donor Restricted Funds).

Core Funds

Core funds are used for all aspects of the on-going operations of IFS. Core funds are recorded at the time of official notification by the Donor on the accrual basis of accounting.

Donor Restricted Funds

Donor restricted funds are used in accordance with the restrictions placed by the contributor. Donor restricted funds are recorded at the time of official notification by the Donor as deferred revenue. These deferred revenues are accounted for as self-balancing funds and the Restricted Contributions are recognised in the year in which the related expenses are incurred (utilised).

Contributions not received as of 31 December are accounted for as Donor Receivables.

Research Grants

Research grants are recorded as grant expense and as a liability at the time that the grants are approved by the Director.

Receivables

Receivables are recorded according to an assessment of the amounts that are anticipated to be received.

Foreign Currency

Receivables and liabilities in foreign currency are accounted for in Swedish Crowns at the exchange rate as of the date of the Balance Sheet.

Equipment, Furniture and Fixtures

Equipment, furniture and fixtures are recorded at cost and depreciated using the straight line method over a period of five years.

Short-term Investments

Short-term investments contain securities and are accounted for at book value.

Leasing Agreements

Leasing agreements, irrespective of whether they are financial or operational, are accounted for as ordinary operational leases therefore the expenses are recorded as they are paid.

STATEMENT OF INCOME AND EXPENSE

(in thousands SEK)

	1 January - 31 December 2010	1 January - 31 December 2009
	2010	2007
Programme Revenue		
Core and Restricted Contributions	42,910	66,339
Grants Withdrawn	431	441
Other Programme Revenue	217	170
Total Programme Revenue	43,558	66,950
Programme Expense		
Programme Services	34,720	60,042
Fundraising and Partnership Building	2,177	1,782
Management and General	3,003	2,791
Total Programme Expense	39,900	64,615
Programme Income less Expense	3,658	2,335
Interest Income and Expense		
Interest Income	35	210
Interest Expense	0	10
Exchange loss	206	86
Interest Income less Expense	-170	114
Net Income less Expense	3,487	2,449

BALANCE SHEET

(in thousands SEK)

	31 December	31 December
	2010	2009
Assets		
Fixed Assets		
Tangible Assets		
Equipment, Furniture and Fixtures	257	319
Financial Assets		
Long-term Donor Receivables	432	678
Total Fixed Assets	689	997
Current Assets		
Current Receivables		
Donor Receivables	3,124	3,997
Other Current Receivables	929	587
Prepaid Expense and Accrued Income	726	854
Total Current Receivables	4,778	5,438
Short-term Investments	0	18,993
Cash and Bank Balances	28,497	6,336
Total Current Assets	33,275	30,767
Total Assets	33,964	31,764
Equity and Liabilities		
Equity		
Board Designated Fund for Contingencies	800	800
Total Designated Fund	800	800
Unrestricted Equity		
Balance, 1 January	2,919	470
Net Income less Expense for the Year	3,487	2,449
Total Unrestricted Equity	6,406	2,919
Total Equity	7,206	3,719
Current Liabilities		
Research Grants Payable	6,570	14,170
Deferred Restricted Contributions	15,651	9,551
Accounts Payable	86	705
Other Current Liabilities	764	1,084
Accrued Expense and Prepaid Income	3,686	2,535
Total Current Liabilities	26,758	28,045
Total Net Assets and Liabilities	33,964	31,764
Pledged Assets: provision for credit cards	400	400
Contingent Liabilities	None	None

IFS Affiliated Organisations 2010

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 (ÖAW)

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)

• Fundaçao 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 Invest-

ment and Economic Cooperation

Denmark

Akademiet for de Tekniske Videnskaber (ATV)
Det Kongelige Danske Videnskabernes 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)

Madagascar

 Académie National Malgache

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 (CONA-CYT)

Mongolia

 Mongolian Academy of Sciences

Morocco

 Centre National de Coordination 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-Akademi (DNVA)

Pakistan

 Pakistan Council for Science and Technology (PCST)

Panama

Secretaria Nacional de Ciencia y Tecnologia e Innovación (SENACYT)
Universidad de Panamá

Papua New GuineaThe University of Papua New Guinea

Peru

• Consejo Nacional de Ciencia y Tecnología (CONCYTEC)

PhilippinesNational 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 (PEDEC-IBA)

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

 Scientific 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)

- Institut 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 Agronónomico 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

• International Water Man-

agement Institute (IWMI)

· World Fish Center

Research in Agroforestry

(ICRAF)

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Events arranged by IFS and its partners 2010

The following workshops in research skills and key scientific issues, arranged by IFS and its collaborating partners during 2010, were attended by more than 350 scientists, including IFS grantees, applicants and potential applicants:

Country	Event		
Benin	Research skills workshop (EU-ACP workshop proposal writing)		
Bolivia	Research skills workshop (proposal writing and manuscript writing)		
Burkina Faso	International Pesticide Conference		
Ecuador	Research skills workshop (proposal writing and manuscript writing)		
Kenya	a Climate change and gender		
Mozambique	Research skills workshop (IFS/AWARD workshop scientific writing and communication)		
	Research skills workshop (proposal writing and manuscript writing)		
Sierra Leone	Research skills workshop (scientific methodology and proposal writing)		
Tanzania	IFS/WIOMSA workshop "Science outreach: Communication and local communities"		
Uganda	Research skills workshop (IFS/AWARD workshop proposal writing)		
	Research skills workshop (EU-ACP workshop research design and data management)		
Vietnam	Research skills workshop (proposal writing and manuscript writing)		

IFS research grants awarded 2010

In 2010, IFS awarded 112 Research Grants (117 were approved, but 5 were cancelled or withdrawn for various reasons) to scientists in 39 countries; 90 were first grants and 22 were renewal grants; 50% were awarded to women.

Country	Grantee	Research Project Title
Benin	ASSOGBA, Kossigbé Epiphanie Prisca	Caractérisation morphologique et évaluation agronomique participative des variétés de <i>Macrotyloma geocarpum</i> (Harms) du Bénin pour leur meilleure utilisation dans le contexte des changements climatiques
	DJOSSA, Agossou Bruno	Etude de la pollinisation du baobab (<i>Adansonia digitata</i> L.) par les chauves-souris au Bénin: implications pour la conservation de l'espèce
	EDON A, T Solange	Evaluation quantitative de la consommation et production foliaire et racinaire du baobab à des fins de domestication
	SOSSA VIHOTOGBE, Carole	Transformations culinaires et biodisponibilité des nutriments de quatre espèces de légumes feuilles: <i>Ceratotheca sesamoïdes, Sesamum radiatum, Justicia tenella</i> et Acmella uliginosa
	WOROU, O Nadine	Evaluation and simulation of rotation/fallow systems for the upland rice cultivars NERICA cropping according to different agroecological zones in Benin Republic
	ZOSSOU, Espérance	Rôle de la vidéo et des radios rurales dans l'apprentissage des technologies post-récoltes du riz local et influence sur la qualité et la commercialisation du riz local au Bénin
Bhutan	THAPA, Nirmal Kumar	Surveys on transmission dynamics of <i>Echinococcus granulosus</i> in definitive and intermediate hosts in Bhutan
Bolivia	ALVAREZ , Maria Teresa (Renewal grant)	Isolation and characterisation of extremophilic sulfate reducing bacterial consortia or sulfate reducing bacteria as a part of a treatment system for acid mine drainage
Brazil	ALFENAS-ZERBINI, Poliane	Involvement of translationally controlled tumor protein (TCTP) during the initial steps of tomato infection by potyvirus
	ESTRADA, Gustavo CALDERUCIO DUQUE	Carbon sequestration by mangrove forests: spatial and temporal variability
	NEVES, Josiane Sabbadini	Evaluation of the anti-allergic properties of 7-epiclusianone - a tetraprenylated benzophenone isolated from <i>Garcinia brasiliensis</i>
Burkina Faso	BAKOANE, Alexis	Détermination du statut de peste, du cycle de vie et perspective de contrôle de <i>Salebria</i> sp. (Lépidoptère: Pyralidae), foreur des rameaux florifères et les fruits du karité (<i>Vitellaria paradoxa</i> C.F. Gaertn.) au Burkina Faso.
	KAGAMBÈGA, Assèta	Evaluation de la contamination des viandes de grandes consommations par les <i>E. coli</i> verocytotoxinogène (VTEC) et les salmonelles en vue de la protection de la santé des consommateurs
	KEÏTA, Amadou	Flow process study and optimum drainage of the inter-hills irrigation scheme of Moutori, Burkina Faso
	KOUTOU, Mamadou	Molecular characterisation of betasatellite DNA molecules associated with begomovirus species in Burkina Faso
	NARE, Rayim-Wendé Alice	Etude des effets des amendements organiques sur la bioremédiation des sols pollués par les pesticides
	YAMEOGO, T Jérôme	Effets de quelques techniques de Conservation des Eaux et des Sols (CES) sur la régénération naturelle assistée et sur le rendement du sorgho sur un sol ferrugineux tropical lessivé en zone soudanienne du Burkina Faso.

Burundi	BANYANKIMBONA, Gaspard	The fish diversity of the Burundese rivers and the impact of human activities on this ichthyofauna
Cameroon	BAKWO FILS, Eric Moise	Observation on the role of frugivorous bats as seed dispersers in the Sahelian zone of northern Cameroon
	FAI, Patricia Bi Asanga	Ecotoxicological effects and risk assessment of pesticides used by rice farmers in Ndop, North West region, Cameroon
	FOFIRI NZOSSIE, Eric Joël	Impact des exportations agricoles sur la sécurité alimentaire du Nord- Cameroun
	FOUEPE TAKOUNJOU, Alain L (Renewal grant)	Influence des changements climatiques sur le mode de circulation et les mécanismes de contamination des ressources en eau souterraine du bassin de l'Anga'a - Yaoundé
	KONSALA, Souare	<i>Xylopia aethiopica</i> A. Rich. dans le Parc National du Mbam et Djerem et sa périphérie: impact socio-économique, écologie et conservation
	MFOPOU MEWOUO, Yvette Clarisse	Impact des apports atmosphériques sur la qualité des eaux de surfaces et des sols en zone tropicale humide du Sud Cameroun
	NTANGMO TSAFACK, Honorine	Durée de survie d' <i>E. coli</i> , d'oeufs d'helminthes et de kystes de protozoaires contenus dans les eaux d'arrosage, dans les sols marécageux et sur les cultures maraîchères (laitue, carotte, aubergine), en zone tropicale humide
Chile	CHAVEZ, Renato (Renewal grant)	A wild-type Chilean strain of <i>Penicillium purpurogenum</i> as a potential system for heterologous production of proteins of biotechnological interest
China	FENGJIE, Cui	Development of a low cost solid state anaerobic digestion system for methane production from wheat straw
	WANG, De-Yi (Renewal grant)	Study on the novel fire retarding bio-based polymer poly-lactic-acid (PLA) nanocomposites with high performance and their mechanism of actions
	ZHANG, Xin	Arsenic uptake, metabolism and detoxification in plants associated with arbuscular mycorrhiza fungi
Colombia	CASTILLO-CÁRDENAS, María Fernanda (Renewal grant)	Analysis of floral morphology and cytogenetic patterns of the two climatic ecotypes detected in the neotropical mangrove species <i>P. rhizophorae</i>
Congo	IFO, Suspense Averti (Renewal grant)	Stocks et flux de carbone au sol dans quatre forets tropicales du Congo
	MAKOUANZI EKOMONO, Chrissy Garel	Composantes de la variance génétique et de l'interaction génotype x environnement de la qualité du bois et des déterminants écophysiologiques de la croissance d'eucalyptus hybrides en République du Congo
Congo, D R	MALUMBA KAMBA, Paul	Elaboration d'une gamme de malt de sorgho utilisable dans la fabrication des bières du Congo
Cote d'Ivoire	ASSOHOUN, Nanouman Marina Christelle	Etude des potentialités des bactéries lactiques isolées du "doklu" (aliment traditionnel fermenté) à la biopréservation d'aliments à base de céréales
	DABONNE, Soumaila	Valorisation des microorganismes fermentaires du tube digestif des castes (soldats et ouvriers) de termites (<i>Macrotermes subhyalinus</i> et <i>Macrotermes bellicosus</i>): Contribution à l'amélioration des ferments alimentaires traditionnels.
	EHOUMAN, N'guetta Moïse	Distribution spatiale et interaction vers de terre végétaux dans 3 faciès de végétation
	KONE, Ngolo Abdoulaye	Cartographie des zones de fructifications et estimation de la diversité des champignons du genre <i>Termitomyces</i> en Côte d'Ivoire
	KOUAME, Kouassi Innocent	Impact de l'agriculture péri-urbaine sur la qualité des eaux souterraines de Songon (Abidjan, Côte d'Ivoire)
	SORO, Amenan Anastasie	Selection and production of dried starter cultures of predominant lactic acid bacteria and yeasts isolated during the fermentation of tchapalo, a sorghum beer in Ivory Coast

Cuba	ARMENTEROS, Maickel (Renewal grant)	Relationships between macro- and meiobenthic (nematodes) biodiversity and ecosystem functioning as revealed by microcosm
	CARPIO GONZÁLEZ, Yamila	Cloning and characterisation of the RAG-1 gene as marker for early development of the immune system in the tilapia <i>Oreochromis niloticus</i>
	CHONG PÉREZ, Borys	Development of marker-free transgenic banana plants expressing Arabidopsis GDSL LIPASE-LIKE1 (GLIP1) and evaluation of the response against <i>Mychosphaerella fijiensis</i> infection
	FALCÓN RODRÍGUEZ, Alejandro Bernardo (Renewal grant)	Preparation and research of chitosans of different molecular weight in a reactor system: their biological properties to maximise crops efficiency
	GARCÍA FERNÁNDEZ, Rossana (Renewal grant)	Structure-function relationship studies of the recombinant protease inhibitor ShPI-1: Obtainment of more selective mutants for biochemical studies and with potential applications in biomedicine
	GUERRA BORREGO, Yasel	Molecular and functional characterisation of two natural product protease inhibitors as potential lead compounds for malaria chemotherapy
Ecuador	PEÑAFIEL ANCHUNDIA, Dolores Daniela	The relationship between the biodiversity present in the Guasaganda region of Ecuador, and the dietary diversity of local diets
Egypt	EL-SHAROUD, Walid (Renewal grant)	Probing stress responsive genes in natural Campylobacter jejuni isolates
	YACOUB, Hoda (Renewal grant)	Epiphytes and phytoplankton impacts on <i>Najas</i> spp. the main fodder resource for bedouins in Wadi Allaqi Biosphere Reserve, Lake Nasser, Egypt
	ZAYED, Mervat Farag	Bioassay-guided fractionation of two Egyptian traditional medicinal plants; <i>Cymbopogon citratus</i> and <i>Hyphaene thebaica</i> , on the basic of anti-schistosomiasis effect
Ethiopia	KASSA, Rahel Muche	Gender, environment and sustainable development: understanding the linkages: the case of the upper Blue Nile River Basin
Fiji	SUKAL, Amit Chand	<i>In vitro</i> virus elimination from Taro (<i>Colocasia esculenta</i>) for conservation and the safe international exchange
Ghana	ANTWI-AGYEI, Philip	Vulnerability and adaptation of Ghana's food production systems to climate variability and change
	DICKSON, Rita Akosua	Antipediculosis properties of five medicinal plants sourced from Ghana
India	DAHIYA, Pradeep	Technological options for the production of enriched mung bean based food geared to consumer sensory preferences
Kenya	AMBUKO, Lukhachi	Enhancing the postharvest shelf life of passion fruits grown under different agro-ecological conditions through application of an ethylene inhibitor, 1-methylcyclopropene (1-MCP)
	NJAGI, Joyce Gatiiria	Distribution of organochlorines (OCs) in selected aquatic matrices from the upper Tana River in Kenya
	NYAMBEGA, Benson C. O.	Functional characterisation of trypanolysin at the trypanosome - tsetse interface
	ODHIAMBO, Ruth Akech	Synthesis of binucleating macrocycles incorporating thiolato and polyether components fused to 1,10-phenanthroline as sensors for soft heavy metal
	OMUTO, Christian Thine (Renewal grant)	Design of a framework for monitoring soil physical degradation in arid and semi-arid eastern Kenya
	OWINO, Eunice Anyango	Field evaluation of Limburger cheese and African traditional milk cream in combination with lactic acid and carbon dioxide as attractants in sampling African malaria vectors
	RECHA, Charles S.w	Evaluation of rain water harvesting and conservation techniques among smallholder farmers in semi-arid eastern Kenya

APPENDIX 2

Madagascar	ANDRIAHARIMALALA, Onja Hariveloniaina Morilline	Interrelations fleurs - pollinisateurs chez le genre <i>Adansonia</i> (Malvaceae) à Madagascar : Contribution à l'étude des mécanismes de la pollinisation et des phénomènes d'introgression génétique
	RABETOKOTANY, Nantenaina	Matières organiques issues de l'élevage et de la ville en milieu tropical: Apports de la spectrométrie proche infra-rouge (SPIR) pour orienter leurs usages agronomiques et/ou énergétiques
	RASOAMANANA, Noromalala Elysée	Etude de la pollinisation et des interactions pollen-pollinisateur chez les baobabs malgaches
	RAVAOMANALINA, Bako Harisoa	Production durable de plantes médicinales en Afrique subsahélien: Dynamique de croissance et de régénération de l'écorce de <i>Prunus africana</i>
	RAZAFINDRATSIMA, Onja Harinala	Functional difference among a guild of lemur species: Effects on their host-plant dynamics
Malawi	TEMBO, David Tryson Wadenya	Effect of ripening and storage time on nutritional attributes of <i>Uapaca kirkiana</i> fruits of Malawi
Morocco	TAJDI, Amina	Utilisation des données de satellites pour une gestion optimale de l'Irrigation dans la région des Doukkala (Maroc occidental) : Impact des changements climatique durant les trois dernières décennies
Namibia	HIWILEPO, Penny	Kinetics of thermal degradation of vitamin C in marula fruit <i>Sclerocarya birrea</i> subsp. <i>caffar</i>
Nicaragua	CALDERON PALMA, Heyddy	Stream-aquifer interactions in dipping and fractured sedimentary rocks
	RUIZ, Javier (Renewal grant)	Effects of multiple scales biological interactions on plant recruitment and tree diversity in tropical rainforests
Nigeria	ADEYEMO, Olanike Kudirat	Tetracycline residue in feral and cultured fish and their products in Nigeria
	ARIMORO, Francis Ofurum	Towards the development of bioassessment protocols for Nigerian streams
	KAZEEM, Shakiru Adewale	Evaluation of resistance to ratoon stunting disease in sugarcane grown in different agroecological zones of Nigeria
	OKORO, Elizabeth Ifeyinwa (Renewal grant)	Groundwater potentials and sustainability in the salt and lead-zinc mineralised areas of Okposi and Uburu, Nigeria
Pakistan	HASSAN, Muhammad Nadeem	Biocontrol of <i>Macrophomina phaseolina</i> causing charcoal rot in oil seed crops by using plant growth promoting rhizobacteria (PGPR)
	NAIM, Asma	Virulence factors profile of Shiga toxin-producing <i>E. coli</i> isolates from food and drinking water samples
Papua New Guinea	SAM, Legi	Responses of butterfly communities to rainforest succession along an altitudinal gradient in Papua New Guinea
Philippines	AGUSTIN, Melissa	Isolation and characterisation of cellulose nanocrystals from agricultural residues for bionanocomposite preparation
Senegal	DIENG, Ndeye Maguette	Analyse et évaluation de la dégradation des zones humides, des sols et de la mangrove dans le delta du Saloum par approche géomatique: Impacts potentiels des changements climatiques
South Africa	DALTON, Desiré Lee (Renewal grant)	Identification of markers for the discrimination of hybrid wildebeest
	EDWARDS, Shelley	Patterns and processes of adaptation in lacertid lizards to environments in Southern Africa
	HASSEN, Abubeker	Supplementation of adapted fodder trees and shrub leaves in combination with non-protein nitrogen to improve low quality forage utilisation by goats in South Africa
	KONDIAH, Kulsum	Bioprospecting acid mine drainage in South Africa for applications in biotechnology
	MAKGAHLELA, Mahlako Linah	Application of genomic evaluation in the South African Holstein cattle population
	MAVUNGANIDZE, Zira (Renewal grant)	Weed dynamics and management in a cotton, cereal and legume based farming system under conservation agriculture in smallholder sector

	OKANGA, Sharon Margaret	Parasites of South African birds: Influence of host community, urbanisation and pollution on avian parasite ecology
	SWANEPOEL, Lourens Hendrik	The conservation of leopards (<i>Panthera pardus</i>) through sustainable utilisation in the Waterberg Biosphere, Limpopo, South Africa
	VISSER, Carina	Increasing genetic progress in South African Angora goats through improved pedigree integrity
Tanzania	HELLAR, Harieth	Pesticide residue analysis in water and bottom sediments of the Pangani river basin, Tanzania
	INNOCENT, Ester	Phytochemical studies of mosquito larvicidal compounds from ethanol extracts of four Kotschya species
Thailand	AMNUAYKANJANASIN, Alongkorn	Determination of potential role of reducing clade III PKS gene in the entomopathogenic fungus <i>Beauveria bassiana</i> on pathogenesis against insect pests
	JIAMYANGYUEN, Sudarat	Effect of germination on the levels of antioxidants, certain micronutrient, and acceptability of germinated colored rice
	KLOMKLAO, Sappasith (Renewal grant)	Proteinase inhibitor from adzuki bean seeds: extraction and inhibitory effect on modori inducing proteinases
	PHUTDHAWONG, Weerachai (Renewal grant)	Utilisation of palm oil mill wastes in the production of natural rubber antioxidant
	SAKSMERPROME, Vanvimon	Production and delivery of double-stranded RNA to control yellow-head virus disease in shrimp
	VISUDTIPHOLE, Virak	Characterisation of genes and proteins related to Ca2+ homeostasis and stress in the black tiger shrimp (<i>Penaeus monodon</i>)
Togo	ADJOSSOU, Kossi (Renewal grant)	Biodiversité, fragmentation et dynamique spatio-temporelle dans les forêts tropicales humides du Togo
	DOURMA, Marra (Renewal grant)	Contribution a la gestion des forets claires à <i>Isoberlinia</i> spp. du domaine guinéen au Togo diversité, écologie et structure
Tunisia	ARFAOUI, Arbia	The utilisation of actinomycetes as biological control against two bee pathogens: <i>Paenibacillus larvae</i> , the causative agent of American foulbrood and <i>Ascosphaera apis</i> , the causative agent of chalkbrood
	KHELIFI, Olfa	Biological decolorisation of textile wastewater in bioaugmented membrane bioreactor
Uganda	BABAASA, Dennis	Ecological and anthropogenic influences on habitat suitability for the mountain gorilla in Bwindi Impenetrable National Park, Uganda
	MAPHOSA, Mcebisi	Enhancing durable resistance to soybean rust disease
	MUZIRA, Robert	Linking potato health to soil health through integrated soil fertility management
	OTUKEI, John Richard	Image objects and tree models: A potential for mapping and monitoring the protected habitats of the Bwindi National Park
	TEMBO, Langa	Linkage of molecular markers for resistance to ear rots (Stenocarpella maydis and Fusarium moniliforme) in tropical maize
Viet Nam	MAI, Thanh Van	Balancing economic development, local livelihoods and conservation goals through sustainable tourism in the Cat Ba Biosphere Reserve, Vietnam
	NGUYEN, Quang Huy	Study on microorganisms degradation of poly(L-lactide) in Vietnam
	NGUYEN, Thi Van Anh	Development of streptavidin-biotin based Bacillus spore: a novel tool for diagnostics and drug delivery
Zimbabwe	GASURA, Edmore	Developing selection criteria for improving the yield of early maturity maize genotypes in Zimbabwe
	MAHAMADI, Courtie (Renewal grant)	Batch and continuous flow sorption of heavy metals from aquatic systems by water hyacinth weed (<i>Eichhornia crassipes</i>)
	MUKANGANYAMA, Stanley (Renewal grant)	Screening natural plant products from selected plants from Zimbabwe as a source of anti-infective compounds for phytomedicines development

APPENDIX 3

Summary of

IFS Strategy 2011 – 2020

WORKING • TOGETHER

A mighty challenge

The UN General Assembly, 2010 High-level Plenary Meeting committed to an action agenda for achieving the MDG, including accelerating progress in order to achieve Millennium Development Goal 1 – the eradication of extreme poverty and hunger. This is a mighty challenge that now confronts humanity and one which also directly impacts the achievement of all the MDG.

Three key priority areas within the action agenda, drawn up by 192 Heads of State and Government relate very directly to the mandate of IFS and underscore its contemporary relevance. These are:

• The strategic role of science and technology promoted, including information technology and innovation in areas relevant for the achievement of the MDG, in particular agricultural productivity, water management and sanitation, energy security and public health.

- The capacity for technological innovation in developing countries greatly enhanced through strengthened national innovation, research and development capacity, and facilitating the availability of environmentally sound technologies and corresponding know-how by promoting the development and dissemination of appropriate, affordable and sustainable technology; and
- Opportunities for young people improved through the creation of enabling environments including to address the special needs of least developed countries.

Improving agricultural yields and adressing issues impacting on available land are two important roles for developing country research



Interlinked crises, entitlements and climate change We live today in a world that faces many interlinked crises. The challenge before us is not only to provide sufficient food, water and energy (to a population that will peak at around 9 billion people by 2050) but also to ensure security of supply, at affordable cost and within acceptable limits of environmental change.

Regarding food – Millennium Development Target 1c is to halve, between 1990 and 2015, the proportion of people who suffer from hunger. However, progress to end hunger has been stymied in most regions. Despite some progress, one in four children in the developing world is still underweight, children in rural areas are nearly twice as likely to be underweight as those in urban areas and of course, the prevalence of underweight children is dramatically higher among the poor. For those who survive, their susceptibility to chronic diseases, such as heart disease, type 2 diabetes, high blood pressure and cancer later in life is also increased.

Developing country research in this context could include:

- Improving agricultural yields. (In many countries, available farm *land is exhausted*. The current *slow growth in yields* of staple plant crops is well below the *growth of population* and the additional yield required by the *rising demand for meat*).
- Addressing issues that impact available land. (Informing, through evidence, government policies around cropping, biofuels and so-called 'land grabbing').
- Assessing options and efficiency of fertilisation. (The financial cost of bringing concentrated nitrogen and phosphorus into soils rises with the oil price – which, due to demand and conflict is now at record levels; the cost of fertiliser peaked even more dramatically than food prices in 2007-8).
- Addressing issues that impact availability and quality of foodstuffs. (Today, food prices have reached record levels, whilst supply and contamination radically impact globalizing food chains).
- Addressing post-harvest losses. (In both rich and poor countries, a staggering 30-50% of all food produced is never consumed. In the rich, due to habit and law; in the poor, due to pests and spoilage).

Regarding water – Millennium Development Target 7c is to halve, by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation, however, the world is increasingly constrained by the availability and quality of water.



Halving the proportion of people who suffer from hunger by 2015 is a MDG that requires increased efforts to build scientific and technological capabilities in the poorest countries and to direct research and development efforts towards specific challenges facing the poor such as the need for improved agricultural production.

40



It is a priority for IFS to support women within developing world science, and to enrich the scientific enterprise with the added diverse themes and perspectives that can be derived from a more balanced gender representation within science.

Developing country research in this context could include:

- Identifying innovative and targeted efforts to bring safe drinking water to rural households (whilst the world is on track to meet the drinking water target, much still remains to be done in some regions).
- Identifying improvements in sanitation without bypassing the poor (with half the population of developing regions without sanitation, the 2015 target appears critical).
- Investigating efficient and multiple use of water (70% of our water use is for irrigation, and there is increasing competition from fast growing cities. *Water tables are plummeting*; the waters that irrigate the world's bread and rice, such as the Colorado, Murray-Darling and Indus *rivers no longer reach the sea*, whilst others like the Mekong, the centre of rice production in Vietnam which is the second largest exporter of rice to the world, have deltas that are becoming increasingly saline).

Regarding energy – The World Energy Council in 2007 estimated that global energy use was increasing by about 2% per year. According to the International Energy Agency (IEA), notwithstanding the financial and economic crisis, world primary energy demand is expected to be 36% higher in 2035 than 2008. Non-OECD countries, led by China (where energy use is expected to surge by 75%) and India, are expected to account for 93% of this increase, with their share rising from 52% to 63%. During this period, global demand for electricity is projected to also grow by 76%.

Also in the energy demand picture is the need for energy to supply water; it is estimated that pumping systems account for 20% of world's electrical demand.

Developing country research in this context could include:

• Investigating greater energy efficiency and alternative energy sources. (The world's people would be healthier and its climate less prone to change if it used a lot less coal; that requires greater energy efficiency, and other energy options). Improving renewable power and its role in greater energy security. (Whilst IFS is less likely to be called upon to support research investigating better grids, carbon capture technology or the direct consequences of the Fukushima Dai-ichi nuclear plant damage following the 2011 tsunami, it may play a role, for example, in off-grid supplies such as micro- and pico-hydro solutions, which are often small-scale and village-based approaches where small research programmes have a role to play).

In addition, overlaying all of the issues outlined above are two further fundamentals:

Securing entitlements – It is not enough to increase availability of food, water and energy. Starvation, as well as water and energy deprivation is not addressed by increasing availability alone, but by securing entitlements to food, water and energy for 9 billion people.

Developing country research in this context could include:

- Characterizing legal, political and economic entitlement arrangements within a social structure.
- Understanding formal ownership rights and informally accepted legitimacy.
- Policy impacts on the entitlements of different social groups to the means of subsistence (see for example cropping, biofuels and so-called land grabbing, under 'Regarding food').

The spectre of climate change – To put this threat into perspective, in 2010 the UN Environment Programme estimated that for the world to have a reasonable chance of limiting global warming to less than 2°C, and thus avoiding the more apocalyptic globally destructive scenarios, carbon dioxide emissions should be reduced to 44 billion tonnes by 2020. With business as usual, emissions would be between 54 billion and 60 billion tonnes. If countries take the most ambitious of the courses of action that they have outlined to the UN, the figure still only comes down to about 49 billion tonnes.

Developing country research in this context could include:

- Characterising local climate change impacts from weather-related disasters, sea-level rise, and reduced agricultural productivity.
- Developing cost-effective, practical, actionable recommendations to assist climate adaptation.
- Gender analysis to improve development and delivery of *relevant and responsive adaptation* programmes.

 Identifying innovative and targeted efforts to bring safe

Identifying innovative and targeted efforts to bring safe drinking water to rural households and improving sanitation without bypassing people who are poor are vital research and development agendas.

 How to link indigenous based climate change adaptation knowledge and contemporary scientific strategies.

The topics above *do not* prescribe what recipients of IFS grants should research; they serve only to characterise some of the mighty challenges that exist. In the past 40 years, scientists, planners, farmers and funders enabled an increase in world food supply of 150%. In the coming 40 years, the challenge is to increase food supply by 70%. Yet this challenge is more complex, and inter-related with the crises in water and energy, conservation and biodiversity loss and a changing climate.

In this context, the original need identified for IFS remains crucial today, that 'Scientific research provides an important input for sustainable management of biological and water resources. Scientific knowledge is central for rural, urban, industrial, and policy development, which will lead to improvement of people's livelihoods'.

The most recent independent review of IFS acknowledged its bespoke support, as an unparalleled global network of researchers, technical advisers and partnerships in developing countries dedicated to building the capability of young developing country scientists. It represents an important mechanism for science academies and development organisations to contribute to international research development cooperation, the key objectives of which are to support excellent science and equitable and sustainable development towards the attainment of the MDG. 42

The International Foundation for Science Contribution

The original concept

One of the principal recommendations of the Pugwash Conference in Venice¹ in 1965 was to establish the *International Foundation for Science* 'in order to address the stultifying conditions under which younger faculty members in the universities of developing countries were attempting to do research'². The original concept proposed that 'individual grants to developing country scientists will greatly enhance opportunities for original research and scientific growth' and the concept has been strongly endorsed by every subsequent independent review of the organisation.

Whilst small grant schemes are notoriously expensive to administer compared to larger scale projects, they play a special and vital role in the early career path of scientists. Applications have always been rigorously assessed by international specialists, with detailed feedback to all applicants. The provision of grants has been complemented by capability enhancing support. This has included equipment purchasing support and thematic workshops, commonly with partner organisations, such as Proposal Writing, Science Writing and Science Communication, and travel grants to share research results.

Between 2006 and 2010 IFS organised 127 thematic and research skills capability building events in collaboration with its partner organisations, with 3,154 participants in over 30 countries. In the period 1974-2010, IFS has awarded 6,835 small grants, in 102 countries; 17,500 scientists in the developing world have benefited from scientific counselling, and more than 65,000 from using equipment purchased by IFS.

Nearly forty years on, the International Foundation for Science is seeking to renew cooperative solutions around today's global problems, and to contribute to building in the developing world the potential of science to address the mighty challenges that now confront humanity.

Listening and reflecting ahead of making change A global conversation amongst IFS stakeholders lasting four months engaged with 4,400 people in different ways. Colleagues that provided inputs into the discussions about the future IFS strategy included potential,



For almost forty years, IFS has contributed to building the potential of science in the developing world to address the mighty challenges that now confront humanity.

successful, as well as failed IFS applicants, active and former grantees, advisers and scientific specialists, as well as academics and educationists – some of whom were not earlier connected to IFS, and representatives of donors, partner organisations, government officials and others. The envisioning process began with scientists from the developed and developing world hosted by Norad together with IFS at a seminar considering the merits of 'Science for Science and/or for Social Relevance: Is there a Contradiction?' in Oslo in 2010.

During the process Regional Consultation Meetings were hosted in Latin America in Merida, Mexico, Asia Pacific in Bangkok, Thailand and Africa in Kampala, Uganda. Sessions also took place at scheduled meetings across Africa and Asia. A digital questionnaire survey was sent out to 20,000 IFS stakeholders, and to which over 4,000 persons responded.

A key emphasis of the envisioning process was on proposed new elements that have been suggested for the future programme, building on the recommendations of four external evaluations of IFS including the latest (2010) and the vision statement of the new director.

With support from Norad, and in association with the Regional Universities Forum for Capacity Building in Agriculture (RUFORUM), IFS investigated the specific regional needs with regard to empowering African women scientists, mechanisms IFS could use to promote empowerment of women scientists, and value which might be added to associated on-going regional initiatives and strategies.

¹ The Nobel Prize winning conference series of scientists meeting in private as individuals, rather than as representatives of governments or institutions seeks cooperative solutions for global problems.

² The idea was refined at the Pugwash Conference in Sochi in 1969, Sven Brohult, president of the Royal Swedish Academy of Engineering Sciences became an enthusiastic convert to the idea and a persuasive strong-willed soul of the enterprise. Backed by 16 national academies of science the International Foundation for Science was established in Stockholm in 1972.

A revised mission

Given the world's commitment to accelerating progress in order to achieve the eradication of extreme poverty and hunger, the crises in food, water and energy that confront humanity today, and the spectre of climate change, biodiversity loss and environmental degradation, planners and funders have to invest in the potential of science to dramatically transform the legacy left by the poor recent stewardship of the world's biological and water resources. In this context, it is more crucial now, than ever before that the International Foundation for Science plays its role in granting and building the capability of those embarking on a research career. The scientists of tomorrow must contribute to securing affordable food, water and energy to a rising population, where their scope for action is constrained by the urgent challenge of environmental sustainability.

In order to adequately respond to this challenge, the new strategy 'Working Together' is built around a revised mission:

'To contribute towards strengthening the capability of young men and women scientists in developing countries to conduct relevant and high quality research and their individual agency to put it into use'. In maintaining the original objective of supporting science in ways that promote a decline in the 'brain drain', whereby talented scientists are distracted away from the developing world and the problems extant there, the revised mission also aims to reflect today's changing circumstances and opportunities, especially the role that science plays in society today, and the ways in which science and development landscapes are navigated and linked. In this regard, IFS attaches particular importance to the transformational nature of emerging Information and Communication Technologies for bringing early career developing country scientists into the global research community.

A major change in our agenda is therefore not only to strengthen the *capability* of those embarking on a research career in the developing world, but also to support young scientists in their actions to bring about change, in terms of their values and objectives and to put their science into use. Capability in this context denotes a scientist's opportunity and ability to generate valuable research outcomes. Agency in this context is what a scientist is able to do and to achieve in applying his/her research in pursuit of whatever goals or values he or she regards as important³.





3 The use of the term agency here is best understood via Amartya Sen's description of an agent, defining an agent as someone who acts and brings about change, whose achievement can be evaluated in terms of his or her own values and objectives. This differs from the more common use of the expression "agent" sometimes used in the literature of economics and game theory to signify a person who is acting on someone else's behalf. An important argument for focusing on the individual agency of developing country scientists is the role that such agency can play in removing inequality in the respect and regard accorded to such scientists. IFS believes that respect and regard is strongly influenced not only by publishing, but also by participating in decisions on policy and influencing the understanding, processes, products and services that derive from scientific enquiry.

Our approach

In the next decade we aim to support excellent individual and collaborative research, to build capability of early career scientists in the developing world, and to contribute innovation to sustainable management of biological and water resources. In particular, IFS wants to enable those scientists to contribute to a global research community that is reducing poverty and supporting sustainable development.

To deliver the IFS mission, we will provide three distinct strands of support: (i) grants and capability enhancing support early in the research career of individual scientists from least developed countries; (ii) grants and capability enhancing support for collaborative research; and (iii) support to contribute innovation and to put research into use (see Figure 1).

Programme 1: Individual research

Throughout the coming decade the primary focus will be the **promotion of excellent science through early career research grants and capability enhancing support to researchers in developing countries.** The rigorous assessment by Specialists will continue to provide international recognition to successful applicants and enhance opportunities for original research and scientific growth.

IFS believes that science holds the potential to transform the contemporary global challenge, not only to provide sufficient food, water and energy but also to ensure security of supply, at affordable cost and within acceptable limits of environmental change. IFS is aware that starvation, as well as water and energy deprivation is not addressed by increasing availability alone, but by securing entitlement to those commodities for 9 billion people. In the face of such a task there is a vital and powerful role for many creative, analytical minds across a broad array of research fields.

IFS recognises that the sustainable and equitable stewardship of global resources and the provision of services from them will draw on many technical and social

Specific Objective # 1:

Capability of young developing country scientists built to produce new research findings, relevant to developing countries and of assured quality according to current academic principles

Research capability built A body of quality scientific research delivered A 'multiplier effect' that impacts more young scientists than just IFS grantees

• • •

Specific Objective # 2:

Capability of researchers from developing countries to access collaborative research networks promoted, including links to the international research community

Interdisciplinary collaborative research that tackles development issues Collaborative research links between scientists in the developed and the developing world built

• • •

Specific Objective # 3:

The use of research in developing countries promoted and the demand for research increased

Scientific research findings made accessible to users, entrepreneurs and policy and decision makers Improved knowledge and networks leads to the

production of more research results that are applicable, user-relevant and policy-relevant

•

fields of research, relating to: agriculture, energy, fisheries, food security, forestry, health and nutrition, natural products, water and sanitation. However, IFS believes it is vital that young researchers have the opportunity to propose research which they identify can address problems in their country of origin, relevant to the needs of the country, supported through a demand-led, long-term, predictable research granting and capability enhancing support programme across a broad spectrum of biological and water resources.



IFS believes that through interdisciplinary **collaborative research**, early career scientists can learn new insights from each other, can develop new skills and gain access to different funding sources.

Photo: Petronella Nva

Programme 2: Collaborative research

IFS has recognised the importance of support to individual researchers for nearly four decades and will continue to provide renewable individual grants. However, the interlinked development challenges that face humanity increasingly require scientists to work with each other, uniting different disciplines, different countries and regions, as well as to work with other professions and specialists. Therefore, through the phased introduction of a new programme IFS will also support researchers to combine strengths, expertise, and experience, to address a larger topic or a research issue where more than one discipline is required. IFS believes that through interdisciplinary collaborative research, early career scientists can learn new insights from each other, can develop new skills and gain access to different funding sources. Through support and mentoring we aim to reduce possible barriers including: difficulties in finding appropriate working partners, reaching consensus and team building, clarification of intellectual property rights, ownership of data, credit for work, differences (amongst disciplines) in the nature and scope of knowledge, different methodologies or analytical frameworks, inaccurate preconceptions about other disciplines, or difficulty in learning the 'languages' of other disciplines.

Collaborative research could be across departments in a single institution (e.g. nutritionists, social economists, technical specialists – able to take an holistic approach and tackle a bigger development problem than any may tackle alone), across a country (e.g. where a common issue such as cyanide toxicity of tube well water might be spatially investigated), or across regions (e.g. where climate change resilience being investigated amongst communities in similarly affected places might be shared and compared).

We see a vital role for IFS as a platform for linking early career scientists from developed and developing countries in research collaboration.

Programme 3: Contributing innovation

IFS operates at the interface of science and sustainable development. We contribute to, and are supported by,

science academies and development organisations. IFS believes that science holds the potential to transform the contemporary global challenge and it can provide the evidence for policy change and the basis for international development impact.

Recognising that research products are just a starting point in the broader process of **putting research into use and enabling innovation**, there are two key challenges to be addressed in this context. The first is to begin to build capabilities such as understanding of the political and incentive context for the uptake of research by entrepreneurs, industry, and medicine, and in policy and decision-making. Related to this, on a very practical level is capability in Science communication for impact, through support in science writing as well as media development (drama, film, mobile phone and internet, web 2.0 applications) to influence policy and practice.

The second challenge is building links and brokering networks and alliances that support demand for and use of research. This will include working with partners towards establishing more supportive policy and institutional environments that can create effective demand for appropriate research products, and building links to society at large, and the business community, including networks, science fairs and conferences.

A graduation strategy from IFS support will necessarily involve building collaborative links amongst the IFS research community and linking successful grantees with other research programmes so that, promising young scientists are facilitated to bring their skills into larger arenas of opportunity (i.e. EU frameworks, GEF, CGIAR, AU/NEPAD plans for science and technology, or bilateral grant provision e.g. BioInnovate Africa).

Priority and eligibility for IFS support

Country eligibility

We live in a complex world of both unprecedented opulence and remarkable deprivation, and the development priorities of IFS go beyond economic developments alone to include the processes for: overcoming poverty, hunger and all forms of malnutrition, the sustainable management of resources, improving living conditions, expanding the interests and individual agency of people in least developed countries, the human rights of those who suffer deprivation, especially women, and of expanding freedoms as the primary end and principal means of development.



Figure 2: The relationship between strategic planning, performance measurement and Results-Based Management at IFS

IFS aims to provide research grants, build capability in scientific research and individual agency in science and technology innovation in the service of expanding freedoms, and seek to preferentially support countries with weak and volatile scientific infrastructure.

Therefore, applications for individual IFS grant support (Programme 1) will be selected on merit, but are only eligible for consideration if they come from developing country scientists who are attached to institutions with a reasonable academic environment in the world's Least Developed Countries (LDC). Persons from countries with a GNI per capita, Atlas method (current USS) at or below the average for Middle Income Countries (MIC) will be considered eligible for Programme 1 support and as principal investigators within Programme 2.

In order for scientists from countries with weak and volatile scientific infrastructure to work together with scientists from other countries (which have reached the threshold in national development that graduates them from IFS eligibility for Programme 1), country eligibility for Programmes 2 and 3 will be unrestricted, provided that principal investigators are from countries at or below the average for MIC, and that MIC are always beneficiaries. Therefore Collaborative Research (Programme 2) will be led by researchers from countries where GNI/capita is equal to or below the average for MIC countries but may include scientists from other countries. For Contributing Innovation (Programme 3), networks and partnerships will be considered based on the benefit they bring to scientists from countries where GNI/capita is equal to or below the average for MIC countries.



Improving renewable power sources and their role in greater energy security, especially small-scale village-based systems could be important IFS research agendas.

IFS has significant experience of brokering research links between scientists in the developing and developed world. Expanding and supporting productive links between young researchers from countries with different levels of economic development will be a priority of Programmes 2 and 3.

IFS also has a large alumni constituency that are often strategically placed in scientific and policy positions, in many countries with less developed neighbours, but that themselves are above the average for MIC countries. Experience has shown they can play an important role in helping IFS to reach early career scientists of less developed neighbours. Alumni can also play a major role in collaborative research and in contributing innovation.

Gender balance and ways of empowering women scientists

It is a priority for IFS to support women within developing world science, especially African research, and to enrich the scientific enterprise with the added diverse themes and perspectives that can be derived from a more balanced gender representation within science.

Global statistics indicate that women are not only unequally represented in science but also less likely than men to be involved in the planning, research, development or application of science. The underrepresentation of senior women scientists limits the role models, mentors and professional networks available to girls.

The priority and the approach to empowering women in science builds on learning from the 2009 IFS



One example of relevant developing country research is the investigation of efficient and multiple use of water from rivers such as the Mekong in Vietnam, so important for agriculture and food production, yet becoming increasingly saline.

initiative 'Developing Africa through Science, Technology, and Innovation in Agriculture: Women as key drivers', undertaken with the Technical Centre for Agricultural and Rural Cooperation (CTA) and RUFORUM, and from the IFS contribution to the CGIAR project 'African Women in Agricultural Research and Development' (AWARD). The approach aligns with the Norwegian Committee for Mainstreaming Women in Science, and contributes to the global agenda for gender equality and women's empowerment implied by MDG 3. The focus on Africa reflects the identified needs, that are found to be most prevalent in Sub-Saharan Africa and supports the African Union declaration of 2010-2020 as the African Women's Decade, which includes a thematic focus on the promotion of women in science and technology.

To strive for gender equity in science is not only an international obligation, but a wise approach to science management and governance. IFS believes that mainstreaming a gender perspective in Science, Technology and Innovation (STI) could enrich innovative problem-solving and decision-making, enhance social equity, women's rights and contribute to a more effective achievement of the Millennium Development Goals and the attainment of sustainable development.

Age eligibility criteria in IFS programmes

IFS will continue to target its support to those at the beginning of their research careers through early career research grants and capability enhancing support to researchers in developing countries. Based on the recommendations of its recent independent review and the results of consultations with many stakeholders across the regions, IFS will adjust its age eligibility criteria to better reflect the changing gender disaggregated regional research demographics (see Table 1).

These age eligibility criteria relate to first time applicants. There is no age limit for renewal applicants.

IFS will pilot Programme 2: Collaborative Research early within the ten-year strategy. The aim of this pilot will be to understand how IFS can best enhance the capability of young researchers to learn "how to conduct collaborative research". The age limit in Table 1 refers to the age of the principal investigator. As the programme develops, different models of collaborative research may be applied and different age criteria may be used. Whilst supporting several ways of conducting collaborations, calls for collaborative research will sometimes target researchers by gender, region, nationality or thematic area.

Monitoring, Evaluating, Learning and Planning at IFS

IFS recognises that effective management and monitoring requires sound and authoritative data and clear results chains and causal relationships linking activity, output and outcome.

AGREE RESULTS AREAS

- Define the scope of the work of IFS in a Logic Model as a series of concisely prescribed Results Areas.
- Identify SMART indicators for each Results Area to measure process, outcomes and impacts.
- Agree a Work Breakdown Structure where all activities contribute to one or more Results Areas

MONITOR, EVALUATE

- Monitor indicators to capture anticipated changes.
- Capture unanticipated changes through Most Significant Changes experienced by grantees.
- Evaluate progress against Results Areas and other outcomes and impacts.

LEARN AND PLAN

- Use Monitoring and Evaluation data to identify learning through a routine Structured Learning and Planning Event (every other year) as a Secretariat *retreat* or *in-week* and share the process and learning with grantees, alumni, SACs, donors and others.
- Use learning to review/amend Results Areas and/or indicators to revise the Work Breakdown Structure.

Figure 3: The integration of monitoring, evaluation, learning and planning at IFS

IFS Programme	Upper age limit of first time applicants	
	Men	Women
1 - Individual Grants	35	40
2 - Collaborative Grants	35	40
3 - Contributing Innovation	35	40

Table 1: Age eligibility in IFS programmes (all eligible countries)

Integration of planning, measurement and management

Strategic planning, performance measurement and Results-Based Management are integrated at IFS (see Figure 2) to support flexible and responsive management and accountability to all stakeholders including donors. IFS introduced the **Monitoring and Evaluation System for Impact Assessment** (MESIA) in 2000 to analyse data on grantees work. MESIA reports provide a long term oversight of the impact of IFS support. In 2010, staff received training in **Results-Based Management** (RBM). IFS will introduce RBM to deal with analytical issues of attributing impacts and aggregating results, to ensure a distinct yet complementary role for evaluation, and to establish organisational incentives and processes that will stimulate the use of performance information in management decision-making.

In 2012 IFS will introduce the 'routinised', nonindicator based system of reporting by grantees and recipients of capability enhancing support that is complementary to the RBM logic model approach, to capture unanticipated changes, through **Most Significant Change** (MSC) reporting.

Beginning in 2012, and every second year of the ten year time horizon of the strategy, IFS action plans will be drawn from the rolling monitoring, evaluation, learning and planning process shown in Figure 3.

IFS mission statement

The need

Scientific research provides an important input for sustainable management of biological and water resources. Scientific knowledge is central for rural, urban, industrial, and policy development, which will lead to improvement of people's livelihoods.

The mission

IFS shall contribute towards strengthening the capacity of developing countries to conduct relevant and high quality research on the sustainable management of biological and water resources. This will involve the study of physical, chemical, and biological processes, as well as relevant social and economic aspects, important in the conservation, production, and renewable utilisation of the natural resources base.

The strategy

IFS shall identify, through a careful selection process, promising young scientists from developing countries with potential to become future lead scientists and science leaders. They will receive support in their early careers to pursue high quality research in developing countries on problems relevant to the mission, which will help them to become established and recognised nationally and internationally. Additional supporting services will be provided to researchers in scientifically vulnerable institutions and countries.

IFS shall act in collaboration with Affiliated Organisations and other national, regional, and international institutions utilising the complementary strengths of such partnerships.

Supporting young researchers in developing countries

The International Foundation for Science (IFS) supports scientific capacity building in developing countries. It gives research grants and supporting services to young scientists at the beginning of their research careers.

IFS was established as a non-governmental organisation in 1972, is presently funded by more than 15 donor organisations and has provided over 7,000 grants to researchers in 100 countries.



INTERNATIONAL FOUNDATION FOR SCIENCE

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